1. Sepsis

MOLECULAR MEDIATORS AND ARDS IN SEPTICEMIA.

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Objectives: Evaluate the levels of TNF, IL-6 and PAI-1 in different moments of the ARDS and the possible relationships among them.
Methods: 23 septic patients with ARDS were studied. Also, 30 non complicated septic patients and 30 healthy volonteers.
Results:

	TNF	IL-6	PAI-1
HEALTH	2,59±0,53	12,91±2,69	9,06±1,16
SEPTIC	44,25±10,1	242,27±79,95	18,73±1,58
ARDS(1)	46,82±12,0	1361±398,87	18,08±1,93
ARDS(2)	46,11±15,8	1860±679,36	27,30±1,81

Significant differences for: TNF, PAI-1 and IL-6 in septic patients and both evaluations of ARDS witn control gropup; PAI-1 between septics and 2nd evaluation in ARDS, and between the 1st and 2nd evaluation in ARDS; IL-6 between septics and both evaluations in ARDS; and IL-6 in both evaluations in ARDS patients in relation to mortality.
Conclusions: 1) Elevations of TNF, PAI-1 and IL-6, with clinical signs, are suggestive of infection; 2) The persistent and progressive elevation of PAI-1 with any clinical criteria may suggest evolution to ARDS; 3) Due to its own kynetics, IL-6 takes part later in the acute phase, its levels being related to the magnitude of the injury in the tissues.

INFLUENCE OF DIFFERENT VOLUME THERAPY ON CIRCULATING SOLUBLE ADHESION MOLECULES IN THE CRITICALLY ILL

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Objectives: The influence of long-term volume therapy with different solutions on plasma levels of circulating adhesion molecules was studied.
Methods: According to a randomized sequence, 30 patients with sepsis secondary to major surgery exclusively received either hydroxyethylstarch solution (10% *HES*, mean molecular weight (Mw) 200,000 daltons, degree of substitution (DS) 0.5) or human albumin 20% (*HA*) for volume therapy for 5 days. Plasma levels of circulating (soluble) adhesion molecules (endothelial leukocyte adhesion molecule-1 [*s*ELAM-1], intercellular adhesion molecule-1 [*s*ICAM-1], vascular cell adhesion molecule-1 [*s*VCAM-1], and P-selectin [*s*GMP-140]) were serially measured on the day of admission to the intensive care unit (='baseline' value) and during the next 5 days.
Results: sELAM-1, sICAM-1, and sVCAM-1 plasma levels were markedly higher than normal at baseline in both groups. In the HES-patients, sELAM-1 decreased to normal range, whereas it further increased in the HA-group (from 89±17 to 106±21ng/ml). During the study period, sICAM-1 and sVCAM-1 plasma levels remained unchanged in the HES-patients, but further increased in the HA-group (from 626±98 to 1,329±143ng/ml). sGMP-140 increased significatly only in the HA-group (483±103 to 683±94ng/ml). Only PaO_2/FIO_2 was significantly correlated to plasma levels of adhesion molecules.
Conclusions: Sepsis is associated with markedly elevated plasma levels of adhesion molecules indicating endothelial activation or damage. By long-term volume therapy with HES, these levels remained unchanged or even decreased, whereas volume therapy with human albumin did not have any beneficial effects on soluble adhesion.

EFFERENT METHODS IN THE MANAGEMENT OF THE PATIENTS WITH SEPTIC SHOCK.

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Objectives: Among different types of shock the septic shock occupies the fourth place in its incidence bat the first place in lethality. The usage of antibacterial remedies has not reduced the lethality in septic shock. The efferent methods of management (dialysis, sorptional, gravisurgical detoxication) assume ever greater importance in the fight against shock.
Methods: 46 patients were treated. Control group included 16 patients. The choice of the method in the management depended on the integral index and the polypeptide of the medium-molecular mass, estimated in the blood serum and on the surface of the erythrocytes in urine. If the pool of the polypeptide was higher in blood serum the plasmapheresis and plasmosorption were done but we prefered hemosorption if the pool was higher on the surface of the erythrocytes. In case of the edematous syndrome development on the background of the reduced excretory function of Kidneys the dialysis was necessary but the ultrafiltration in combination with hemosorption was done more frequently.
Results: The usage of the efferent methods of the treatment in different combination along with the traditional methods has allowed to reduce the lethality by 11%.
Conclusions: The positive effect in the usage of the efferent methods consists of the absence of absolute contraindications for the detoxication if these methods are used at the early stage and in combination with different technologies during management.

INCIDENCE OF SEPSIS DUE TO CENTRAL VENOUS CATHETERS

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Central venous catheters are frequently used in the care of the critically ill patient. The incidence of catheter related sepsis varies in the literature. We investigated the occurrence of contamination and sepsis compared to results of the EPIC study as part of quality assesment in our intensive care unit.

From january until august 1994 all removed central venous catheters were examined for microbiological culture. The patients who showed signs of sepsis were also registered. The results of the contaminated catheters and septic patients were compared with results from the EPIC study.

During the 8 month period ,2059 patients were hospitalized on our intensive care unit. 230 Central venous catheters were examined for microbiological culture. 118 specimens appeared to be possitive (51%). 13 patients showed clinical signs of sepsis. The incidence of sepsis due to contaminated central venous catheters was 13/118 (11%). The incidence of sepsis due to the presence of all central venous lines was 13/230 (6%). The microorganisms responsible for the sepsis syndrom were : Stapylococcus aureus (n=5), Escherichia coli (n=7), others (n=6). In the EPIC study the percentage for sepsis on the ICU was 17.6% for the Netherlands and 17.8% for Europe.

Despite a high number of positive culture from removed intravascular lines, a low percentage of sepsis was seen compared to results of the EPIC study. We recommend routine bacteriological culture of all removed central venous lines and recommend to look at colonization and sepsis due to intravascular lines as a measure of quality control in the intensive care unit.

CONTINUOUS VENO-VENOUS HEMOFILTRATION (CVVH) IN PATIENTS WITH SEPTIC SHOCK: EFFECT ON CARDIAC OUTPUT AND RIGHT VENTRICULAR EJECTION FRACTION (RVEF).

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Objectives: To determine whether the application of CVVH at zero fluid balance in patients with septic shock has a beneficial effect on CO and RVEF related to the elimination of cytokines.

Methods: We prospectively studied five adult patients with septic shock requiring hemodynamic monitoring and CVVH for renal failure and volume overload. After baseline hemodynamic evaluation (H0), patients underwent CVVH with an ultrafiltration rate of 1000 ml/h approximately. The ultrafiltrate was reinjected to the patient during the first hour, while it was was replaced by an equal volume of crystalloids during the next three hours. Therefore, hemodynamic changes (if any) after the first hour (H1) could be explained as the result of absorption of cytokines by the filtration membrane, while changes during the next three hours (H2, H3 and H4) should be considered as the effect of elimination of cytokines by ultrafiltration. Cardiac output (CO) and RVEF were evaluated by a modified fast response pulmonary artery catheter (Baxter Health Care Corporation). Changes in hemodynamic parameters were compared by one way analysis of variance.

Results: As indicated in the table below, no significant difference in CO, RVEF or any other hemodynamic parameter was observed.

	H0	H1	H2	H3	H4
CO	8.91±2.8	9.24±2.3	8.35±3.0	7.98±3.2	8.23±3.7
RVEF	41.4±6.5	42.2±6.3	38.2±9.5	36.0±6.4	35.0±9.9

Conclusions: Although cytokines absorption and/or elimination by CVVH is an attractive hypothesis, our preliminary data do not confirm a favourable effect of CVVH at zero fluid balance on right ventricular function in patients with septic shock.

CAN ANTIPYRETICS PROVOKE SEPTIC SHOCK IN FEBRILE PATIENTS WITH HEMATOLOGICAL MALIGNANCIES?

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Introduction: Antipyretics sometimes are used for fever control in febrile neutropenic patients with hematological malignancies(HM). We observed a dramatic fall of blood pressure(BP) and development of septic shock(SS) in some of the patients who received antipyretics. Aim: To clarify can antipyretics provoke SS in neutropenic patients with infection. Methods: Retrospective review of medical records of 52 neutropenic(WBC <0,5 10^9/l)patients with HM, admitted to the intensive care unit for SS, was performed. There was selected group of 8 patients receiving antipyretics shortly before a fall of BP. Results: There was a definite causal relationship between receiving antipyretics and fall of BP in 4 from 8 patients. All patients had fever due to infection and had normal level of BP before receiving antipyretics. Hypotension developed within 40 minutes up to 1,5 hours after administration of antipyretics. Three patients received 0,5 g of metamisol and one 0,5 g of paracetamol per os. In all cases we observed dramatic diaphoresis and the temperature fall to subnormal level (35.4±0.4°C) accompanied by hypotension. But in 8-12 hours the fever was coming back without blood pressure elevation. The fluid replacement was controlled by central venous or wedge pressures. There were required 1200±350 ml colloid and cristalloid solutions for volume loading. In spite of fluid administration the hypotension persisted and all patients required inotropic therapy. Only one patient survived and is alive now. Conclusion: It seems to us that our data offer to state that antipyretics administration can initiate SS in febrile neutropenic patients with infection.

SIMPLIFIED ACUTE PHYSIOLOGY SCORE IN GRANULOCYTOPENIC PATIENTS WITH SEPTIC SHOCK

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Objectives: Prognostic assessment of Simplified Acute Physiology Score (SAPS) in granulocytopenic patients with septic shock (SS). Methods: The medical records of 59 admissions to an intensive care unit (ICU) of granulocytopenic patients with SS are reviewed. Fifty-two patients had haematological malignancies. Seven patients had aplastic anaemia. Patients were categorised as survivors (discharged from ICU) and non-survivors (died in the ICU). SAPS index was calculated for patients daily during their stay in ICU . All patients were severe granulocytopenic (total white cell count less than 0,5 10^9/l).
Results: Five patients (8,5%) were discharged from ICU. Fifty-four patients died in ICU. Non-survivors had SAPS on admission higher than survivors (20.9±4.6 and 16.5±3.0, respectively, $p<0,01$, Mann-Whitney U test). No patient with a SAPS greater than 20 survived. Mortality among the 27 patients with SAPS from 9 to 20 was 81,5%. The evolution of SS was rapid. The mean stay in ICU among non-survivors was only 56 hours. An analysis of the SAPS index on admission of non-survivors showed an inverse correlation with the duration of their stay in ICU ($r=-0,52$, $P=0.001$). All survivors recovered from granulocytopenia. They had normal white cell counts at the time of discharge from ICU. There was inverse correlation in survivors between SAPS and white cell counts, when these parameters were evaluated daily. However, the SAPS index alone cannot be considered to be on individual predictor factor of mortality. Patients who had failure of the malignancy to respond to chemotherapy and who had persistent granulocytopenia died in ICU despite SAPS index on admission and recovery from SS.
Conclusion: SAPS index greater than 20, failure of the malignancy to respond to chemotherapy and persistent leucopenia all point to a poor outcome of granulocytopenic patients with SS.

CARDIAC OUTPUT MEASUREMENT BY AN ESOPHAGEAL DOPPLER MONITOR (ODM_{II}): AGREEMENT WITH OTHER METHODS USED IN ICU PATIENTS.

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Objectives: To assess the agreement between cardiac output (CO) measured by ODM_{II} and by 3 other methods used in ICU patients. **Methods:** We prospectively studied 12 adult patients requiring hemodynamic monitoring with a pulmonary artery catheter. An esophageal doppler monitor provided measurements of CO (ODM), stroke volume and flow time (FT) used as an indirect evaluation of patient's volume status. Patient hemodynamic status was evaluated by a modified fast response pulmonary artery catheter (Baxter Health Care Corporation, Santa Ana, CA), allowing CO measurements by thermodilution (TD) and an evaluation of right ventricular ejection fraction and end diastolic volume (RVEF and RV-EDV). In the last six patients CO was measured by transthoracic echocardiography (ECHO) and oxygen consumption was measured by a DELTATRACK II metabolic monitor (Datex) allowing CO calculation according to the Fick formula (FICK). The agreement between methods measuring CO and their reproducibility, were evaluated by Bland and Altman analysis.
Results: Agreement between CO measurements is expressed as bias (d) and 95% limits of agreement (L of A = d±2SD).

Comparison	d	L of A	Reproducibility	d	L of A
ODM-TD	2.29	-2.67 to 7.25			
ODM-ECHO	1.44	-0.98 to 3.86	ODM	-0.01	-0.31 to 0.33
ODM-FICK	0.41	-5.93 to 6.75	TD	0.23	1.17 to 1.63
TD-ECHO	-0.82	-4.16 to 2.52	ECHO	-0.13	-5.41 to 5.15
TD-FICK	-2.36	-8.06 to 3.34			
FICK-ECHO	0.60	-5.92 to 7.12			

There was no correlation between FT and RV-EDV.
Conclusions: Although CO measurements by ODM_{II} had the best reproducibility, the limits of agreement between the four methods tested were unacceptable for clinical purposes. Further investigation is required in order to improve the accuracy of CO measurement in the ICU.

THE USE OF CYTOKINES IN TREATMENT OF PATIENTS WITH SURGICAL INFECTIONS

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Objectives: Efficiency of native cytokines used in the treatment of patients with severe surgical infections has been studied.
Methods: For two years 120 patients were treated with cytokine mixture (SSP) obtained by arterio-venous perfusion of swine spleen and contained the following cytokines: IL-1, IL-2, IL-3, TNFa, IFNy, GM-CSF.
Results: SSP intravenous infusions were shown to accompany with mortality decrease from 23.4% to 12.5% in patients with abscessed pneumonia and lung abscesses and from 50% to 13% if disease course was complicated with sepsis. In patients with purulent peritonitis and sepsis efficiency of SSP was decreased due to endotoxicosis. Thus, we used adoptive immunotherapy with MNC activated *in vitro* with SSP or recombinant IL-2. Intravenous infusions of such cells resulted in transformation of a pathologic process from destructive into productive one. Moreover, clinical manifestations of sepsis were controlled in 81% and mortality was decreased from 46% to 19%.
Conclusions: The use of cytokines themselves as well as cytokine-treated lymphocytes permits to control the disease and leads to the mortality decrease owing to stimulation of host defence mechanisms.

COLLOID ADMINISTRATION DOES NOT IMPROVE GASTRIC MUCOSAL ACIDOSIS IN SEPTIC PATIENTS.

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Objectives: Gastric mucosal acidosis is frequently observed in patients with sepsis. The aim of this study was to determine whether volume infusion using Pentaspan® decreases abnormal gastric mucosal PCO_2 ($PiCO_2$) in patients who have sepsis syndrome (SS) who have already been resuscitated using clinical endpoints.
Methods: We prospectively identified 5 patients who met strict criteria for SS, had a pulmonary artery catheter and a gastric tonometer in place, and $PiCO_2 > 50$ mmHg. Pentaspan® (500 mL) was infused in 30 min. Measurements of hemodynamics, hemoglobin, arterial lactate, blood gas analysis, and $PiCO_2$ were performed before and repeated 30 min and 2 hr after Pentaspan® infusion. We calculated the $PiCO_2$ - arterial PCO_2 difference ($PiCO_2$-$PaCO_2$) and pHi (using Henderson-Hasselbach equation). ANOVA was used to assess statistical significance.
Results: All patients were receiving adrenergic drugs. MAP was 73 ± 13 mmHg and lactate 1.2 ± 0.6 mmol/L. Pentaspan® increased CI by 22% ($p<0.05$) but did not change $PiCO_2$ (table).

	Baseline	30 min. after	2 hr. after
$PiCO_2$, mmHg	58 ± 6	59 ± 9	58 ± 8
$PiCO_2$-$PaCO_2$, mmHg	13 ± 4	14 ± 7	13 ± 11
pHi	7.25 ± 0.06	7.25 ± 0.07	7.26 ± 0.08
PAOP, mmHg	13 ± 2	17 ± 4	16 ± 4
CI, L/min·m^2	4.9 ± 2.3	5.9 ± 2.6 †	5.5 ± 2.9
Hgb, gr/dL	11.6 ± 1.2	10.3 ± 0.7 †	10.6 ± 0.9
DO_2, mL/min·m^2	768 ± 404	824 ± 408	795 ± 477

† $p < 0.05$

Conclusions: According to this preliminary study, increasing flow by fluid administration does not seem useful to reverse gastric mucosal acidosis in resuscitated SS patients. Possible explanations of these results include: 1) volume of Pentaspan® was inadequate; 2) increasing CO did not increase gastric flow because of maldistribution in SS; or 3) $PiCO_2$ does not reflect ischemia.

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RED BLOOD CELL TRANSFUSION IS ASSOCIATED WITH HIGHER MORTALITY OF PATIENTS WHO HAVE SEPSIS SYNDROME.

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Background: Although red blood cell transfusions (RBCt) are used to increase oxygen availability in septic patients, several lines of evidence suggest that RBCt may actually worsen tissue hypoxia. Thus, RBCt may negatively influence outcome of septic patients.
Objectives: To determine the association of 1) RBCt ; 2) number of units transfused; and 3) mean age of the units transfused on the first day of transfusion with mortality of critically ill septic patients.
Methods: We prospectively identified patients who met strict criteria for sepsis syndrome (SS) seen in the ICU of St. Paul's Hospital from 1992 to 1994 and excluded patients who died in the first 5 days after the onset of sepsis. We recorded clinical characteristics, multiple system organ failure score, and APACHE II at onset of sepsis. Then, we retrospectively recorded the total number and age of RBC units transfused during the first 5 days after onset of sepsis. Overall 30-day mortality was 22%.
Results: The main results are shown in the table. The mortality of patients who received RBCt was nearly double the mortality of those who did not receive RBCt even after adjusting for severity of illness using APACHE II. No. of RBC units and age > or < 20 d. of transfused RBC was not associated with different mortality.

Mortality (%)					
All Patients (n=208)		Transfused Patients (n=62)			
Not Transfused	Transfused	# Units		Age of blood (days)	
(n = 146)	(n = 62)	≤ 2 U	> 2 U.	< 20	> 20
18	31 †	28	33	31	27

† $p < 0.05$

Conclusions: RBCt within the first 5 days of SS identifies a much higher mortality group. It is not yet clear whether transfusion is merely a marker or whether transfusion is a potential cause of mortality in SS.

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COMBINED ADMINISTRATION OF POLYVALENT IMMUNOGLOBULINS AND LOW-DOSE HYDROCORTISONE IN THE TREATMENT OF SEPSIS

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Introduction: In recent years, treatment of sepsis has included the attempt to neutralize endotoxins and cytokines in septic patients by using polyclonal or monoclonal antibodies and various antagonists. However, all these novel approaches involved a single treatment modality.

In 1991, we introduced a combination approach for adjuvant sepsis treatment into our intensive care unit. Our regimen consists of the administration of polyclonal human immunoglobulins together with an infusion of low-dose hydrocortisone. The suggestion to treat septic patients with immunoglobulins came from Dominioni's [1] and Schedel's [2] groups in 1991. In addition, a study by Pilz et al. [3] suggested that early postoperative treatment of high-risk cardiac surgical patients with an intravenous immunoglobulin preparation reduces the severity of the disease and may also reduce mortality in these patients. The decision to use low-dose hydrocortisone treatment [4] is based on the findings that septic critically ill patients suffer from occult hypoadrenalism [5, 6, 7].

Methods: After institutional approval, 64 general and cardiac surgical patients who fulfilled the criteria of septic shock were included in the study. Norepinephrine or epinephrine had to be given for cardiovascular support at a dose ≥0.2 µg/kg/min. 100 mg hydrocortisone was administered as a bolus, followed by a continuous infusion of hydrocortisone at a dose of 200-300 mg/day [4]. In addition, polyvalent human immunoglobulins (Pentaglobin, Biotest/Germany) were administered at a daily dose of 15 g for 3 days. Patients were considered as responders, when the catecholamine dose could be reduced by 100% within 24 h. Statistical evaluation was performed using Chi square analysis.

Results: 47 patients (73%) responded to this combination treatment; 17 patients were non-responders. In the non-responder group, mortality was 76%, whereas only 23% died in the responder group ($P<0.001$).

Conclusion: Our results show that septic patients may benefit from a combination approach for adjuvant sepsis treatment consisting of the administration of immunoglobulins and low-dose hydrocortisone.

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NOREPINEPHRINE-DOBUTAMINE IS BETTER FOR SPLANCHNIC CIRCULATION THAN EPINEPHRINE IN DOPAMINE RESISTANT SEPTIC SHOCK.

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Aim of the study : to compare the hemodynamic and metabolic effects of epinephrine (ep) or norepinephrine-dobutamine (nor-dob) after failure of volume loading and dopamine (>20μg/kg/min) in a prospective, randomized study. (* p<0.01 vs H0)

	Epinephrine (n=15)		Nor-Dob (n=15)		Ep vs Nor-Dob
	H0	H6	H0	H6	Anova
MAP(mmHg)	60±2	93±2*	60±2	86±2*	NS
CI l/min/m^{-2}	3.97±0.3	4.5±0.31*	3.98±0.25	4.7±0.28*	NS
IDO_2 ml.min.m^{-2}	481±41	608±40*	538±39	665±37*	NS
IVO_2 ml.min.m^{-2}	141±9	156±13*	130±8	159±12*	NS
($HCO3^-$) art	21.7±1.5	18±1,6*	23.1±1.7	24±1.6	**p<0.01**
Lactate mmol/l	3.1±0.4	5.88±0.3*	3.1±0.4	2.66±0.3	**p<0.01**
pH art	7.35±0.02	7.26±0,03*	7.37±0.03	7,38±0.02	**p<0.01**
pHi	7.29±0,03	7.16±0.02*	7.30±0.03	7.35±0.02*	**p<0.01**
L/P	15.5±1.4	21±1.5*	13.8±1.3	14±1.3	**p<0.01**
PCO_2 i- $PaCO_2$	10±0.7	14±0.7*	10±0.8	4±0.5*	**p<0.01**
Ketone ratio	0.26±0.03	0.33±0.04	0.16±0.03	0.26±0.03	NS

Hypotension reversal and increase in oxygen delivery were similarly achieved in both groups. Nevertheless, epinephrine was associated with a lactic acidosis and increased lactate/pyruvatemia ratio (L/P) that evoke a dysoxia rather than a metabolic effect. An higher gastric mucosal PCO_2 in the ep group compared to nor-dob suggests the hypothesis of an anaerobic production of CO_2 in favor of a splanchnic hypoxia. In both group, arterial ketone body ratio that reflects hepatic mitochondrial redox state, compared to a control group without shock was decreased but increased between 12 and 24 hours after restoration of arterial pressure. The association norepinephrine-dobutamine seems to be better for splanchnic circulation than epinephrine and should be used for dopamine resistant septic shock. Moreover, the increase in arterial pressure with nor-dob improved gastric mucosal pH and hepatic mitochondrial redox state and argue to reconsider arterial pressure as a significant goal for resuscitation in septic shock.

HEMOFILTRATION IN HUMAN SEPSIS: ELIMINATION OF IMMUNOMODULATORY MEDIATORS AND EFFECTS ON HEMODYNAMICS

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Hemofiltration (HF) is widely used for renal replacement therapy in patients with acute renal failure. Recent studies suggested that HF may eliminate toxic mediators of sepsis and improve specific organ failure.

Objectives: To examine whether HF can eliminate or activate mediators of sepsis and whether the ultrafiltrate can alter cytokine release of peripheral blood mononuclear cells (PBMC) *in vitro*. Also changes in hemodynamics during HF in septic patients were studied.

Methods: Continuous isovolemic high-volume HF was performed in 16 patients with sepsis and in five healthy volunteers. Pre-and post-filter and ultrafiltrate concentrations of cytokines (IL-1β, IL-6, IL-8, TNFα), and of complement compounds (C3, $C3a_{desArg}$, $C5a_{desArg}$, C5b-9) were measured at the beginning of hemofiltration (t_1), and 1h (t_2) and 4h (t_3) (patients) later. Healthy PBMC, and monocyte and lymphocyte subfractions were incubated with ultrafiltrates.

Results: HF showed no signs of mediator activation. No evidence for effective cytokine elimination was found. However, pre-filter $C3a_{desArg}$ concentration showed a significant decline during HF (patients: t_1 = 676.9±99.7 ng/ml, t_2 = 545.4±83.2, t_3 = 508±73.0; p<0.001, paired Student t-test, volunteers: t_1 = 54.82±13.3 ng/ml, t_2 = 33.9±10.7; p<0.001). Ultrafiltrate from patients which contained large amounts of $C3a_{desArg}$ significantly stimulated PBMC and monocyte TNFα release and suppressed lymphocyte IL-2 and IL-6 production. Ultrafiltrate from healthy volunteers remained without effect. HF resulted in a significant increase over time in mean arterial pressure and in systemic vascular resistance.

Conclusions: Septic mediators such as $C3a_{desArg}$, but not established cytokines, are effectively eliminated by hemofiltration. Ultrafiltrate from septic patients induces changes in PBMC function with similarity to the septic response. High volume HF represents a new modality for mediator removal and may, thereby, improve hemodynamics in patients with sepsis.

CORRELATION BETWEEN LIPID PEROXIDATION, ANTIOXIDANT STATUS AND CLINICAL OUTCOME IN CRITICALLY ILL PATIENTS WITH SEPSIS: A PROSPECTIVE OBSERVATIONAL STUDY

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Objectives: The aim of this study was to evaluate the correlation between lipoperoxidation, antioxidant status and clinical outcome (mortality) in critically ill patients with sepsis.

Methods: After institutional approval 51 critically ill patients with sepsis of different source and requiring ventilatory support were prospectively studied. Patients with head injury were excluded. Malondialdehyde (MDA) as a marker of lipid peroxidation, glutathione (G) and glutathione-peroxidase activity (GPX) as the markers of antioxidant capacity were measured daily until death or discharge (day D).

Results: 38 patients survived (group S) and 13 patients died (group NS) as a result of multiple organ failure. Presented values are expressed as mean ± SD. Statistical significance p*<0.05.

	Malondialdehyde (umol/l)		Glutathione (mg/g Hb)		Glutathion-peroxidase (U/g Hb)	
Day	group S	group NS	group S	group NS	group S	group NS
1.	0,86 ± 0,30	0,88 ± 0,42	6,64 ± 3,05	6,03 ± 2,09	44,0 ± 19,5	46,0 ± 14,1
2.	0,82 ± 0,26	0,78 ± 0,44	6,59 ± 2,18	5,68 ± 2,12	42,1 ± 15,3*	53,7 ± 13,0*
3.	0,80 ± 0,30	0,73 ± 0,28	7,23 ± 2,32	6,84 ± 1,87	49,4 ± 18,7	46,3 ± 15,4
4.	0,87 ± 0,50	0,74 ± 0,26	6,31 ± 2,91	6,66 ± 2,51	48,1 ± 17,9	52,0 ± 20,7
5.	1,00 ± 0,40	1,18 ± 0,94	6,32 ± 3,19	5,44 ± 2,07	49,7 ± 20,1	55,1 ± 12,6
6.	1,00 ± 0,42	1,19 ± 0,67	6,97 ± 3,71	7,15 ± 2,39	43,9 ± 15,6*	55,5 ± 14,2*
7.	0,87 ± 0,42	0,99 ± 0,43	5,22 ± 3,15*	8,05 ± 1,09*	45,3 ± 14,7*	56,3 ± 13,1*
D	0,93 ± 0,27*	1,32 ± 0,55*	6,14 ± 2,62	6,52 ± 2,12	49,3 ± 15,8	58,4 ± 15,0

Conclusion: Significantly higher malondialdehyde and glutathione levels and glutathione-peroxidase activity in group NS at the end of ICU stay were related to mortality. These findings indicate an increased generation of free oxygen radicals together with increased antioxidant activity in this group and support the employment of antioxidant interventions in critically ill patients.

NITRIC OXIDE METABOLITES ARE NOT ELEVATED IN CIRCULATORY SHOCK DUE TO ISOLATED LIMB PERFUSION WITH RECOMBINANT TNFα

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Objectives: To determine the role of nitric oxide (NO) in the mechanism of septic shock induced by isolated limb perfusion with recombinant TNFα.

Methods: We have measured TNFα and metabolites of NO in 5 patients with signs of septic shock following treatment with isolated limb perfusion for nonresectable soft tissue tumors and melanomas of a limb. Perfusion was carried out with melphalan (Burroughs Wellcome) and recombinant TNFα (Boehringer). TNFα was determined by specific radiometric assay (Medgenix Diagnostics), nitrate and nitrite were measured with a modification of the Griess reaction[1].

Results: Results are shown in the Table.

Table. Clinical signs, TNFα-levels and NO-metabolites before and after perfusion with recombinant TNFα and melphalan

	before	after†	p-value
cardiac output (L/min)	6.3	12.5	p<0.01
systemic vascular resistance (dyne.sec/cm^5)	937	443	p<0.01
heart rate (beats/min)	74	131	p<0.01
TNFα (ng/ml)	25	42391	p<0.05
nitrite and nitrate (μmol/L)§	30.1	32.3	N.S.

† Post perfusion variables represent means of highest values, except for systemic vascular resistance where the lowest values were used for calculating the mean
§ Data represent the sum of nitrite plus nitrate concentrations

Conclusions: During isolated limb perfusion with recombinant TNFα very high levels of TNFα were measured in arterial blood in 5 patients. They all showed signs of severe sepsis syndrome with shock from vasodilation, probably due to leak of recombinant TNFα from the perfusion circuit to the systemic circulation. TNFα-induced vasodilation was not accompanied by a rise in serum NO-metabolites. Our findings do not confirm the widely accepted theory, mainly based on animal experiments, that generation of NO is the key pathogenetic mechanism in septic vasodilation[2], nor that TNFα invariably induces formation of NO. The precise mechanism of shock in these patients remains to be elucidated.

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Ethyl carbonate (EC) reduced the lethality and multiple organ toxicity of LPS.

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EC is a commonly used for prolonged, stable animal anesthesia. Noting that the hypotension after IV LPS was attenuated by EC, we hypothesized EC also protects against LPS toxicity. Sprague-Dawley rats received IP saline (S), thiobutabarbital 80 mg/kg (TB), or varied doses of EC, followed 2 hours later by bolus 30 mg/kg IV LPS. 7-day survival is shown below:

GROUP:	S	TB	EC(0.1GM/KG)	EC(0.5GM/KG)	EC(1.2GM/KG)
ALIVE (n)	1	0	0	3	9*
TOTAL (n)	10	5	5	7	10

*Significantly different from all other groups, p<0.05

5/5 rats given LPS followed 2 hours later by EC (1.2 gm/kg) also died. Additional rats were treated with S (n=10) or 1.2 gm/kg EC (n=10) followed by 30 mg/kg LPS, then sacrificed at 4 hours. Blood glucose (BG, mg/dl), hematocrit (HCT), leukocyte count (WBC/mm^3), platelet count (PLTx10^3/mm^3), bicarbonate (HCO, mg/dl), gross bowel hemorrhage (BH, 0-4 scale) and lung myeloperoxidase activity (MPO, ΔA/min/gm wet lung) are shown below (±se):

	BS	HCT	WBC	PLT	HCO	BH	MPO
S	46±13	46±2	2099±132	203±25	14±1	2.8±.4	55±2
EC*	35±9	41±1	3079±290	466±35	23±1	1.7±.3	39±5

* All significantly different from S, p<0.025

We conclude that EC reduces the lethality and multiple organ toxicity of LPS. Its diverse effects suggest a site of activity upstream from the cytokine cascade. These results are important for studies of LPS which may use EC anesthesia and may have potential in the therapy of septic shock.

PATHOGENESIS AND PROPHYLACTIC OF POSTSPLENECTOMY SEPSIS

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Objectives: Sepsis and his special form OPSI, which manifested by the bacteremia, coma, shock, coagulopathy and hemorrhages on the suprarenal glands, are the most serious complications after splenectomy. However, questions of pathogenesis and prophylactic of postsplenectomy sepsis still not make clear.

Methods: Results of surgical intervention on the lien in 175 patients were studied. The splenectomy was performed in 145 cases. The purulent-septic complications were observed in 41 patients and 4 out of them died. The immunohormonal peculiarities after operation were studied.

Results: The inadequate of immune response was observed in patients with the septic processes. The deep T-cells' immunodeficit with the lowering of T-helpers' quantity was revealed. The total complement level and IgM concentration were decreased, what impede to adequate neutralization of pathogenic microorganisms and, first of all, the incapsulated bacteria. The phagocytic activity of polymorphonuclear leukocytes obviously lowered also. These immunological changes correlates with renin-aldosteron, prostaglandin $F_{2\alpha}$ and thromboxan A_2 synthesis stimulation and β-thromboglobulin synthesis increase. This promotes to the intensification of fibrinogen degradation processes (fibrinopeptide A level increases). The immunohormonal disorders, which were revealed, are dangerously to the septic shock development. Accordingly to the hemostasis disturbances, which were revealed, with the goal of prophylactic and treatment septic complications, the thymus hormones, interferon α and regulators of hemostasis vessel-thrombocytic link are successfully use in clinic.

Conclusions: Thus the immunohormonal disorders engage important place in sepsis pathogenesis after splenectomy. This necessary takes into consideration during the treatment of such conditions.

INFLUENCE OF LOW DOBUTAMINE ADMINISTRATION ON PROLACTINE SECRETION IN POSTOPERATIVE PATIENTS.

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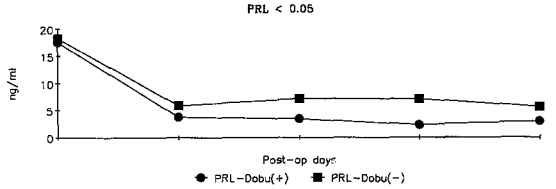
Prolactine (PRL) has recently been suspected to be a modulating factor of the reaction to sepsis. We have studied the influence of low dose dobutamine (DOBU) on PRL secretion. DOBU is a commonly catecholaminergic drug in ICU patients (pts), used to perform a better cardiac output and oxygen delivery.

20 ICU patients were randomised after elective non complicated surgery : group I (10 pts - mean age 64±11.5) (DOBU+) received low dose DOBU (continuous IV administration: 2mcg/kg/min) and group II (controll - 10 pts - mean age 67±13.3) (DOBU-) perfused with saline solution. These pts were surveyed from day 1 to day 4 after surgery; significant cardiac or pulmonary past history justified the ICU admission.

Determination of the PRL serum concentration as well as clinical an laboratory parameters related to sepsis (T°, WBC, CRP, fibrinogen) was performed daily for 4 days.

A statistical analysis (Wilcoxon test) demonstrated a significant higher PRL level in group II (DOBU-) ($p<0.05$) compared to group I (DOBU+) from day 1 to day 4 after surgery.



No significant difference was observed with the other parameters; no postoperative complications occurred in the 2 groups.

Conclusion: this randomised study suggests that, like Dopamine (*), DOBU could interfere with the PRL secretion in postoperative pts.
Further studies are necessary to evaluate the clinical implications of these observations on septic complications.

(*) Guinotte: Int Care Med: 1994, 20: S22

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VASOREGULATION BY ISOFLURANE, ENFLURANE, AND HALOTHANE IN SEPTIC RATS

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Objectives: Inhalational agents are able to change systemic vascular resistance (SVR). Isoflurane dilates the vessel by nitric oxide (NO), whereas halothane may act by calcium channel antagonism. NO released by activated macrophages is markedly elevated in sepsis. This may change the different effects of inhalational agents on microcirculatory parameters. Aim of the present study was to observe haemodynamic and microcirculatory changes due to volatile anaesthetics in an animal model.

Methods: 23 Sprague-Dawley-rats were prepared by cannulation of trachea, carotid artery, and jugular vein. A flow probe was placed around the aortic arch for continuous monitoring of cardiac output. The spinotrapezius muscle was prepared for microscopy of arteriolar vessels. Data of the vascular effects of inhalation of isoflurane, enflurane, and halothane were obtained in a control state and after infusion of lipopolysaccharides (LPS).

Results: In the septic condition the pressure decreasing effect of halothane is decreased to 50 %, whereas the reactions to the other agents remain unchanged. In the control state isoflurane dilates the arteriole. This effect is diminished after LPS. Halothane has no influence on the vascular tone in the skeletal muscle arterioles during control, but there is a constrictory effect during septicemia. The vasoactive potency of enflurane is small.

Conclusions: In septic rats the vasoactive potency of inhalational agents is changed. The vasoconstrictory effect of halothane during sepsis may be explained by an inhibitory influence on the nitric oxide synthase which is increased in sepsis. Our results show a loss of dilatory potency of isoflurane due to the elevation of nitric oxide in the septic condition. There seems to be no more abiltiy to release additional NO.

INHALED NITRIC OXIDE INHIBITS PULMONARY VASCULAR IMPEDANCE RESPONSES TO HYPOXIA IN DOGS AND MINIPIGS

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Objectives: The pig has been reported to present with a stronger hypoxic pulmonary vasoconstriction than many other species, including man. Aim of the present study was to investigate pulmonary vascular impedance (PVZ) responce to hypoxia in adult dogs and minipigs.
Methods: We investigated PVZ spectra and pulmonary artery pressure (Ppa) minus pulmonary artery occluded pressure (Ppao) versus pulmonary blood flow (Q) in 9 anaesthetized and ventilated minipigs (m) and 9 weight-matched dogs (d). The animals were sequentially exposed to hyperoxia (FiO_2 0.4), hypoxia (FiO_2 0.12) without and with nitric oxide (NO) inhalation (150 ppm).
Results: Flow matched PVZ data (mean±SEM) are shown in the table. [Z_0 = 0 Hz impedance (Z; {dyn.sec.cm^{-5}}); Z_1 = first harmonic Z; Z_C = characteristic Z; Z_1 ph. = first harmonic phase angle {radians}; *f*, #, * at least $p < 0.05$ between FiO_2 0.4 and 0.12, FiO_2 0.4 and FiO_2 0.4&NO, d and m respectively]

FiO_2		0.4	0.12	0.4&NO	0.12&NO
Z_0	d	433±33	534±66 *f*	422±33	438±38
	m	779±51 *	1339±123*f**	728±61 *	846±70 *
Z_1	d	107±12	119±15	102±16	86±12
	m	147±13 *	246±33 *f**	147±18	150±19 *
Z_C	d	100±13	102±12	112±20	94±13
	m	117±11	158±23 *f**	127±15	121±12 *
Z_1 ph.	d	-0.43±0.1	-0.46±0.1	-0.26±0.1 #	-0.24±0.1
	m	-0.85±0.1 *	-0.85±0.1 *	-0.74±0.1 *	-0.88±0.1 *

In hyperoxia, compared to dogs at the same Q, minipigs had a higher Ppa (26±1 mmHg versus 16±1 mmHg; $p < 0.01$). Hypoxia increased (Ppa-Ppao) at all levels of Q by an average of 13 mmHg in minipigs and 2 mmHg in dogs. Inhaled NO inhibited hypoxia-induced (Ppao-Ppa)/Q changes in both species.
Conclusions: We conclude 1° that the minipig is an animal model of elevated pulmonary vascular resistance and impedance, and 2° that hypoxia-induced alterations in PVZ spectrum are due to changes of resistance in small arteries.

REDUCED NITRIC OXIDE PRODUCTION AFTER CORTICOSTEROID ADMINISTRATION IN SEVERE SEPSIS

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Objectives: Evaluate nitric oxide (NO) production in relationship to hemodynamics after corticosteroid therapy in human patients with severe sepsis.
Methods: 13 consecutive patients with severe sepsis were studied, 9 controls and 4 receiving high dose corticosteroid therapy (dexamethason 3, prednisolone 1). On days 0,1 and 2 nitrate (NOx, stable metabolite of NO) was measured in plasma and urine using high performance liquid chromatography.
Results: Mean plasma NOx decreased from 60 (± 15.0) to 50 (± 19.7) µmol/l in the steroid group, but increased from 67 (± 13.7) to 112 µmol/l (± 33.9) in controls ($p = .13$ on day 2). Mean urinary NOx increased from 94 (± 43.2) to 378 (± 198) µmol/day in the steroid group, and from 690 (± 237) to 1577 (± 429) µmol/day in controls (between group differences significant on day 0 and 2, $p < .05$). Mean arterial pressure did not differ between groups on any day. During the 2 days norepinephrine administration could be reduced by .5 (± 2.9) mg/hr in the steroid group but had to be increased by .07 (± .07) mg/hr ($p < .05$) in the control group. Dopamine administration was reduced in both groups (more in the steroid group, n.s.), but dobutamine adminstration was increased (more in the steroid group, n.s.).
Conclusions: Corticosteroid administration in severe sepsis is associated with reduced nitric oxide production and lower norepinephrine requirements to maintain blood pressure. Whether this steroid effect is beneficial should be studied.

CLINICAL TRIAL OF N^G-METHYL-L-ARGININE IN VASOPRESSOR-REFRACTORY SEPTIC SHOCK.

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Objectives: 1) To determine the toxicity of N^G-monomethyl-L-arginine (NMA) administered by intravenous bolus to patients with refractory septic shock. 2) To investigate the biologic activity of nitric oxide synthase inhibitors in septic shock.
Methods: From August 1993 to January 1995, thirteen patients with vasopressor refractory septic shock received NMA intravenously in escalating doses from 1 to 40 mg/kg.
Results: No hepatic, renal, gastrointestinal, or hematologic toxicity was observed at doses of NMA as high as 40 mg/kg. Significant biological activity was observed at all dose levels consisting of increased blood pressure (Systolic blood pressure from 70.9 mm Hg ± 3.4 to 109.0 ± 4.3 s.e.m., p=0.0004, systemic vascular resistance (430 ± 57 to766 ± 93 dyne·sec/cm ^{5}, p=.002), and a decrease in vasopressor requirements. The magnitude and duration of these effect were dose dependent. Decreased cardiac output (8.1 ± 0.8 to 7.0 ± 0.9 l/min p=.003) and increased pulmonary artery pressure (35.6 ± 2.1 to 43.5 ± 2.0 mm Hg; p=.004) were also observed. No significant effects on heart rate, pulmonary capillary wedge pressure, or central venous pressure were observed. Four of 13 patients survived for more than 28 days, 4 patients died of cancer complications (all 5 patients had maintained blood pressure for 24 h on NMA) and 4 patients died of complication attributable to septic shock (MODS, ARDS, DIC, refractory hypotension), and 1 patient was unevaluable. Conclusions: No adverse clinical effects have been observed in patients receiving bolus doses of NMA as high as 40 mg/kg. The increased pulmonary artery pressures observed in septic shock patients is further augmented by NMA and may limit the dose which can be administered by intravenous bolus. Other schedules of drug dosing may attenuate this effect.

ACCURACY OF A LACTATE ANALYZER FOR MEASUREMENTS OF ARTERIO-VENOUS DIFFERENCES IN LACTATE.

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Objectives: Arterio-venous differences in lactate (AVLAC) are frequently determined both in animals and in humans to evaluate the lactate production of different organs like the lungs, gut or liver. We evaluated the accuracy of using a commercial lactate analyzer for this purpose.
Methods: Blood samples obtained from humans (n=124) and dogs (n=176) were measured in pentuple using an automated analyzer (2300 STAT plus YSI, OH, USA). 300 samples were analyzed to determine the coefficient of variation, as defined by the ratio of the standard deviation of these five values divided by the mean value. 200 samples were analyzed to obtain 100 AVLAC. The values obtained averaging 1, 2, 3, 4 and 5 consecutive measurements of lactate were compared. AVLAC obtained with 5 averaged values was considered as the reference (AVLAC5). The differences between AVLAC5 and AVLAC using n determinations (AVLACn) were plotted against AVLAC5 measurements to determine the bias and the limits of agreement (Bland and Altman method). The agreement was also expressed in % of a representative AVLAC value (0.3 mEq/L)
Results: Lactate measurements ranged from 0.17 to 23.2 mEq/L. The average coefficient of variation was 0.94 ± 1.54%. AVLAC5 ranged from -0.59 to +0.54 mEq/L. Bias and limits of agreement are given in the table.

AVLACn	BIAS (mEq/l)	AGREEMENT	AGREEMENT(%)
n = 1	0.015	± 0.124	± 41%
n = 2	0.007	± 0.032	± 21%
n = 3	0.003	± 0.026	± 6.5%
n = 4	0.001	± 0.018	± 6%

Conclusions: Blood lactate determinations with this device are reliable since the coefficient of variation is very low. However for AVLAC, single measurements are not reliable since errors as large as 41% of the true value could be observed. We propose to average at least 3 measurements to determine AVLAC.

INFUSION OF HYPERTONIC SOLUTIONS IN CANINE ENDOTOXIC SHOCK : IS GIK SUPERIOR TO SALINE ?

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Glucose-insulin-potassium (GIK) solutions have been shown to improve cardiac contractility and increase oxygen availability in experimental and clinical settings of septic shock. Several mechanisms have been proposed to explain these effects including a direct improvement of the energy balance by glucose, a direct influence of insulin on cardiac performance or an increase in intravascular volume due to the hyperosmolarity of the solution. To explore the role of hyperosmolarity, we compared the effects of GIK to those of a isoosmolar hypertonic saline solution in endotoxin shock in dogs.

Methods : The study included 18 mongrel dogs (25±5kg), pentobarbital-anesthetized and mechanically ventilated with air. Thirty minutes after the intravenous administration of 3 mg/kg of E. coli endotoxin, the dogs were randomized to receive a 2ml/kg infusion in 30 min of a hypertonic (2895 mOsm/L) solution including either a mixture of glucose 50 % with 750 U insulin and 2000 mEq KCL/L (GIK-Group 1) or hydroxyethyl starch 7.5 % in NaCl 8.4 % (HES-Group 2). In each dog, a 0.9 % saline infusion was continued to maintain the pulmonary artery occluded pressure at baseline level. Hemodynamic, blood gas analysis and laboratory data were collected at baseline and 30 min, 60 min, 120 min, and 240 minutes later..

Results : Endotoxin administration was followed by a fall in mean arterial pressure (MAP) and cardiac index (CI) and a rise in blood lactate levels. Resuscitation with either GIK or HES hypertonic solutions resulted in similar increases in MAP, CI, oxygen delivery and left ventricular stroke index (Table 1). We conclude that during resuscitation from endotoxic shock the use of GIK solutions is not superior to hypertonic HES solutions. The higher blood lactate levels observed in the dogs receiving GIK can be attributed to the glucose metabolism.

Mean ± SD	Group	baseline	30 min	60 min	240 min
MAP(mmHg)	1	119±6	84±9*	93±8*	84±5*
	2	121±7	92±14*	100±10*	105±8*
CI(ml/m.n/kg)	1	126±10	90±11*	200±37* #	196±34* #
	2	163±32	115±20*	160±20* #	190±32* #
LACT(mEq/l)	1	1.67±0.33	3.2±0.38*	3.61±0.38*	2.83±0.44*
	2	1.96±0.48	3.53±0.51*	3.24±0.47*	2.20±0.43*

*p<0.05 vs baseline, #p<0.05 vs T30.

THE O_2-HAEMOGLOBIN AFFINITY CHANGES IN THE CRITICALLY ILL OF A GENERAL ICU.

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Objectives: To investigate the Hb-O_2 affinity in different clinical situations in an ICU. Design: To compare the P_{50} in vivo (P_{50}"in vivo") to the P_{50} in standard condition (P_{50}st) in septic, cardiac, and SIRS patients. Patients: 54 consecutive critically ill, 21 for sepsis (group 1), 10 for SIRS (group 2) and 23 for cardiogenic shock (group 3) undergoing pulmonary arterial catheterization for clinical purposes. Average age 68 (range 42-81), average SAPS of 16 (range 12-20). Methods: Together with the hemodynamic measures, a total of 308 mixed venous samples (128 for group 1, 75 for group 2, 105 for group 3) were drawn and immediately analysed at 37° C using the ABL500 Radiometer for PO_2, PCO_2 and pH, and the OSM3 Radiometer for HbO_2%, HbCO% and MetHb%. P_{50}st (i.e. the P_{50} at pH=7.40, PCO_2=40 mmHg and temperature at 37° C) was calculated automatically by the instruments on mixed venous blood, as was the P_{50}"in vivo" (i.e. the P_{50} at the patient's value of pH, PCO_2 and temperature), using Siggaard-Andersen's algorithm. The data were compared by the one-way ANOVA test and by the t-test for paired and unpaired samples. Results: The mean resulting values (in mmHg) with the statistical differences are shown in table I. In addition, the time series analysis shows the mean P_{50}st values as statistically below the P_{50}"in vivo" in the septic patients while the opposite is shown for the cardiac patients. No differences in the time analysis are demonstrated for the second group. A possible clinical significance may be drawn from these different behaviours.

Table I.

Group	P_{50}st	P_{50}"in vivo"
1	26.62±2.1 §	27.30±2.3 *
2	27.20±0.92	27.27±1.82
3	27.24±2.7	27.0±3.23

Data are Mean ± SD; §, p<0.05 vs group 2 and 3; *, p<0.0005 between P_{50}"in vivo" vs P_{50}st.

DOES SEPSIS AFFECT THE CORRELATION BETWEEN CENTRAL AND MIXED VENOUS OXYGEN SATURATION ?

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Objectives: Central venous blood (superior vena cava) is not the same as mixed venous blood, in terms of Hemoglobin oxygen saturation, because there can be variations in the oxygen content of the upper and lower part of the body. Accordingly, central venous oxygen saturation is not equal with mixed venous oxygen saturation, but it is well known that there is a correlation between them. In this study, we evaluated the influence of sepsis on the above correllation.

Patients-Methods: Twenty-eight critically ill patients were included in this study. Fifteen of them were septic (group A) and 13 patients were the control group (group B). [Sepsis creteria according to: RC. Bone, Fisher G., Klemmer TR. ,and al. 1989: The sepsis syndrome. A valid clinical entity. -Critical Care Medicine 17: 389-393].

All patients were catheteriazed with a fiberoptic pulmonary artery catheter connected with an Oxymetric (R)3 SO2/CO Abbot computer.For any pulmonary artery catheter insertion, two pairs of ScvO2 and SvO2 were obtained, one during insertion and one during taking the catheter out.

Results: The correlation equations and coefficients between ScvO2 and SvO2 into the two groups (group I and group II) were: SvO2=5.741+0.889·ScvO2 ,r=0.90 (p<0.001) and SvO2=6.669+0.910·ScvO2, r=0.90 (p<0.001) respectively.

No significant differences were found between the slopes of the regression lines of the two groups.

Conclusion: These data suggest that sepsis does not affect the correlation between central and mixed venous oxygen saturation, and therefore the SvO2 value can be estimated measuring ScvO2.

ESTIMATION OF TOXEMIA SEVERITY IN PATIENTS WITH SEPSIS

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Objectives:Toxemia degree and humoral immunity condition have been studied in 36 patients aged from 19 to 72 with progressive course of sepsis and polyorganic insufficience.

Methods: Such toxemia and humoral immunity findings as lencositicindex of toxication (LII), level of oligopeptides of the middle molecular mass registered at the wave length of 25nM(MM1) & 280nM (MM2), distribution index (ID), immunoglobulins A,M,G, concentration of circulating immunocomplexes (CIC1 & CIC2) and also some clinical and biochemical findings on the 1,3,5 day after the operation serve as criteria for treatment effect.

Results: It was founded that in intensive therapy and detoxication, level of LII is successively decreased from 12.6±1.4 to 2.6±.5 on the 5-th day after the operation. True decrease of the level MM2 from .704±.09 to .402±.08 un & optimal density and increase of distribution index from .96 to 1.09 are argued.

Conclusions: In studing the dynamics of the immunoglobulin's spectrum and the true increase of immunoglobulin G level from 8.4+.6g/1 to 10.8+.7g/1 on the 5-th day after the operation simultaneously with the decrease of CIC2 from 806.9±60 to 624.7±54.8(P .05) were founded. Some stages of the investigation true increase of lymphocytes from 9.0+2.6% to 15.0+1.8% was noted and it appeared to be a favourable prognosis finding for disease outcome.

High correlation dependence between bacillus-and segmentonuclear neutrophils and immunoglobulins G & M (r=.5-.7 in P<.05) was discovered and it also showed positive dynamics of the course of the disease.

Cytokine production in acute paraquat poisoning

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A 34 year old male patient was admitted to the ICU with severe paraquat poisoning. Treatment consisted of gastic lavage and oral administration of Fuller's earth. Because of very high plasma levels hemodialysis together with charcoal hemoperfusion was started within one hour after admission. This treatment was further continued by continuous veno-venous hemofiltration in order to remove the circulating paraquat and also circulating cytokines. Nevertheless patient's condition worsened necessitating artificial ventilation and hemodynamic support. Patient died 24 hours after admission of acute multiple organ failure due to paraquat poisoning.
Serum levels of paraquat were determined by colorimetric method (table). Levels of interleukin 6 (IL 6) and 8 (IL 8), tumor necrosis factor (TNF-alpha), interleukin 1 receptor antagonist (IL 1 Ra) were determined both in plasma and ultrafiltrate (table).

	paraquat (µg/ml)	TNF (pg/ml)	IL 6 (pg/ml)	IL 8 (pg/ml)	IL 1 Ra (ng/ml)
admission	109	40	54	< 10	0.5
10 h	26	90	> 2500	217	58
14 h	10	88	> 2500	508	51
18 h		101	> 2500	927	55
ultrafiltrate 1	4,5	< 10	> 2500	110	22
ultrafiltrate 2	7.1	< 10	> 2500	496	19

Conclusion: 1. The acute inflammation and ARDS seen in paraquat intoxication seems to be directly correlated with activation of different cytokines. 2. CVVH is able to remove different cytokines in this clinical situation. 3. Monoclonal antibodies against cytokines together with CVVH might be helpfull in reducing organ toxicity in this particular clinical setting.

EFFECTS OF LOW-DOSE DOPAMINE ON GASTRIC MUCOSAL BLOOD FLOW IN CRITICALLY ILL PATIENTS.

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Objectives : Evaluate in critically ill patients the effects of low-dose dopamine on gastric mucosal blood flow (GMBF) using Laser-Doppler Flowmetry, a continuous non invasive method of assessing microcirculation.
Methods : 6 patients requiring both mechanical ventilation and pulmonary artery catheterization for multiple trauma (n=3), ARDS (n=2) and pancreatitis (n=1) were included. In each patient, the Laser-Doppler (LD) probe was inserted through a naso-gastric tube. The LD signal is proportional to the number of red blood cells moving in the measuring volume and the mean velocity of these cells. When the LD signal was satisfactory, an aspiration was created into a catheter which was fixed in parallel to the LD probe, to maintain the tip of the probe against the gastric wall at the site of measurement. Data (systemic hemodynamic parameters and GMBF) were obtained at the end of a 30 min resting period (baseline), then 30 min after dopamine (2 mcg/kg/min) infusion, and finally 30 min after the end of dopamine infusion (recovery).
Results : Data are expressed as mean ± SEM and compared by ANOVA followed by Newman-Keuls test.

	Baseline	Dopamine	Recovery
MAP (mmHg)	73 ± 4	76 ± 4	70 ± 4
CO (l/min)	6.6 ± 0.5	7.4 ± 0.5*	6.7 ± 0.6
CO (Δ% vs baseline)	0	13 ± 4*	2 ± 2
GMBF (Perfusion Units)	185 ± 23	325 ± 27*	197 ± 25
GMBF (Δ% vs baseline)	0	87 ± 19*	12 ± 15

* $p < 0.05$ vs "baseline" and "recovery".
Conclusions : 1) Despite a slight increase in CO (+13%), the dramatical increase in GMBF (+87%) with dopamine, strongly suggests a selective vasodilator effect of low-dose dopamine on gastric mucosal perfusion.
2) Laser-Doppler Flowmetry appears a promising method to assess gastric microcirculation in critically ill patients.

INTERACTION OF INTERFERON-γ AND ENDOTOXIN WITH PTERIDINES IN THE EXPRESSION OF THE INDUCIBLE NITRIC OXIDE SYNTHASE (iNOS) IN VASCULAR SMOOTH MUSCLE CELLS

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Increasing evidence suggests that the activation of iNOS is the final common pathway for vasodilation in human sepsis associated with endotoxic shock. Activation of the cellular immune system induces the excessive release of the pteridines neopterin (N) and 7,8-dihydroneopterin (NH2) by human macrophages/monocytes. Besides the well established diagnostic value of pteridines in several inflammatory diseases, it is speculated that these substances per se exhibit biochemical functions. Thus we hypothesize that pteridines can modulate iNOS gene expression in vascular smooth muscle cells (VSMC) in vitro. Cultured rat aortic VSMC from female Wistar Kyoto rats were incubated with N (20 µM), NH2 (20 µM), lipopolysaccharide (LPS, 5 µg/ml), and interferone-γ (IFN-γ, 100 U/ml) for 9 h, respectively. iNOS gene expression was measured by competitive reverse transcription polymerase chain reaction. The results are summarized in the table.

Incubation	cDNA (amol/µg total RNA)
N	1.0
LPS	2.5
IFN-γ	15.0
N + LPS	3.0
N + IFN-γ	20.0
NH2 + LPS	1.0
NH2 + IFN-γ	10.0

The present study demonstrates a neopterin induced increase in iNOS mRNA expression at the transcriptional level in VSMC. While coincubation of cells with N + LPS resulted in an additive effect on iNOS gene expression, N + IFN-γ seem to have a more than additive effect. NH2 did not alter iNOS mRNA synthesis, but it suppresses the LPS as well as the IFN-γ induced augmentation of iNOS gene expression. We speculate that this pteridine-mediated modulation of iNOS gene expression is involved in the regulation of the vascular tone in endotoxic septic shock.

HEMOSTASIS PARAMETERS DURING THE PROGRESS OF SEPSIS PHENOMENON

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The relationship of sepsis and coagulation abnormalities is well known, mainly in severe sepsis and septic shock. Still further, the extreme expression of hemostasis abnormalities (disseminated intravascular coagulation) in sepsis, has been extensively described.
We studied the changes in several coagulation and fibrinolysis markers in septic patients, trying to correlate them with the evolution of the sepsis phenomenon, with an emphasis in its early stages, where therapeutic intervention might be more drastic.
In 64 patients , 30 with sepsis , 22 with severe sepsis and 12 with septic shock, as well as in 14 healthy volunteers (control group) we measured : platelet (PTL) , PT-INR , aPTT, coagulation markers [Fxii, Fvii, Fviii, Fvw, Fibrinogen (Fibr), prothrombin fragment 1 and 2 (F1+F2), complex thrombin-Antithrombin] , fibrinolysis factors [plasminogen (plasm), Plasminogen Activator Inhibitor -1 (PAI-1) , Fibrin Degradation products (FDPs) , d-Dimers of Fibrin (d-D), complex plasmin a2 Antiplasmin (PAP) and antihtrombotic factors [Antithrombin III (ATIII), Protein C (PrC) and Proteins S(PrS)].
The definition of sepsis , severe sepsis and septic shock were those of ACCP/SCCM consensus conference (August '92).
We used ANOVA test to compare the sepsis results to the control group and x2-test when appropriated. The following factors-markers were reduced in sepsis : PTL($p<0.01$), Fxii ($p<0.001$), Fvii ($p<0.001$), Plasm ($p<0.001$), PrC ($p<0.01$) ATIII ($p<0.001$) . On the contrary the following indices -factors were increased :PT-INR ($p<0.001$), FvW($p<0.05$), Fibr ($p<0.001$), F1+F2 ($p<0.001$), TAT ($p<0.001$), PAP ($P<0.1$), FDPs ($p<0.001$), d-D ($p<0.001$), PAI -1 ($p<0.01$).

We conclude that all parts of the coagulation system are gradually changed during the evolution of sepsis phenomenon , even in the earliest stage of sepsis.

FAVORABLE HEMODYNAMIC AND METABOLIC EFFECTS OF L-CANAVANINE DURING ENDOTOXEMIA IN THE RAT.

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The expression of an inducible nitric oxide (NO) synthase (iNOS) plays a major role in the pathophysiology of septic shock (SS). Inhibition of iNOS could therefore be of therapeutic value. However, such an inhibition has been shown to be detrimental, increasing tissue anoxia (and end-organ damage), possibly through the simultaneous blockade of constitutive NOS (cNOS). Thus, selective inhibition of iNOS might be more suitable. We evaluated the effects of L-Canavanine (CAN), a more potent inhibitor of iNOS than cNOS, in an animal model of SS. **Method**: In 30 anesthetized rats, catheters were placed in the femoral vein and artery. 23 rats were given an iv bolus of lipopolysaccharide (LPS, 5 mg/kg), at baseline (T0). After 1 h (T1), rats received at random an infusion of either CAN (20 mg/kg/h; CAN group, n=11) or an equivalent volume of 0.9% NaCl (2cc/kg/h; NaCl group, n=12), given over 4 h (T1-T5). A third group (sham group, n=7) received 0.9% NaCl in place of LPS, and then was treated like the NaCl group. Mean blood pressure (MBP), blood lactate and nitrates (NO3) were measured each h. Glucose, creatinine and ASAT were also measured in 18 rats (n=6 in each group). The table gives the **results** at T5.

	MBP (mmHg)	NO3 (µM)	Lactate (mM)	Glucose (mM)	ASAT (UI/L)	Creatinine (µM)
Sham	104±7	32±23	1.0±0.3	7.8±1.2	174±48	42±6
NaCl	76±24†	356±42†	4.9±1.9†	2.1±1.1†	249±59†	57±13†
CAN	98±9*	304±52*†	3.2±1.1*†	3.6±1.4*†	138±46*	48±10*

*p<0.05 CAN vs NaCl †p<0.05 vs sham

CAN suppressed the hypotension, reduced the hypoglycemia and hyperlactatemia, and attenuated the biological signs of renal and hepatic dysfunction induced by endotoxemia. These effects were associated with a lesser elevation of blood NO3, confirming a partial inhibition of iNOS. **Conclusion**: L-Canavanine attenuates the hemodynamic and metabolic consequences of endotoxemia in the rat. These effects may be related to a partial inhibition of iNOS. They contrast with the deleterious effects described with non selective inhibitors of NOS. L-Canavanine could become a new tool for the treatment of septic shock.

PROCALCITONIN:MARKER OF SEPSIS, INFLAMMATION, OR BOTH

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Objectives: High serum levels of procalcitonin (ProCT) have been shown to be associated with bacterial infection. However, few data exist about the ability of ProCT to differenciate septic shock and shock from other origin in which an activation of inflammatory mediators has been also demonstrated.
Methods: Thirteen patients with bacterial septic shock (SS), 11 patients with non septic shock (NSS), 14 patients with bacterial infection without shock (INF) and 8 ICU patients without shock and without infection (Control) were compared for ProCT levels at Day1, 2, 3, 7, 14. Patients were classified blindly and independently from ProCT results. Twelve patients were excluded because any classification was impossible due to mixed pathology. ProCT was measured with chemoluminescence (BRAHMS diagnostica- Berlin).
Results: Day1 ProCT levels are significantly different between the four groups. Day1 proCT levels are correlated with SAPS (p=0.0002), infection (3.7±3 vs 61±25,p=0.0007), shock (13±10 vs 60±27,p=0.002), death at Day28 (12±7 vs 96±44,p=0.003). When shock and infection are introduced in multifactor ANOVA, only infection remains correlated with Day 1 ProCT levels (p=0.003) In patients with shock, Day1 ProCT levels are correlated with SAPS, infection and death at day28, but not with arterial lactate levels (p=0.37), white blood cells (p=0.2) or fever (p=0.1). ProCT levels remain higher in septic shock patients at Day 1, 2 and 3(Figure).

	SS	NSS	INF	Control	
n =	13	11	14	8	
SAPS	18	16.5	9	6.5	
Arterial lactate (mmol/l)	4.9	5.2	2.1	2.3	
ProCT (average) µg/l	105	6.34	20.9	0.01	
ProCT (median) µg/l	24	0.22	0.7	0	*p=0.0003*

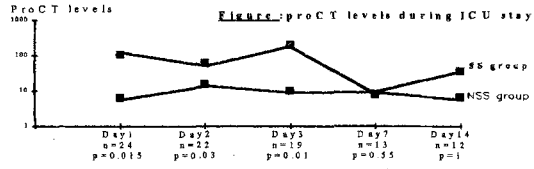

Figure : proCT levels during ICU stay

Conclusion: Procalcitonin levels in the first three days of shock are different between septic and non septic shock patients. In patients with diseases known to induce acute an inflammatory process, procalcitonin seems to be a marker of infection.

ENDOTOXIC SHOCK AFFECTS THE DISTRIBUTION OF BLOOD FLOW WITHIN THE INTESTINAL WALL.

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Objectives: To evaluate the effect of endotoxic shock on the distribution of blood flow between the mucosal and the muscular layer of the intestinal wall.
Methods: In 10 fasted pigs, mean aortic pressure (MAP, mm Hg), cardiac output (CO, ml/min·kg), superior mesenteric artery flow (Q_{SMA}, ml/min·kg), and pHi, where measured before (Control) and after i.v. Endotoxin (10 µg/kg). The blood flow to the mucosal and the muscular layer was measured in 3 regions (proximal jejunum (PJ), mid-small intestine (MI) and terminal ileum (TI)) by colored microspheres, using 8 adjacent samples in each region. The muscular layer was separated from the mucosa by blunt dissection, and the flow determined independently in each layer.
Results: Endotoxin with fluid resuscitation induced the expected decrease in MAP (95.8±3.0 vs 53.9±2.4, p<0.01), and pHi (7.29±0.02 vs 7.13±0.01, p<0.01), with a constant CO (133±4 vs 144±8, p=0.28) and Q_{SMA} (21.5±0.8 vs 22.8±0.9, p=0.09). The results of regional perfusion are presented in the table. (Flow in ml /min · 100g of tissue; mean ± SEM ; * p<0.001 vs Control by two-way Anova)

	Muscular Layer			Mucosal Layer		
	PJ	MI	TI	PJ	MI	TI
Control	109 ±7	95 ±8	105 ±7	35 ±1	23 ±1	17 ±1
Endotoxin	56* ±4	61* ±5	56* ±4	53* ±2	36* ±2	23* ±2

Conclusions: These data indicate that the mucosal flow increased during septic shock. They suggest that a decrease in pHi may be due to hypoperfusion of the muscular layer or to metabolic alterations within the mucosa, despite a 50% increase in flow.

CONTINUOUS ADMINISTRATION OF N-ACETYLCYSTEINE IN SEPTIC PATIENTS (Preliminary Results)

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Objectives: Previous studies have shown that N-acetylcysteine (NAC) given for a short period may be a potent protective agent in sepsis (1,2). We investigated whether continuous administration of NAC in septic patients for as long as sepsis occurs has a beneficial effect in terms of tissue oxygenation indices and outcome.
Methods: Sixteen septic patients who required hemodynamic monitoring were randomized to receive either NAC 150 mg/kg IV over 20-30 min, followed by continuous infusion of NAC 100 mg/kg/day (NAC group) or the same volume of D/W 5% (control). Hemodynamics, blood lactate and pyruvate measurements were done before and immediately after the bolus infusion as well as ½, 2, 24 and 48 hours during the continuous infusion.
Results: NAC was given over (x±SD) 12±8 days (range 3-30) without adverse effects. Age and APACHE II scores were not different between NAC and control group (63±21 vs. 48±21y and 20±5 vs. 19±4, respectively). In the NAC group, CI increased 2 h after infusion from 3.8 to 4.3 L/min and blood lactate levels decreased from 1.9±0.8 to 1.6±0.6 and 1.3±0.1 mMol/L after 2 and 48 h respectively. However, these changes were not significant, neither in the group (p=0.62 and 0.16, respectively) nor between groups (p=0.48 and 0.28, respectively, two-way ANOVA). One month mortality rate was 2/8 (0.25) for the NAC group and 4/8 (0.50) for the control group.
Conclusion: These preliminary data do not confirm that NAC has an apparent beneficial effect in septic patients. However, the trend of NAC group to increase CI, reduce lactates, and improve mortality suggests that NAC may have a therapeutic potential in sepsis.

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COMPARED EVIDENCE OF OXIDATIVE STRESS IN SIRS AND CARDIAC SURGERY PATIENTS.

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In the pathogenesis of systemic inflammatory response syndrome (SIRS), occurring during sepsis, multiple trauma and other severe diseases and leading to multiple organ failure (MOF), oxygen free radicals have been suggested to play an important role.

Objectives: Compare the time course of oxidative stress in SIRS and cardiac surgery patients.

Materials and methods: 10 SIRS patients undergoing surgery (all were septic) (groupS) and 14 non-septic patients scheduled for heart valve surgery with cardiopulmonary bypass (CPB) (groupC). Thiobarbituric acid reactive substances (TBARS) and diene conjugates (DC) as markers of lipid peroxidation, serum total antioxidant capacity (AOC) and red blood cell glutathione content (GSH) as markers of antioxidant state were measured: (T1) before the operation, (T2) 15 minutes after the operation (groupS) or 15 minutes after termination of the CPB (groupC), and (T3) 18 hours after the operation. Student's t-test was used for statistical analysis of data.

Results:

		TBARS (μmol/g prot)	DC (mmol/gprot)	AOC (%)	GSH (mg/er dl)
T1	groupS	16.75±1.20*	530±63.6*	27.0±2.6*	83.29±4.86*
	groupC	7.46±1.46*	358±31.1*	34.9±0.8*	62.8±4.41*
T2	groupS	25.25±2.92	514.0±61.7	28.0±1.9	81.66±6.82
	groupC	34.83±3.20†	493.0±59.3	23.2±1.5†	76.38±6.73
T3	groupS	17.44±3.69	451.0±60.7	27.6±1.5	72.46±4.12
	groupC	10.11±2.73†	353.1±26.1	28.1±1.6†	65.5±4.8

* p≤0.05 between groups

† p≤0.05 compared with preoperative value

Conclusions: SIRS induces similar extent of oxidative stress as it occurs during CPB. These results suggest the possible benefit of antioxidant therapy in both clinical conditions.

MORTALITY IN SEPTIC SHOCK: HAVE WE MADE PROGRESS?

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Objectives: To evaluate a possible reduction in mortality from septic shock over the years.

Methods: We reviewed the clinical literature on septic shock from 1966-1993 (National Library of Medicine -Medline) and additional articles since 1958. Studies with less than 20 patients or studies including only children were excluded. For the publications using the same series of patients, only one of them was referred. Prospective and retrospective studies were included.

Results: 102 studies (70 prospective, 32 retrospective) were collected including a total of 6642 patients. Mean age of 57 years was stable over time (53 publications): r^2=0.31, p=0.28; 62% was male (56 publications). Blood cultures were positive in 55%. The primary site of infection shifted from the abdomen (before 1984, 20/30 studies) to the chest (after 1984, 23/32 studies). The incidence of infections due solely to Gram - bacteria decreased (r^2=0.92) but the incidence of Gram + bacteria (r^2=0.96) or other types (mixed, non bacterial or no growth: r^2=0.56) increased. Mortality rate ranged between 40% and 80% (average 58 %, 78 publications). There was no reduction in mortality rate over time (r^2=0.25, p=0.26).

Conclusions: Despite different definitions of septic shock and populations studied, we documented a shift in source of infection and in the predominant microorganisms, but we failed to find a decrease in mortality rate over time. This may be due to an increased severity of illness of patients with septic shock. Alternatively, the improvements in intensive care may have prolonged survival without increasing it.

Staphilococcus aureus as possible cause of Waterhouse-Friederichsen syndrome

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Introduction: Waterhouse-Friederichsen syndrome, or purpura fulminans, is a well described clinical picture of vasomotor collapse, shock, intravascular coagulation and bilateral necrosis of the adrenal cortex, with progressive development of a characteristic petechial rash, as caused by a meningococcal infection. Other causal agents reported in immunocompetent adults are Pneumococcus, Haemophilus and Capnocytophaga canimorsus. We present the case of a patient in which S. aureus seems to be the causal agent.

Case report: A 19-years old, previously healthy male, underwent a frontal craniotomy for evacuation of an extense fronto-temporal epidural hematoma secondary to a traffic accident, which also caused right parietal hematoma and severe ipsilateral otorrhage. Preoperative Glasgow Coma Scale (GCS) value was 12. At admission in the postoperative care unit, the patient was kept under sedation, mechanical ventilation and anti-edematous medication; 24 hr later, a computed tomography revealed severe cerebral edema, and an intracraneal pressure (ICP) monitor was enabled, showing elevated ICP (65 mm Hg).

Beside the neurological symptoms, the patient developed fever, leucocitosis, and gasommetric worsening; chest radiograms revealed a basal lung condensation, treated with Cefotaxime and Clindamicine. Teicoplanine was added after two consecutive cultures of S. aureus in bronchial aspiration.

Despite this treatment, evolution was deletereous, with presence of higher ICP values, decrease of GCS, fixed midriasis, and generalized petechial rash from the 11th day after surgery, accompanied by high leucocitosis (> 40,000) and intravascular coagulation (Plat.: 32,000; aPTT:40"; Fibr.: 289; Quick: 52 %). With the suspicion of meningococcal infection and Waterhouse-Friederichsen syndrome, high-dosed Penicillin was added.

Two days later, after surmounting two consecutive episodes of respiratory distress, the patient died, with no response to reanimation maneuvers tric.I. Apart from the mentioned S. aureus, no other infectious agent could be demonstrated in blood, bronchial, oropharingeal, urine, liquor or catheter cultures.

Postmortem study: The most relevant data included: Bilateral necrosis of adrenal cortex; subpleural and subendocardic petechia and equimosis; massive bilateral pulmonary hemorrhage; signs of intravascular disseminated coagulation: and signs of septic spleen and liver destruction. The pathologic diagnoses were: 1) Head trauma 2) Waterhouse-Friederichsen syndrome 3) Massive bilateral lung hemorrhage and respiratory distress 4) Respiratory insufficiency and sepsis as causes of death.

Conclusions: The clinical diagnosis of Waterhouse-Friederichsen syndrome was confirmed by the pathology studies, which related no evidence of meningeal alterations. The only infectious agent found was S. aureus, which we suppose to be responsible for the Waterhouse-Friederichsen syndrome in this patient although no such correlation has been previously reported.

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THE ROLE OF GM-CSF IN THE TREATMENT OF SEPTIC ICU PATIENTS

(Preliminary results)

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Aim of the study : To search the possible effects of the growth factor GM-CSF as a complement of the main antimicrobial therapy of septic patients in the Intensive Care Unit (ICU).

Material and method : 8 ICU patients with sepsis due to pulmonary infections received GM-CSF in a subcutaneous dose of 400 mcg daily divided in 2 equal doses for the first 7 daysand 200 mcg in a single dose from 8th to 10th day. White blood cell count (WBC), absolute number of eosinophils in peripheral blood and complement C3 and C4 fractions were measured on days 0, 4, 7 and 10.

Results : No major complications were observed and the mortality rate was not more than the overall mortality at the ICU. There was a 4 fold acute increase in WBC count (from a mean of 10.000/mm^3 to 42.000/mm^3), between the 3rd and the 7th day of therapy. There was a decline of the WBC count to an average of about 25.000/mm^3 after decreasing the daily dose of the medication to 200 mcg. There was no increase in the absolute number of the eosinophils during the whole course of the medication. There was a slight decrease in the C3 complement between 0.26 to 0.29 g/l. Normal values 0.5 to 0.9 g/l. There was no change in C4 values.

Conclusions : An early increase in WBC count was observed (3rd day) without subsequent increase in the number of immature types from bone marrow, probably due to the mobilization of WBC from the periphery and this increase was dose dependent. There was a slight decrease in C3 fraction of complement, probably due to the consumption of this fraction in the process of opsonization. No adverse effects of the medication were observed, during the treatment with the above dose. These data sugest that GM-CSF may be a useful complement to the main antimicrobial treatment of septic ICU patients.

ADHERENCE OF BACTERIA TO CENTRAL VENOUS CATHETERS (CVC)

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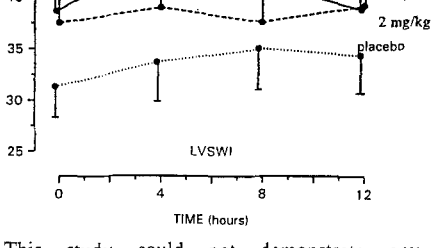
Bacteriological examinations of CVC have been performed of 38 patients from ICU. Pic of CVC was examined after removal and skin swabs from the CVC insertion.Each CVC sampl was devided in two parts.One part was sunk in broth and incubated. The other part was immerged in fisiological solution, exposed to schort effect of ultrasounds, after that washed in fisiological solution, inoculated in nutrition medium and cultivated.
The first sampl of CVC served as indicator of bacterial contamination and the other of bacterial adherence.
Out of 38 CVC from 13 were S. epidermidis isolated, in 1 case Micrococcus, in 1 case multiresistant Enterococcus and in 1 case Enterobacter spp.From samples exposed to ultrasounds, S. epidermidis was isolated in 6 cases and Micrococcus in one case. Nine out of thirteen strains of S. epidermidis were Meticillin resistant.
Skin swabs from 30 patients were bacteriological positive.
Clinical signs of sepsis were not developed in no one patient.
Early removal of CVC and proper local hygiene, with other preventive measures, decrease the possibility of bacterial adherence on the surface of catheters and the risk of bacteriemia ant sepsis.

IL-1ra ADMINISTRATION DOES NOT IMPROVE CARDIAC FUNCTION IN PATIENTS WITH SEVERE SEPSIS

JL Vincent, G Slotman, PAM Van Leeuwen, M Shelly, SA Nasraway, A Tenaillon, J Bander and G Friedman, on behalf of the substudy group on acute hemodynamic effects of Il-1ra.

Objectives: As part of a large multicentric, placebo-controlled, randomized clinical trial investigating the effects of interleukin-1 receptor antagonist (Il-1ra) in the treatment of severe sepsis and septic shock, this substudy evaluated in detail the acute hemodynamic effects of Il-1ra in patients who were invasively monitored.
Methods: In a total of 71 evaluable patients in whom vasoactive support was little altered, hemodynamic measurements were performed at baseline (twice), and 1 hour, 2 h, 3 h, 4 h, 8 h, and 12 h after the administration of 1 mg/kg (N=20) or 2 mg/kg (N=22) of Il-1ra or the corresponding placebo (N=29).
58/71 patients (82 %) were treated with adrenergic agents and 66/71 (93 %) with mechanical ventilation. Data were analyzed by a Kruskal-Wallis test.
Results: During the study, there was no significant difference with time or between groups in arterial pressure, cardiac filling pressures, cardiac index or left ventricular stroke work (figure).



Conclusion: This study could not demonstrate any acute hemodynamic effect of Il-1ra in patients with severe sepsis.

Objectives: In association with the use of aggressive chemotherapy and intravascular devices critically ill patients have emerged as a high risk group for the development of fungal infections.

Methods: In an open prospective randomized study the efficacy of (group I) fluconacole alone (400 mg/qd) and (group II) the combination fluconacole/flucytosine (400 mg/qd - 2,5 mg tid) were tested with the application of (group III) amphotericine B/flucytosine (0,5 mg/kg - 2,5 mg tid). 60 patients with microbiologically or histologically proven systemic mycosis were randomized to 3 groups of 20 patients, comparable in terms of age, sex, hight, weight, and APACHE II Score.

Results: The underlying diseases were mostly (n=43) GI-tract perforations with subsequent peritonitis. The site of infection was checked daily and a serological investigation carried out every 3 days.
The blastomycetes were eliminated in 12 patients in group I, 15 patients in group II and 14 patients in group III. The period from the beginning of therapy to elimination of fungi was a mean of 8.5 days in group I, 7.2 days in group II, and 5.5 days in group III. A death rate of 6 in group I, 5 in group II, and 4 in group III was similar but overall encouraging.

Conclusion: Fluconacole due to its favorable pharmacokinetics and tolerance is our preferred therapy regimen - although fungi could be eliminated earlier in group III.

INCIDENCE OF BACTEREMIA AND SEPSIS IN PATIENTS HOSPITALIZED FOR NONTYPHOIDAL SALMONELLOSIS

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Objectives: Evaluation of the incidence of bacteremia and sepsis in patients with nontyphoidal salmonella (S.) infections. Specification of risk factors, need of ICU treatment, clinical course, and mortality in the group of the patients who developed septic complications.
Methods: Data of all patients with microbiologically proven S. infections hospitalized in the Medical University of Lübeck and in the Southern City Hospital of Lübeck from 1992 to 1994.
Results: Within the observation period S. was isolated from the stool cultures of 748 patients. In 13 patients (9 m, 4 f, median age 52 yrs) S. could be detected in blood cultures (9 S. enteritidis, 4 S. typhimurium). In addition, in 10 of these patients S. was also isolated from other specimens (urine, liquor, and tissue fluids derived from abscess punctures). In all 13 patients with positive blood cultures the clinical course of S. infection was complicated: 7 patients developed MOF (acute renal failure, ARDS, hemodynamic instability, DIC) and required ICU treatment for at least 4 up to 62 days, 4 of the 13 patients died. The predisposing disorders in the patients with S. bacteremia were (n=): AIDS (3), immunosuppressive drugs (2), chronic alcoholism (2), malignancies (2), none (4).
Conclusions: Septic complications in patients with nontyphoidal S. infections are relatively rare (in this study < 2 % of all hospitalized patients with microbiologically proven salmonellosis) but severe (mortality of approx. 30 %). Patients at risk for a complicated clinical course are predominantly those with predisposing disorders but occasionally also patients without evidence for an underlying disease.

PROCALCITONIN IMMUNOREACTIVITY IN SEVERE HUMAN SHOCK

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Procalcitonin (Pro-CT), a 32-amino acide precursor protein of calcitonin has been shown to be increased markedly in pts with systemic complications following bacterial inflammation,septic shock and endotoxinemia. To test the hypothesis, whether Pro-CT-release is associated with low tissue perfusion and hypoxemia, haemodynamic and labaratory data and cytokine levels were monitored at least twice daily during the clinical course of pts with primary cardiac failure versus pts with septic multiple organ failure. Pro-CT was measured by a new ultrasensitive immunoluminometric assay.

	Cardiogenic Shock	Septic Shock
n =	24	22
age (yr)	65 ± 9	58 ± 14
Death (n)	22	18
Duration of Shock (h)	27 ± 37	54 ± 44
Noradrenaline (mg/h)	5,9 ± 6	2 ± 5
Temperature (^{o}C)	38,2 ± 2	38,1 ± 1
PVR (dynxsecxcm^{-5})	1195 ± 408	572 ± 418
CO (L/min)	4,2 ± 1,6	9,9 ± 3,6
Lactate (mmol/L)	7 ± 5,9	9,2 ± 9
Interleukin-6 (pg/ml)	829 ± 798	1331 ± 888
Interleukin-1 (pg/ml)	9,3 ± 9,4	9,8 ± 7,3
TNF-alpha (pg/ml)	23,5 ± 31,7	166 ± 209
Neopterin (nmol/L)	43,2 ± 43,7	218 ± 193
CRP (mg/L)	131 ± 97	233 ± 138
Pro-CT (ng/ml)	22,6 ± 50,5	77,9 ± 160

There was no positive correlation between serum lactate levels, degree of shock, hypoxemia and pro-CT positivity. Pts with septic shock of bacterial origin entirely developed hyperprocalcitoninemia, whereas pts with cardiogenic shock, who expired within 24 h did not. However, in late cardiogenic shock (>24h) all pts developed fever of unknown origin and consecutive hyperprocalcitoninemia. These data suggest bacterial inflammation and/or mucosal translocation of bacterial products in pts with prolonged cardiogenic shock.

EVALUATION OF PARASITE VIABILITY DURING TREATMENT OF SEVERE FALCIPARUM MALARIA (SFM). PRELIMINARY RESULTS

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The use of a loading dose of quinine (16.7 mg/kg base in 4 h) is recommended in previously untreated patients (pts) with SFM, particularly in multi-drug resistance areas. This protocol is difficult to validate, since the viability of microorganisms is not assessed routinely in parasitology laboratories.
Objectives: to examine the evolution of parasite viability during the early phase of therapy of SFM.
Methods: from 02/1993 to 12/94, pts with SFM (WHO 1990) treated with IV quinine for less than 6 h were included prospectively. Blood samples were collected at 0, 6, 12, 18, 24, 36 and 48 h. Viability was assessed by culturing parasitized red blood cells in the presence of ^{3}H-hypoxanthine, and radioactivity was determined at 42 h by scintillation counting. Viability was expressed as the percentage of radioactivity compared to the initial sample. Plasma quinine was determined by liquid chromatography. The ratio plasma quinine (µmol/l)x1000/IC$_{50}$ for quinine (nmol/l) was called the parasiticidal index.
Results: 5 pts were included, 42±14 years, SAPS1 18.6±4.9. The initial parasitemia was 21.4±7.2%. Complications of malaria were coma (4 pts), shock (3 pts), renal failure (2 pts) and acute lung injury (2 pts). All strains were sensitive to quinine (IC$_{50}$ 174±67 nmol/l). In 2 pts who were not given a loading dose, parasite viability increased by 63 and 157%, with concomitantly low quinine levels (22 and 19 µmol/l at 12 h); 1 pt died. In 3 pts that received a loading dose (serum quinine at 12 h = 33.1±2.0 µmol/l) a marked decrease of parasite viability (by 73±10% at 12 h) was shown. Viability was inversely correlated with plasma quinine (r=.677, p=.011) and parasiticidal index (r=.678, p=.01).
Conclusions: Even with fully sensitive strains, the use of a loading dose of quinine seems warranted in severe falciparum malaria in order to reach rapidly adequate plasma quinine levels, necessary to inhibit significantly parasite viability.

POSITIVE BLOOD CULTURES AND SURVIVAL OF ICU PATIENTS

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Objective: To determine the incidence of positive blood cultures, their microbial subgroups and to evaluate the outcome of ICU patients with different bacteremias.

Material and methods: We analysed all positive blood cultures in 3077 consecutive admission to a university hospital ICU in 1992 - 93 and the ICU and hospital survival of the bacteremia patients. During these years 73 patients had 176 positive blood cultures that were considered as clinically relevant, excluding colonizations or contaminations.

Results: Patients with positive blood cultures had an ICU survival of 65.8 % (vs. 92.7 % in all ICU patients) and six month survival of 50.7 % (vs. 85.8 % in all ICU patients). The most common bacteria were enterobacteriaceae (27.3 %), staphylococcus aureus (18.8 %), coagulase negative staphylococci (14.2 %), pseudomonas (14.8 %) and streptococci (9.1 %).

Microbes in blood culture		ICU survival (n / total)	6 mo survival (n / total)
Gram -positive		78 % (25 / 32)	56 % (18 / 32)
	Streptococci	80 % (8 / 10)	40 % (4 / 10)
	Koagulase negative staphylococci	86 % (6 / 7)	43 % (3 / 7)
	Staphylococcus aureus	82 % (9 / 11)	82 % (9 / 11)
Gram -negative		58 % (15 / 26)	46 % (12 / 26)
	Enterobacteriaceae	63 % (10 / 16)	44 % (7 / 16)
	Bacteroides	67 % (2 / 3)	67 % (2 / 3)
	Pseudomonas	43 % (3 / 7)	43 % (3 / 7)
Other bacters		40 % (2 / 5)	40 % (2 / 5)
Multibacterial		58 % (7 / 12)	50 % (6 / 12)
Fungi		33 % (1 / 3)	33 % (1 / 3)

Multiple positive blood cultures and multimicrobial bacteremias has similar outcome as other subgroups.

Conclusions: The outcome of bacteremia patients was not related to the type of micro-organism. A susubstitutional amount of deaths occurs during the first si: months after bacteremia.

SEPTIC SHOCK IN PATIENTS WITH HUMAN IMMUNODEFICIENCY VIRUS (HIV) INFECTION

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Objectives: To evaluate prognostic factors and mortality in consecutive patients (pts) with HIV infection and septic shock.
Methods: From 03-1991 to 12-1993, records of consecutive pts with septic shock (Crit Care Med 1992, 20: 864-74) admitted to the ICU were reviewed retrospectively.
Results: Among 76 pts with septic shock admitted during the study period, 28 had HIV infection-26 of whom had AIDS-(gr. I) and 48 were HIV-negative (gr. II). Ten gr. II pts (21%) were immunosuppressed because of neoplastic or immune disease. Mechanical ventilation was required in 89% gr. I and 83% gr. II pts. In 8 gr. I pts (29%) and no gr. II patient, septic shock was related to an opportunistic infection: toxoplasmosis 1 pt, cryptococcosis 2 pts, mycobacteriosis and cytomegalovirus infection 1 pt each.

	group I (n=28)	group II (n=48)	p
SAPS I	22.2±1.0	18.7±1.0	.025
APACHE II	35.1±1.4	26.0±1.3	<.001
Glasgow scale	9.7±1.0	12.3±0.6	.03
Organ failures (n)	3.7±0.2	3.1±0.2	.001
Mortality (ICU)	93%	50%	<.001
Mortality (d. 28)	96%	45%	<.001

A multivariate analysis demonstrated that HIV infection and SAPS I were independently predictive of death in pts with septic shock.
Conclusions: Evidence of increased mortality, number of organ failures and higher severity scores (SAPS I does not take into account immunosuppression) is demonstrated in HIV-positive pts. Infection with HIV appears to be an independent prognostic factor in pts with septic shock. The frequency of opportunistic infections (often responsible for delayed diagnosis and treatment) may contribute to the poor prognosis in this population.

THE HAEMOSTATIC RESPONSE IN SEPSIS AND ITS RELATIONSHIP WITH THE CYTOKINE INHIBITORY SYSTEM (IL-10).

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Objectives: Interleukin (IL)-10 is a well known potent inhibitor of proinflammatory cytokines production and has been implicated in suppressing procoagulant activity induced by bacterial lipopolysaccharide (LPS) during sepsis. The purposes of this study are to analyze the relationship between IL-10 and haemostatic alterations in sepsis and to know the influence of the severity and the outcome.
Patients and methods: We studied prospectively 75 critically ill patients (54 men, 21 women; mean age 18-82 year old) divided in tree groups: Group 1 (G1), 23 without sepsis; Group 2 (G2), 27 with sepsis; and Group 3 (G3), 25 with septic shock. We analyzed in the first 12 hours after diagnosis: IL-10, coagulation parameters (Protein C (PC), antithrombin III (ATIII), D-Dimer (D-D)) and the fibrinolytic system (alpha2-antiplasmin (α2-AP), plasminogen (PGN), PDF, tissue plasminogen activator (tPA), plasminogen activator inhibitor type 1 (PAI) and functional plasminogen activator inhibitor (f-PAI)).
Results: The values that were found significantly higher in G3 respect to the other groups were: IL-10 (median 54 pg/mL; range 5-6000 pg/ml; $p=0.0001$), DD (median 11073 ng/mL; range 746-37800 ng/ml; $p=0,0009$), PDF (median 1493 ng/mL; range 150-31500 ng/ml; $p=0,03$), tPA (median 40.5 ng/mL; range 8.5-96 ng/mL; $p=0.05$), PAI (median 156 ng/mL; range 9-600%; $p=0,02$) and f-PAI (median 36 UA/mL; range 2.3-43 UA/mL; $p=0,02$). The values were lower in: PC (median 39 %; range 0.1-110 %; $p=0,0001$), ATIII (median 49 %; range 10-89 %; $p=0,0001$). There was an inverse relationship between IL-10 concentration and PC ($r=-0.41$; $p=0.007$) in patients who died and a good correlation between IL-10 and tPA ($r=0.40$;$p=0.004$) and IL-10 and PAI ($r=0.32$; $p=0.005$) in G3.
Conclusions: There is an activation of coagulation (increase of D-D and decrease of PC and ATIII inhibitors) and a blockage of fibrinolysis (increase of PAI levels) in sepsis, especially in patients with shock. The hemostatic alterations during sepsis and septic shock are related to the release of IL-10 by activated monocyte-macrophage.

PLASMA ENDOTOXIN LEVELS AFTER ANTIBIOTIC THERAPY IN SEVERE SEPSIS

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Objective: A prospective randomized study was performed to detect the presence of endotoxin after antibiotic therapy in Gram-negative infected patients.
Methods: Nine multiple injured patients (6 males, 3 females; mean age 25±10 years, APACHE II score on admission 8±2) were included in the study on the day the sepsis score reached 18-29 (day 0). For handling of sepsis they received antibiotic therapy according to antibiotic sensitivity tests. On day 0, blood samples for endotoxin levels were taken just before initiation of therapy as well as in the 1st, 2nd, 3rd and 6th hours after antibiotic administration. As soon as on days 0 and 5 arterial blood gases were measured and laboratory tests for liver and renal function were performed. Mean arterial pressure (MAP), heart rate (HR) and body temperature (T^o) were recorded daily. T paired student test was used for statistical analysis.
Results: Detectable endotoxin was not found in any patient before treatment, but in six patients endotoxemia appeared after antibiotic administration. Endotoxin levels showed a maximum increase in the 1st hour after antibiotic administration and they a constant decline decreased during following hours in all cases ($p<0.05$). Arterial blood gases, renal and liver function were significantly improved in all patients ($P<0.005$). Three patients with the highest plasma endotoxin levels entered in septic shock and died finally.
Conclusion: High quantities of endotoxin are released in the patient's plasma with severe Gram-negative sepsis after antibiotic therapy. This is related with high mortality rate in spite of a significant, however transient, improvement of organ function after therapy.

THE ANTI-INFLAMMATORY RESPONSE DURING THE SEPTIC PROCESS. ROLE OF INTERLEUKIN-10

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Objectives: To determine interleukin (IL)-10 levels in plasma of patients with sepsis and septic shock. To analyze the relationship between plasma IL-10 and the proinflammatory mediators, tumor necrosis factor-alfa (TNF) and IL-6, the underlying severity of the disease and the evolution of patients with sepsis.
Methods: We studied 94 critically ill patients (63 men, 31 women; 18-86 years old) in three diferents groups. Group I: 23 patients without evidence of infection, group II: 34 patients with sepsis and 37 with septic shock (group III). We measured plasma IL-10, TNF and IL-6 levels in the first 12 hours of diagnosis. Severity of illness was estimated with the Acute Physiology and Chronic Health Evaluation (APACHE II) scoring sytem.
Results: Plasma levels of IL-10 were higher in group III (median, 51 pg/mL; range, 5-6000 pg/mL) than in group II (median, 10 pg/mL; range, 2-970 pg/mL; $P<.001$) and group I (median, 5 pg/mL; range, 2-133 pg/mL; $P<.001$). Median IL-10 concentrations did not differ among patients who survived (median 7 pg/mL; range, 2-6000 pg/mL) and those who died during the overall follow-up period (28 days) (median, 15; range, 5-5400 pg/ML); but patients who died in short-term (< 24 hours) with catecholamine-refractory hypotension showed the highest concentrations of IL-10 (median, 1200 pg/mL; range, 51-5400 pg/mL). In patients with bacteriemia (34%), levels of IL-10 were higher (median, 51 pg/mL; range, 2-6000 pg/mL) than in those with negative blood culture (median, 8,5 pg/mL; range 2-5.400 pg/mL; $P<.001$). There was a good correlation between plasma IL-10 concentration and levels of TNF ($r=.59$; $P<.001$) and IL-6 ($r=.60$; $P<.001$). The correlation between levels of IL-10 and the APACHE II score was significant only in the septic shock group ($r=0.48$; $P<.005$).
Conclusions: In septic shock, IL-10 and proinflammatory citokines are released in high concentrations. The significant correlation observed in patients with septic shock between IL-10 levels and APACHE II, short-term death and bacteriemia can possibly be explained by the massive inflammatory response in septic shock with fulminant course.

SPLANCHNIC ORGAN PERFUSION IN SEPTIC PATIENTS : COMPARISON OF GASTRIC INTRAMUCOSAL PH (PHi) WITH INDOCYANINE GREEN (ICG) HEPATIC CLEARANCE

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In septic shock, inadequate splanchnic blood flow may play a prominent role in the pathogenesis of multiple organ failure. Measurement of gastric pHi has been propose to evaluate tissue oxygenation in splanchnic organs.
Objectives: to compare gastric pHi values with hepatic ICG clearance, an index of liver blood flow and function ; to determine if one of these two methods could be proposed to assess the entire splanchnic perfusion in septic shock.
Methods : 6 patients (age : 65±18 years ; SAPS II : 46±16,4) were prospectively investigated (septic shock : Bone criteria). Following parameters were collected during 12 hours : systemic hemodynamic parameters (Swan Ganz catheter 93A434H - REF1 computer - Baxter Lab.), calculated systemic oxygen transport (DO_2), oxygen consumption (VO_2) by indirect calorimetry (Deltatrac Datex Lab.), gastric intramucosal PCO_2 (PCO_2ss) and pHi (TRIP - NGS catheter - Tonometrics Lab.) and plasma disappearance rate of ICG (PDR dye) (femoral artery fiberoptic/thermistor catheter 2024, Cold Z021 computer - Pulsion Medizintechnik,Germany). Correlations were performed using a linear regression.
Results : main data (mean±se) are reported in the table below (48 measurements)

MAP mmHg	**CI** $l.min^{-1}.m^{-2}$	**RSVRI** $Dyn.s.cm^{-5}m^{-2}$	**DO_2** $ml.min^{-1}.m^2$
74±18	5,3±2,5	1045±396	609±269
VO_2 $ml.min^{-1}$	**PCO_2ss** mmHg	**pHi**	**PDR dye** $\%.min^{-1}$
373±115	51±9,3	7,32±0,16	13±7,9

Both gastric pHi and PDR dye values were decreased (PDR dye normal value : >20 $\%.min^{-1}$).
There was no significant correlation between pHi or PDR dye and systemic hemodynamic parameters or oxygen transport variables. PDR dye and pHi (or PCO_2ss) values are significantly ($p<0,05$) but poorly correlated ($r=0,32$).
Conclusions : splanchnic perfusion is not predictable by systemic parameters. Moreover, pHi or PDR dye alone are unable to provid a global assessment of the entire splanchnic circulation. These findings should have important implications when the locoregional effects of therapeutic interventions are evaluated.

Acute lung injury after multiple trauma complicated with sepsis – changes in interleukins and adhesion molecules concentrations.

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Objectives: Evaluate changes in IL-6, IL-8, selectins E, P and ICAM-1 concentrations in connection to lung function in patients with acute lung injury after multiple trauma complicated with sepsis.

Methods: The study concerns 11 mechanically ventilated patients. In 10 succesive days IL-6, IL-8 (RIA), ICAM-1, selectins E, P (ELISA) concentrations, platelet and leucocyte amount, static compliance were measured. Lung injury score (LIS), MOF score, APACHE II and PaO_2/FiO_2 ratio were calculated.

Results: Five patients died. IL-6, IL-8 and selectin E concentrations were elevated in all days with the highest value in second and third days of treatment. Nonsurvivors had higher values of these parameters than survivors but differences did not reach statistical significance. Another trend of changes were observed in selectin P (GMP-140) concentration. In all patients concentrations measured were elevated but in survivors after not significant decrease this parameter in second day another one had simmilar values. In patients who died we noted significant decrease in third day ($p < 0.05$) whereafter prominent increase, significant after seventh day, in comparison to third day value and value in survivors group. ICAM-1 concentrations in all patients reached high levels and in nonsurvivors after four day of treatment significant increase in comparison to survivors we found.

Conclusions: Multiple trauma complicated with sepsis induce rapid elevation of concentrations of IL-6, IL-8 and increased expressior of adhession molecules (selectin E, P, ICAM-1) Measure of ICAM-1 and selectin P concentration determine lung injury severity and prognosis as to health and life.

THE COMPARATIVE EFFECTS OF ENDOTOXIC AND HEMORRHAGIC SHOCK ON RAT PERIPHERAL NERVE BLOOD FLOW IN VIVO.

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Objectives: Up to 70% of critically ill patients with sepsis are reported to have peripheral axonal neuropathy called critical illness polyneuropathy (CIP). Pathophysiology of CIP is unclear, but changes in regional blood flow may be a significant factor. Nerve blood flow (NBF) is reduced in rat models of hemorrhagic shock (H), but no information is available in sepsis. We studied the comparative effect of acute endotoxemic shock (ETX) & H on perfusion of rat sciatic nerve.
Methods: 20 male Sprague-Dawley rats were anesthetized with pentobarbital (ip), instrumented with a tracheostomy, carotid arterial & venous catheters and mechanically ventilated (FiO2=0.5). The left sciatic nerve was surgically exposed. Monitored variables included: a) mean arterial pressure (MAP, mmHg), b) NBF (ml/100 g/min) by laser Doppler flow meter, c) nerve internal arterial diameter (ID μm) by video image shearing and splitting method. After stable baseline measurements were obtained, acute hypotension was induced by randomly assigning the rats to ETX (0.25 B6, Difco) in saline at 1 mg/kg or H. Both interventions produced 50% reduction in MAP within 3 min., which recovered to baseline values spontaneously in ETX group, & by reinfusion of heparinized withdrawn blood in H. Data were analyzed by linear regression, two-way repeated measures analysis of variance followed by Bonferroni-t method. Experimental stages were: (1) baseline, (2) mid- point of MAP reduction, (3) nadir of hypotension, (4) midpoint of MAP recovery, & (5) after stable recovery of MAP.
Results: Transient reduction in MAP was directly related to reduction in NBF in ETX ($r=0.83$, $p<0.001$) & H ($r=0.92$, $p<0.001$) (fig.1). The changes in NBF (and ID) at different stages of transient hypotension were not statistically different between ETX and H groups (fig.2).
Conclusion: Both ETX & H induced shock result in similar reduction in NBF consistent with lack of autoregulation in peripheral nerve vessels independent of etiology. Since CIP is primarily associated with sepsis, it is not likely that acute reduction in NBF alone causes CIP. Direct & indirect neurotoxic effects of mediators of sepsis need to be evaluated.

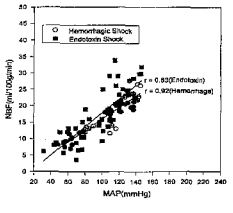

Figure 1

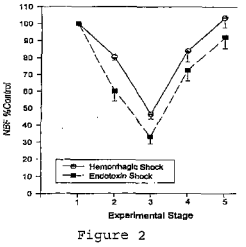

Figure 2

TNF-ALPHA AS A MARKER OF HOST DEFENCE IN SEPSIS

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Serum levels of endotoxin (ETX, BIO-WHITTAKER-SERVA), TNF-alpha (DIANOVA), IL-6 (H.BIERMANN) and percentage of HLA-DR positive monocytes (FACCS, anti-HLA DR, BECTON DICKINSON) were estimated in 45 septic patients of a medical intensive care unit in order to evaluate the degree of infection (ETX, APACHE II) and the competence of host defence (TNF, IL-6, HLA-DR positive monocytes). Investgations were done on establishing the clinical diagnosis of sepsis and then every 2 days till day 8.
Results: Patient survival was characterized by a decrease of ETX, TNF and IL-6, while in non-survivors ETX levels increased, IL-6 remained high and initially very high TNF values dropped. There was no difference in APACHE II scores throughout the eight study days. The table shows initial lab findings.

	PATIENT GROUPS		
	A(n=21)	B(n=9)	C(n=15)
ETX(pg/ml)	1.0+1.48	7.0+0.66	24.3+26.9
TNF(pg/ml)	80.9±79.9	69.5±39.2	44.1±8.2
IL-6(pg/ml)	181.1±188	225.6±143.9	344.5±162.8
HLA-DR+(%)	83.6±17.3	94.3±5.7	93.8±6.2
died(%)	23.8	55.6	46.7

(p<0.05 in group A vs C for all parameters)
Conclusion: Decreasing TNF-alpha level in a persisting infection is expression of incompetence of host defence. IL-6 seems to characterize the extent of infection.

INTERLEUKIN-10 (IL-10) AND SEPSIS

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Objectives : Evaluate the relationship between IL-10, a cytokine which inhibits TNF_α production and protects mice from endotoxin toxicity, and the other proinflammatory cytokines, TNF_α, IL_6 and IL_8 in severe sepsis and septic shock.
Methods : Twenty-eight ICU patients (19 M, 9 F, mean age 54 ± 17 y) were studied as soon as they developped a severe sepsis (n = 16) or a septic shock episode (n = 12) as defined by a conference consensus in 1992 (1). TNF_α, IL_6, IL_8 and IL-10 plasma levels were measured by immuno-radiometric assays from Medgenix (Fleurus, Belgium).

Sepsis state	Number	Apache II	Death	TNF_α pg/ml*	IL_6 pg/ml*	IL_8 pg/ml*	IL-10 pg/ml*
Severe sepsis	16	19.2±6.1	4	55 15-512	1620 60-20000	72 3-3793	25 3-374
Septic shock	12	28.9±6.3	9	399 66-4770	61700 1722-731000	2100 139-31560	206 12-2272
Signification		p<0.05	p<0.05	p<0.05	p<0.01	p<0.01	p<0.05

* geometric mean and range.

Results : The comparisons between cytokine levels in severe sepsis versus septic shock were made using the logarithm of the value in order to normalize the distribution of data, and student test. IL-10 plasma levels were higher in patients with septic shock than in patients in severe sepsis. There was a significant correlation ($p < 0.05$) between IL-10 and TNF_α ($r = 0.6$), IL-10 and IL_6 ($r = 0.73$) and IL-10 and IL_8 ($r = 0.65$) as well as between IL-10 and $Apache_{II}$ score ($r = 0.52$). Patients who died (n = 13) had IL-10 levels higher than patients who survived but this difference was not statistically significant (114 pg/ml vs 34.5 pg/ml; $p > 0.05$).
Conclusions : During severe sepsis and sepsis shock, IL-10 seems at least to follow the same evolution (increase in plasmatic level) with the severity of sepsis as the other cytokines.
Reference : (1) Crit Care Med 1992;20:864-74.

Nosocomial infections in 9 ICU: global results on 2015 patients after standardization of care procedures

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The aim of this work was the prospective study of the incidence of nosocomial infections on 4 sites (vascular, urinary, pulmonary, and blood flow) from the continuous analysis of all hospitalized patients during a 6 months period in 9 ICU.
Methods: Care and sampling procedures, bacteriological analysis, and collecting of data (administrative, clinical, and infectious) were standardized on common written protocols among 3 working groups (nurses, bacteriologists, intensivists). Data were collected on common printed documents, and processed with a specially developed software. Criteria of infections, based on CDC definitions, required always however significative bateriological data.
Patients: Among 3 250 patients, 2 015 stayed more than 48h (62%) and totalized 10 692 days of stay in ICU. Mean length of stay was: 11,7 ±22 days; mean SAPS II: 31 ±17; mean Apache II: 18 ±9; mortality: 14,8%.
Results: 281 patients (13,9%) had 545 nosocomial infections (23,2 per 1 000 days of stay in ICU). 39 patients (1,9%) had 45 catheter related infections (3,9 per 1 000 days of vascular catheter). 158 patients (7,8%) had 256 urinary tract infections (22,1 per 1 000 days of urinary catheter). 89 patients (4,4%) had 124 pneumonia (12,2 per 1 000 days of mechanical ventilation). 96 patients (4,8%) had 120 nosocomial bacteriemia (5,1 per 1 000 days of stay in ICU).
Among 609 identified bacteria, 93 were Staph. aureus (15,3%), 61 Staph. coag. neg. (10,0%), 32 Enterococci (4,5%), 89 Pseudomonas (14,6%), 79 E. coli (11,1%), 26 Acinetobacter (4,3%), 95 other Gram negative bacilli (15,6%), 97 Fungi (15,9%).
Main differences between infected and non-infected patients were: mean length of stay (26,5 vs 8,7 days), mortality (29% vs 12%), mean SAPS II (38 vs 29), mean Apache II (22 vs 17), mean Omega (333 vs 90).
Conclusions: As a result of the standardization of care procedures, the rate of nosocomial infections seems here lower than in many publications.

THE EFFECT OF VASOACTIVE DRUGS ON THE ARTERIAL PULSE WAVE VELOCITY IN SEPTIC PATIENTS

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Pulse wave velocity (PWV) is not a widely used parameter in ICU monitoring, but it can simply be detected without additional equipment from the electrocardiogram (ECG) and arterial pulse wave. In several studies PWV is used to evaluate the effects of antihypertensive drugs on the circulation [1,2]. The aim of our study was to look for changes in PWV in relation to changes of other hemodynamic parameters in septic patients.

Methods: 24 septic patients (mean APACHE II 18, ages 53 - 77 years) have been examined. ECG and arterial pulse wave were digitally registered with a sampling rate of 100 Hz. The PWV was calculated from the time interval (Δt) between the QRS complex in the ECG and the beginning of the systolic pressure wave in the radial artery.

Results: Under enoximone therapy we registered a reduction of blood pressure and an increase in heart rate (HR) and cardiac index (Q). PWV increased from 5.2 ± 0.6 to 6.8 ± 2.0 m/sec. Under prostacycline therapy blood pressure decreased and HR also increased, but Q increased only moderately. PWV in this group decreased from 5.2 ± 0.6 to 5.0 ± 0.4 m/sec. In all patients we found a correlation between PWV and HR ($r = 0.36$, $Y = 3.7 + 0.16 \cdot X$), Q ($r = 0.51$, $Y = 3.8 + 0.28 \cdot X$) and stroke index ($r = 0.47$, $Y = 2.9 + 0.46 \cdot X$). But we could not find any correlation between PWV and blood pressure.

Conclusion: The elasticity of the arteries mainly determines PWV. It is known that age and positive changes in blood pressure reduce elasticity and increase PWV[3]. In our septic patients we could not find this effects. It seems to be possible, that in this septic patients the arteries were maximal dilated, so an increase of blood pressure could not dilate the arteries further more. An increase of cardiac index lead to a faster traveling pulse wave in stiff arteries with high impedance.

1) Cardiovasc Res 1986; 20:563-567; 2) J hum Hypert 1992; 6(5):381-385
3) Wetterer, Arteriensystem, Springer Verlag 1968

BENEFICIAL EFFECTS OF CORTICOSTEROIDS IN SEPTIC SHOCK

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Objectives: To evaluate the effects of steroids on hemodynamics and mortality in septic patients with konwn levels of cortisol concentration.
Methods: Retrospectively we analyzed data of patients with documented septic shock who received steroids after assessment of adrenal function. In all patients hemodynamic parameters as well as the necessary vasoactive medication were assessed, before and 24 hours after corticosteroid medication. Immediately before administration of corticosteroids adrenal function was evaluated with cortisol levels before and after synthetic corticotropin (0.250 mg). Finally we studied mortality. We defined a positive respons on corticosteroids as an elevation of MAP of at least 30 mmHg and/or a decrease in the necessary vasoactive medication of at least 50% within 24 hours. Adrenal insufficiency was defined as a cortisol level after stimulation of less than 500 nmol/l.
Results: 15 of 23 patients were found to respond to steroid medication, 8 did not. Mean cortisol levels before and after corticotropin were 534 ± 366 and 737 ± 396 nmol/l in the responder group (RG) and 583 ±232 and 907 ± 301 nmol/l in the non responder group (NRG). In the RG 9 out of 15 (60%) were found to have an adrenal insufficiency, in the NRG 3 out of 8 (37%). In the RG 2-weeks mortality was 6.7% (1 out of 15), the overall mortality 33% (5 out of 15). Mortality in the NRG was 62% (5 out of 8) ($p < 0.01$) and 75% (6 out of 8) ($p < 0.005$) respectively.
Conclusions: In patients in septic shock there is a beneficial effect of steroids in case of adrenal insufficiency, but also in a subgroup with normal adrenal function.

RELEVANCE OF ICAM-1 IN THE COURSE OF SEPSIS

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Objectives: Intercellular adhesion is a critical step in the accumulation of leukocytes. Postischemic cardiac lymph has the capacity to stimulate ICAM-1. In the coronary microcirculation neutrophils can be trapped and in many cases obstruct capillaries. Previously we found that Troponin T (S-TnT) a marker for myocardial ischemia, was increased in septic patients. The aim of the study was to follow sICAM-1 and S-TnT levels continuously starting at the beginning of sepsis.
Methods: 19 Patients were included in this institutionally approved study after relatives had given their informed consent. All patients were included within 24 hrs following the beginning of sepsis. Blood was drawn every 4 hrs in the first 24 hrs, after 48 hrs, followed once per day for 7 days. S-TnT, ICAM-1, ELAM (ELISA's, Boehringer Mannheim Inc, R&D Systems Ltd.) arterial and venous blood gases were determined, an ECG and a complete hemodynamic measurement including cardiac output were obtained. All patients received adequate volume and catecholamine therapy (norepinephrine, dopamine, dobutamine; median (range) 0.6 (0.0-1.66), 3.12 (2.4-12), 6.29 (0.0-15.3) µg/kg/min, respectively). Statistical analysis: Wilcoxon signed rank-sum test.
Results: [Median (range)]

	Initial value	Maximal value	p
ICAM-1 (µg/L)	635 (203-1237)	869 (389-1421)	0,0117
ELAM (µg/L)	28 (22-723)	49 (26-2562)	0,0277
S-TnT (µg/L)	0.08 (0.0-5.8)	0.45 (0.06-7.6)	0.0003

13 patients had S-TnT levels >0.2µg/L. 11 of these died, whereas only 2 of 6 patients died with S-TnT values <0.2 µg/L (p=0.0296). All patients that died had elevated sICAM-1 levels (232 µg/L:cut-off) whereas in the survivor group only 50% had elevated ICAM-1 levels (p=0,043).
Conclusions: Increased sICAM-1 and S-TnT levels were found during early sepsis in the majority of patients. A high sICAM-1 and S-TnT value was associated with a higher mortality.

Reactive Oxygen Species And Total Antioxidative Capacity In Patients Suffering From Sepsis.

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Introduction: The enhanced production of reactive oxygen species (ROS) by activated macrophages contribute to the injury of endothelial cells and the development of multiple organ failure. The degree of damage may be reduced by intra- and extracelluiar antioxidant activity. The aim of the study was to investigate if there is a difference in ROS-production and Total Antioxidative Capacity (TAC) between healthy controls and patients suffering from sepsis or systemic inflammatory response syndrome(SIRS) and if there is a correlation between ROS and C-reactive protein(CRP) or ROS and TAC.

Methods: The relatives of intensive care patients (n=40), suffering from either sepsis or SIRS, gave there written informed consent to participate in this institutionally approved study. Fourty sex- and age matched healthy colleagues of the hospital staff served as controls. Phorbolester-stimulated chemiluminescence(CL) of EDTA-anti-coagulated blood was measured in the presence of lucigenin as amplifier in a LB 953 luminometer (Berthold, Wildbad, Germany) for the estimation of the superoxidanion concentrations. Potassium peroxochromate was used for the determination of TAC, as the generated oxidants mimic the oxidative burst of phagocytes. C-reactive protein, an unspecific marker of infection, was measured by turbidimetry. The Mann and Whitney U-test was used for statistical analysis.

Results: Seven-fold elevated levels of oxygen free radicals were measured in septic patients, when compared to healthy controls ($p<0,001$). The CL levels correlated small but statistically significant with plasmatic CRP concentrations with $r=0,37$ ($p<0,05$). TAC-values were diminished by 50% in the sepsis/SIRS group ($p<0,01$).

Conclusion: Phorbolester-activated whole blood chemiluminescence showed a small, but significant correlation with CRP-levels in septic patients. Further studies are requiered to determine whether the assays may be used for the rapid follow-up of the disease course in individual patients suffering from sepsis/SIRS.

NONINVASIVE HAEMODYNAMIC MONITORING OF SEPTIC PATIENTS BY IMPEDANCE CARDIOGRAPHY

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The research of the noninvasive haemodynamic monitoring accelerated recently all over the world. The aim of our study was to test whether the changes of the haemodynamic parameters measured by impedance cardiography (ICG) were corresponded to clinical changes in septic patients. Investigations were performed on 20 critically ill post-operative septic patients (their multiple organ failure score was 8-9/with ICG monitor. In 9 cases the investigations were performed in septic shock. The measured parameters were: heart rate (HR), mean arterial pressure (MAP), cardiac output (CO), peripherial resistance (SVR) pre-ejection period (PEP), and ventricular ejection time (VET). These parameters were measured during 3-72 hours in every 30 minutes, depending on the patients clinical condition.

Results: At the septic patients the HR and the CO increased. In septic shock the CO was significantly higher the SVR lower than in the septic group. In the HR there was no difference between the two groups. In septic shock Noradrenalin influenced more effectively the measured parameters than Dobutamin.

Conclusion: The trend of the measured ICG parameters correlated with the clinical changes of septic patient's state. The noninvasive haemodynamic monitoring by impedance cardiography helps the planning and leading the adequate intensive therapy of these critically ill septic patients.

DEVELOPMENT OF SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS), SEPSIS AND SEPTIC SHOCK IN HOSPITALIZED PATIENTS WITH FEVER

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Objectives: To evaluate the development of SIRS, sepsis and septic shock in hospitalized patients with fever, a prospective study was performed on 300 patients using previously defined criteria.

Methods: 300 normotensive patients with fever (temperature >38.0 °C axillary), admitted to the Department of Internal Medicine were evaluated for the existence of SIRS during the first three days of the study and sepsis at inclusion. During a follow-up period of 7 days the patients were daily evaluated for the development of sepsis or septic shock.

Results: Most patients (69%) had or developed SIRS within the first three days, 16 patients (5%) did not. Sepsis was present in 25% at inclusion. In patients with SIRS, 76% did not progress to sepsis or septic shock, 24% progressed to sepsis (mean interval 2.55 ± 1.97 days), and 1 patient (<1%) directly progressed from SIRS to septic shock. In patients with sepsis, 17% progressed to septic shock (mean interval 2.08 ± 1.56 days). Sepsis was preceded by SIRS in 40%. Septic shock was preceded by sepsis in 92% and by SIRS in 8%.

Conclusions: 94% of patients with fever in an internal medicine department develop SIRS, or sepsis. Furthermore, progression from SIRS to sepsis or septic shock is poorly predicted by fever or SIRS. Nevertheless, all patients with septic shock were preceded by SIRS or sepsis. Taken together, this may indicate a severity hierarchy of the syndromes. However, fever, SIRS and sepsis are relatively poor indicators of development of septic shock. This supports further research on additional predictors of septic shock.

DIFFERENTIAL DIAGNOSIS FOR THE ETIOLOGY OF SHOCK: ARE BLOOD NITRATE LEVELS USEFUL ?

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It is sometimes difficult to assert the etiology of a shock state at the bedside. In septic shock, endogenous production of Nitric Oxyde (NO) is increased, which is not the case in cardiogenic shock. NO is transformed to nitrite, then to a final stable product: i.e. nitrate.

Objectives: to evaluate if the blood level of nitrate could help to determine if shock is cardiogenic or septic.

Method: In 14 patients hospitalized for severe shock, blood was drawn on admission to determine nitrates and nitrites by a spectrophotometric method. The etiology of shock (7 cardiogenic and 7 septic) was confirmed by hemodynamic study, microbiology and follow-up.

Results: (Mean ± SD, extremes between parentheses)

	Cardiogenic	Septic	P
MBP mmHg	66 ± 10 (53-79)	63 ± 14 (52-88)	NS
CI l/min/m2	2.3 ±0.6 (1.7-3.4)	4.7 ± 1.3 (2.7-7.2)	<0.01
SVR dynes.sec/cm5	990 ±330 (610-1600)	540±200 (300-790)	<0.01
DAVO2 (ml/l)	56 ± 17 (42-78)	31 ± 6 (22-38)	<0.05
Nitrates µM	43 ± 33 (0-96)	246 ± 179 (132-636)	<0.01
Nitrites µM	1.1 ± 0.5 (0.6-2.1)	2.2 ± 1.4 (0.8-4.6)	NS

MBP = mean blood pressure
CI = cardiac index
SVR = systemic vascular resistances

In comparison with patients in cardiogenic shock, patients in septic shock exhibited significantly higher blood nitrate levels. There was no difference between the two groups of patients in blood nitrite levels.

Conclusion: In patients presenting with severe shock, for which cardiogenic or septic etiology is not obvious, blood nitrate levels could be useful. This test is technically easy and could be done before the instauration of an invasive hemodynamic monitoring.

APPLICATION OF SODIUM HYPOCHLORITE FOR PREVENTION AND TRATMENT OF BRONCHOPULMONARY COMPLICATIONS IN PATIENTS IN THE SETTING OF THE INTENSIVE CARE UNIT

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In recent years sodium hypochlorite (SH) has been successfully used to eliminate pyo-septic complications. Moreover, the mechanism of the SH effect on the immune system has not been sufficiently studied. The aim of the present investigation was to study the mechanism of SH effect in inflammatory pulmonary diseases. 20 patients with double pneumonia were subjected to the evaluation. SH in the concentration of 600 mg/l in the volume of 400-800 ml/24 hours was administered by drop infusion into the central vein. To evaluate one of the defence systems the leukocytes activity by the chemoluminescence technique was studied. In all the patients baseline secondary immunodeficiency which was indicated by the decrease in the luminescence level was established. Even 1 hour after the SH administration the leukocytes activation exp- ressed by the enhancement of their chemoluminescence 0.5-5 times was observed. This supports the available findings that accumulation and liberation of the oxygen active forms (O_2^-, $^{\cdot}OH$, $^1O_2$, H_2O_2) are accompanied by the increased phagocytosis, i.e. the signs of "the oxydation explosion" testify to the favourable SH effect on the course of inflammation processes. The use of SH permitted to decrease the percentage of lethality in double pneumonia by 15% in the intensive care unit over the year.

At the same time, excessive activation of free radical oxygen may be a damaging factor. Therefore, precise individual control over the choice of concentration, dosage and the preparation administration rate is required.

Prospective, double-blind, placebo-controlled, trial of ATIII substitution in sepsis

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Objective: Pilot study to evaluate the efficacy and safety of ATIII substimtion therapy in patients with sepsis. Efficacy assessed using change in mortality or organ failure/dysfunction.

Methods: Adult patients meeting a definition of sepsis and cared for in a tertiary care academic medical center in Chicago were identified and prospectively randomied to receive either ATIII (Kybernin P) or placebo in a double-blind treatment protocol. All other therapy and patient management were under the direction of the patient's attending physician. All patient's were followed for 28 days and the organ dysfunction/failure were scored using published scoring systems (Jordan et al Crit. Care Med. 1987, Goris et al Arch. Surg. 1985, Knaus et al Ann. Surg. 1985).

Results: 34 patients were enrolled, 20 females and 14 males. 65 % of the patients were hypotensive at the time of enrollment. The median APACHE II score for the ATIII group was 21.5 (range 2–29) and 17.0 (range 6–31) for the placebo group at study entry (NS). The ATIII % activity at entry was 75.8 + 18.0 % for the ATIII group and 78.1 + 16.8 % for the placebo group (NS) (nl > 75 % activity). There were no significant differences between the organ failure scores between the two groups, however there appeared to be a trend toward greater dysfunction in the ATIII group. The overall mortality rare was 17.6 % with a 22.2 % mortality rare in the ATIII group and a 12.5 % mortality rate in the placebo group (NS). No safety issues were identified.

Conclusion: ATIII infusions were safe in septic patients. Efficacy was not demonstrated in this study possibly related to the smaller number of patients studied, the low overall mortality rate, and possibly some inequalities related to the randomization process.

CONTINOUS ARTERIOVENOUS HAEMOFILTRATION (CAVH) AND THE TREATMENT OF ADULT DISTRESS RESPIRATORY SINDROME (ARDS) IN SEPTIC PATIENTS.

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Objectives: Evaluate the efficacy of CAVH in septics patients with ARDS and multiorganic disfunction.

Material and Methods: All the patients with sepsis and multiorganic disfunction, complicated with ARDS, were submited to CAHV. All were ventilated with muscular relaxants and sedation with propofol. The thermodiluition haemodynamic evaluation using a Swan-Ganz Corodyn® catheter and the CAVH in femural veins Gambro FH66 Kit® was used in all of them. We analise in general the age and sex. SAPSII, stay, admission diagnosis. PaO2/FiO2, cardiac index (IC), median blood pressure (PAM), pulmonar wedge pressure (PAWP), sistemic vascular resistences (SVR), VO2, DO2, O2 tecidular extration (OER) and haemofiltration time. The evaluation was done in three phases: Phase 1 before the CAVH, phase 2 after 12 h with dobutamine and CAVH, and phase 3 after ending CAVH. We consider two patients groups: the survived (S) and no-survived (NS). We analised and compared them.

Results:

	phase 1		phase 2		phase 3	
n=12	S	NS	S	NS	S	NS
MAP	103.8±25	91±15	96.8±27	91±21	95±23	82±13
CVP	16.5±4.9	14.7±7.4	12.1±4.7	12.2±3.7	15.8±5.5	10.7±7.7
PAWP	15.2±2.6	16.4±4.3	14.6±4.3	13.7±4.4	17±4.8	13.5±7.2
IC	7.5±2.2	7±3	6.9±1.9	6±2.5	7.7±2.3	5.7±2
VO2	191±73	223±87	208±97	147±18	240±60	186±29
DO2	834±267	851±345	760±267	669±174	1058±267	733±244
OER	22.5±7.8	23.7±4.8	26.6±4.2	24.5±7.1	22.1±3.2	27.2±7.1
PaO2/FiO2	141±68	119±62	231±80	168±28	231±80	245±74
UF/H			885±196	794±109		
CAVH (hours)			59.6±23	180±136		

Conclusions: When we met the Shonaeker objectivs, the mortality and the prognosis were better. Those criteria were obtained with the traditional factor like dobutamine, but CAVH was an important measure. They acts synergically in the optimization of the left ventricular work index, and fundamentally CAVH seems to have an important role in the better respiratory evaluation, leaving yet the possibility to control the fluids entrances. Although comproved it's not accepted the importance in the elimination of the sepsis mediateurs like FNT and IL-6 with haemofiltration, stopping the evolution to multiorganic failure and decrease the mortality. With ours clinicals results, we could say that CAVH in multiorganic disfuntion septic patients, seems to be an optimal suport or treatment maesure.

POTENTIATION OF LIPOPOLYSACCHARIDE (LPS)-INDUCED NITRIC OXIDE (NO) SYNTHESIS BY SERUM IN CULTURED AORTIC SMOOTH MUSCLE CELLS.

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Objectives: Since some biological effects of bacterial endotoxin require an interaction between the LPS molecule and a serum factor(s), we hypothesized that LPS-induced NO production and cGMP accumulation in vascular smooth muscle cells (VSMC), a mechanism thought to underlie cardiovascular collapse associated with septic shock, is modulated by serum factor(s).
Methods: Cultured VSMC from rat aorta were challenged with E. Coli LPS for 4-6 hours either in the presence or absence of fetal calf serum (FBS), and NO production was monitored by radioimmunoassay determination of cGMP content of HCl extracts.
Results: In the absence of serum, 1000 ng/ml LPS was required to increase cGMP levels, whereas the presence of 10 % FBS shifted the LPS concentration curve 100 times to the left. Similarly to FBS, human serum also potentiated LPS-induced cGMP accumulation. In contrast to LPS, serum had no effect on cGMP accumulation elicited by sodium nitroprusside, a NO releasing agent, suggesting that the sensitivity of VSMC to generate cGMP in response to exogenous NO is not modulated by serum. Heat inactivation (>80 °C, 30 min) but not removal of small molecules (<10,000 D) from the serum by dialysis, reduced the potentiation of cGMP accumulation by serum. Time course studied indicated that serum is required within the first 120 min of LPS exposure to increase cGMP levels. To investigate whether the effect of serum is specific for LPS, we treated the cells with increasing concentration of interleukin 1-β (IL-1). 10% FBS shifted the IL-1-induced cGMP responses five times to the left.
Conclusions: Our study suggests that lower concentrations of E. Coli LPS and IL-1 require a heat labile macromolecule in the serum in order to elicit NO production. This factor is present in the human serum and it may play a potentially important role during NO synthesis induction in VSMC.

HAEMOFILTRATION IN THE TREATMENT OF SEPTIC SHOCK

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Objectives: asses the influence of haemofiltration (HF) in the respiratory function and haemodinamic status in septic shock without oliguria.

Methods: 3 patients with septic shock were submitted to "zero-balanced" arteriovenous haemofiltration. Changes in respiratory function and haemodinamic status with HF were determined by examining PaO2/FiO2 (PF), CO, CI, PCWP, LVSWI and necessity of vasopressor support.

Results:

Patient	Age	Indication	Primary disease	HF	UF/h	Outcome
1	65	ARDS/septic shock	Legionella pneumonia	3 days	1100,66 ml/h	Survived
2	37	ARDS/septic shock	Legionella pneumonia	4 days	980,13 ml/h	Died
3	72	Septic shoc	Peritonitis	4 days	1268,24 ml/ h	Survived

In the 3 patients we obtained better results of respiratory function and haemodinamics status after HF, demonstrated by (average values):
Phase 1 (before CAVH): PF= 72,9, CO= 9,5, CI= 5,1, PCWP= 17,7 LVSWI= 25, dopamine= 22,3 µg/Kg/min, dobutamine= 10,9µg/Kg/min, norepinephrine= 1,5µg/Kg/min.
Phase 2 (after CAVH) PF= 164,9, CO= 10,6, CI= 6, PCWP= 16,7, LVSWI= 57,4, dopamine= 2,3 µg/Kg/min, dobutamine= 7,8µg/Kg/min, norepinephrine= 0,4µg/Kg/min.

Conclusions: Human septic shock requires early and simultaneous application of different therapeutic approaches to counteract the dynamics of this life-threatening illness and to improve the still high mortality rate.

The most substantial result of this study was that the process of HF ultrafiltration in septic shock had a favourable influence on haemodinamics and respiratory function..

The results obtained from this study are merely encouraging, although future research, with prospective clinical trials must be made, to substantiate the view that this new treatment modality is of proven value in the therpy of septic shock.

ACQUISITION AND OUTCOME OF METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* BACTEREMIA IN AN INTENSIVE CARE UNIT

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Objective: To evaluate the factors of acquisition and the outcome of methicillin resistant *Staphylococcus aureus* (MRSA) bacteremia in an intensive care unit (ICU).
Methods: All patients in which bacterermia due to *staphylococcus aureus* developed >72 hours following admission to our ICU, during a 10 year period (january 83 through january 94) were reviewed. 30 patients (pts) were included, mean age 68,1y (SD 13,1), SAPS 2 35,9 (SD 11,1), Mac Cabe (1 and 2) 53%, mortality directly due to sepsis 30%. 16 pts had MRSA bacteremia and 14 methicillin susceptible *Staph. aureus* (MSSA). Both groups were compared using the chi square (with correction of Yates), Fisher's exact, student's t or Wilcoxon test.
Results: There was no statistically significant difference between MRSSA and MSSA regarding at age (71,8± 4,8 vs 63,9± 1,8), SAPS2 (33,6±6,6 vs 38,2±14,1), use of vancomycin (94% vs 71%), mechanical ventilation (94% vs 100%), number of days (d) before the drawing of the first positive blood culture (median 20 d, range 7-150 d vs median 30 d, range 7-120 d). More MRSA than MSSA pts had previous use of nonsteroidal anti-inflammatory drugs (NSAID) (25 % vs 0% p<0,001), central venous catheter infection due to *Staph.aureus* (62,5% vs 14% p<0,01), but previous use of antibiotics was not significantly different (37,5% vs 21%). The outcome of the bacteremic pts was not statistically different: SAPS 2 at the first day of bacteremia (33,6±7,2 vs 40,7±14,5), severe sepsis and septic shock (31% vs 28%), persistence of the bacteremia (43% vs 78%), mortality directly due to bacteremia (25% vs 45%).
Conclusion: Previous use of NSAID, infection of venous central catheter are more frequently associated with MRSA bacteremia. Thus, similar to others studies (Hershow Infect Control Hosp Epidemiol 1992;13:587-593), these results do not indicate that MRSA is associated with increased virulence.

NOSOCOMIAL INFECTION - A FACTOR OF PRIORITY FORMATION OF MULTIPLE ORGAN FAILURE IN SEPSIS.

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Objectives: To closer definition of MOSF formation mechanismes in nosocomial sepsis (NS) the complex clinicobiochemical, microbiological, immunological, functional examination of 62 cases with NS had been done.
Methods: Examination of cellular and humoral immunity, nonspecific immunologic reactivity, systemic and hepatic circulation, microbiological examination of blood, electro- and echocardiography, sonography and computer tomography of chest and abdomen organs were obligatory. Autopsy findings of 5 dead cases had been analized.
Results: In 45 cases (72,6%) opportunistic pathogen microscopic flora (Staphylococcus aureus, Staphylococcus epidermidis, Staphylococcus saprophyticus) had been found out in blood inoculations. In 36 cases (58%) side by side with destructive process in lungs the bacterial endo- and myocarditis with blood circulation failure had been determined. In 21 cases (34%) simultanious lesion of three organs (heart, lungs, liver) had been found. Morphologic examinations of 5 dead cases (8%) internal revealed involvement of them in MOSF-syndrome. Hyperplasia of adenohypophysis; sclerosis of adrenal glands cortical layer; perivascular brain oedema, paralysis of brain capillaries and plasmorrhagia, cerebral thrombosis and cerebral abscess, necrobiosis of epithelium tubules of the kidney, pletora of hepar, fatty and granular degeneration of hepatocytes had been found. Atrophy of white pulp and hyperplasia of red pulp, supress of lymphoid tissue, plethora and formation of infarctious had been found in spleen. Mentioned changes in spleen were indispensable in NS.
Conclusion: In NS spleen can not secure it functions to support and appropriate detoxication potencial of organism, elimination of microbes, toxines, autoallergenes. Insolvency of immunological link of antimicrobic defence is the starting mechanism of MOSF developmentin NS.

GUT OXYGENATION IN ENDOTOXEMIC PIGS DURING SHOCK AND RESUSCITATION : Effects of fluid loading and dobutamine.

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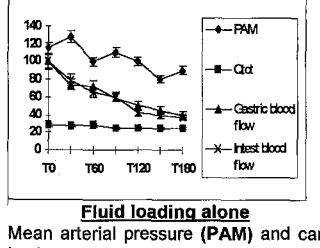
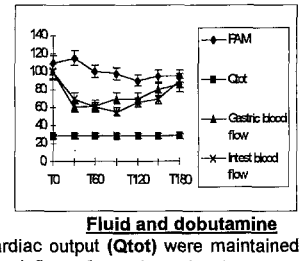
Several studies have described hypoperfusion of intestine during sepsis. However, it is unknow whether the mesenteric blood flow is associated with mucosal hypoperfusion. Additionally, the effects of resuscitation on the intestinal microcirculation remain controversial.
Objectives : to describe the effects of endotoxin in a porcine model during shock and resuscitation.
Methods : Ten pigs (30 kg) were anesthetized and instrumented for measurement of cardiovascular variables. Gastric and gut oxygenation were assessed by intra-mucosal pH and microvascular laser Doppler flowmetry. After baseline data collection, a 30 minute intravenous infusion of *Escherichia coli* (serotype 34H4113, Sigma, St. Louis, MO) was begun at a rate of 150 µg/kg. An infusion of either saline at 1.7 ml/kg/min (Group I; n=5) or saline and dobutamine at a rate of 5 µg/kg/min (Group II; n=5) was begun 30 mn after the end of the endotoxin infusion.
Results :





Fluid loading alone **Fluid and dobutamine**

Mean arterial pressure **(PAM)** and cardiac output **(Qtot)** were maintained in the two groups. Microvascular blood flow of gastric and gut mucosa were decreased in the saline group whereas it were restored in the saline plus dobutamine group. Gastric and gut intra-mucosal pH **(pHi)** decreased in the two groups at the end of the endotoxin infusion but was not restored by either saline or saline plus dobutamine infusion.
Conclusion : Our data indicate that microvascular alterations are important factors in regulation of mucosal hypoperfusion during endotoxemia.

EFFECT OF CONTINUOUS VENO-VENOUS HEMOFILTRATION (CVVH) ON SEPSIS

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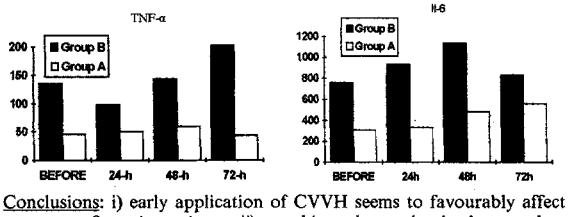
Objectives: Much controversy exists concerning the beneficial effects of CVVH on sepsis. We studied the effects of CVVH application on septic patients with reference to the following parameters: i) survival rate ii) cytokines' removal and iii) timing of CVVH onset.

Methods: 20 patients with sepsis (criteria according to ACCP/SCCM, 1992) underwent CVVH as soon as they developed renal failure or dysfunction (urinary output<250 ml/8h, Cr>2.5 mg/dl and BUN>60 mg/dl). Specimens were collected: Blood samples before CVVH and therafter both blood and ultrafiltrate (UF) samples on 24, 48 and 72 hours. Cytokines TNFa, Il-1 and Il-6 were measured by the immunoassay method in all specimens (UF and plasma - P) and sieving coefficient ([UF]/[P]) and 24 h solute mass transfer of TNF and Il-6 were calculated (V_{24h} x [UF]). The APACHE II score before CVVH onset, the duration of ICU stay and the timing of CVVH application related to the sepsis onset in days (TA) were recorded.With respect the mortality two groups were formed, i.e. Group A (survivors) and Group B (non-survivors). The morbidity period in days of those septic patients who died in the past year and were not subjected to CVVH (Group C) was compared to that of group B.

Results: Group A included 8 pts and group B 12 pts with mean±SD age (65 ±19 vs 64±9, NS) and APACHE scores(24±2 vs 24±2.2, NS). The mean TA± SD was 3.6±2 vs 10±6, p<0.05. The mean±SE morbidity period of Group B vs Group C was 20±4 vs 8±0.8 p<0.05. The mean values of cytokines are presented in the following figures. The sieving coefficient for TNF was 0.2 and for Il-6 was 0.25. The solute mass tranfer was 6-fold the actual plasma content at a given time.



Conclusions: i) early application of CVVH seems to favourably affect the outcome of septic patients. ii) cytokine plasma levels do not decrease although cytokine removal is substantial. iii) it seems that CVVH application in sepsis of any stage helps to buy time for further treatment.

SIGNIFICANCE OF OXYMETRIC PARAMETRES IN TISUE HYPOXIA DETECTON IN EARLY STAGE OF SEPTIC SHOCK

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The most commonly monitored variables in shock stages include : arterial pressure, heart rate, central venous pressure, pulmonary artery wedge pressure and cardiac index. With vigorous therapy it is possible to bring these values back into the normal range in both survivors and nonsurvivors. Therapeutic goal in septic shock stages is to maximize the values of cardiac index, O2 delivery (DO2) and O2 consumption (CO2).

Objectives: The main purpose of this article is to determine the relationship between O2 delivery an O2 consumption as a sign of hypoxia.

Results: Fifteen patitents with septic shock were treated with intention to maximize the value of CI,DO2 and VO2. We compared the levels of these parameters between the survivors and nonsurvivors and found no significant differences after 24 hours.

Conclusions: High levels of DO2 and VO2 may not guarantee against tissue hypoxia in early stage of septic shock.

ANALYSIS OF BURN SEPSIS IN DEPARTMENT OF PLASTIC AND RECONSTRUCTIVE SURGERY, NOVI SAD, YUGOSLAVIA

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Objectives: Evaluation and mutual comparison of clinical signs, laboratory data and microbiological monitoring in the patients with burn sepsis.

Method: Retrospective analysis of the recorded data of all burn patients treated in our Department between January 1989 and December 1994. Specially attentions were given to data considering wound infection, positive haemocultures, positive urinocultures and characteristics of septic state.

Results: Out of 372 patient there were 324 (87,09%) adults and 48 (12,90%) children. Almost two thirds of the patients (238 - 63,97%) were males. The predominantly cause (68,75%) of children's burns was scalding by hot liquids and flame burns (63,97%) in adult patients. The most frequently species isolated from surface swabs were Pseudomonas aeruginosa (64,17% in adult patients) and Staphyloccocus epidermidis (78,57% in children). In only five patients (1,34%) the haemocultures were positive - Pseudomonas aeruginosa was isolated in three and Staphyloccocus aureus in two patients. Urine infection was diagnosed in 6,72% of all patients. The treatment protocol included use of Imipenem and polyvalent Pseudomonas vaccine against Pseudomonas aeruginosa and Vancomycin and aminoglycosides against Staphylococcus aureus. Total mortality rate in this group of burned patients was 6,98%, but the mortality rate caused of sepsis was low (1,34%).

Conclusions: Early detection of any signs of wound infection and symptoms of septic state is a foundation for prevention and treatment of burn sepsis. The burn sepsis could be reliable detected by continuously monitoring the patient's status and by systematic microbacteriological monitoring of the burned patients.

NORADRENALINE DOES NOT ALTER SPLANCHNIC BLOOD FLOW IN HYPERDYNAMIC VASOPLEGIC SEPTIC SHOCK

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Splanchnic ischemia is described as a common feature of septic shock and could determine the development of MSOF. Therapy such as noradrenaline (NA) aiming at improving blood pressure is expected to worsen splanchnic ischemia by its vasoconstrictive effect and subsequent reduction in intestinal blood flow.
Objective : Evaluate the effect of NA on splanchnic blood flow.
Material and method : In a patient admitted for variceal bleeding, ARDS and sepsis with positive blood culture, a fiberoptic catheter was positionned in the portal vein after recanalisation of its portosystemic stent shunt. Blood pressure (BP-mmHg), CI, SVR, DO_2 (Vigilance^R Baxter), VO_2 (Indirect colorimetry), arterial, mixed venous and portal vein blood gases, pHi were determined before (TO) and during (T1) NA infusion (0,1 to 0,19 µcg/Kg/min.). Changes in splanchnic flow were assessed by changes in portal oxygen saturation (SPO_2) and arterio-portal oxygen saturation gradient (SaO_2 - SPO_2).
Results : 5 tests were performed in this patient. Data are expressed in mean ± SD and given in table 1.

	DO2 ml/min/m²	*VO2 ml/min/m²*	*Lactate mmol/l*	*pHi*	*SPO_2 %*	*SaO_2-SPO_2*
TO	*689±47*	*161.9±6.5*	*1,08±0,28*	*7,37±0,15*	*80.9±4,1*	*11.9±3,6*
T1	*780±82*	*168±2.8*	*1.06±0,2*	*7,4±0,23*	*84.6±4,5*	*9.1± 3.7*
p.	*<0.05*	*<0.05*	*N.S.*	*N.S.*	*<0,05*	*<0.05*

For all 5 tests, NA infusion induced an increase in BP (67±6,8 vs 96±4,6 mm Hg), CI (5388±424 vs 5786±566 ml/min./m²) and SVR (471±75 vs 643±92 dyn.cm^{-5}) at TO and T1 respectively (p<0,05). DO_2 and VO_2 significantly increased after NA. Lactate and pHi were not modified by NA. SPO_2 increased significantly whilst SaO_2-SPO_2 gradient was reduced.
Conclusion : Despite a peripheral vasoconstrictive response to NA demonstrated by an increase in BP and SVR, splanchnic blood flow was increased, as assessed by a rise in SPO_2 and a reduction in SaO_2-SPO_2 gradient. In this type of hyperdynamic vasoplegic shock, NA might not be deleterious for splanchnic blood flow.

PROGNOSTIC VALUES OF PLASMA IL-8 IN SEPTIC SHOCK (SS) AND SEVERE SEPSIS

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Aim of the study : Prospective determination of plasma levels of TNFα,IL1-b, IL-6 and IL8 in patients with SS and their correlation with the type of microorganism and outcome.
Material and methods : In 19 patients (pts) with SS and severe sepsis, plasma levels of TNFα, IL1-b, IL6 and IL8 were determined every 8 hours for 3 days and on day 7 after fulfilling the criteria of SS and severe sepsis.
Results : In 9 pts, sepsis was caused by a Gram (-) microorganism, in 6 pts by a Gram (+) and in 4 pts no microorganism was identified. There were 12 survivors (63%) (S) and 7 non-survivors (37%) (NS). Cytokines profiles and levels were not different between Gram (+) and Gram (-) sepsis. IL1-b levels were seldom elevated whatever the group studied. TNFα and IL-6 were significantly higher in NS than in S (table).

	TNF (pg/ml)			IL6 (pg/ml)			IL8 (pg/ml)		
	J1	J2	J3	J1	J2	J3	J1	J2	J3
NS	333,8 ±376	210 ±226	128 ±102	103839 ±158681	16335 ±26771	5451 ±10367	524 ±493	376 ±420	300 ±482
S	77 ± 79	43 ±49	30 ±20	3234 ±6285	454 ±907	45 ±52	119 ±203	29 ±29	18 ±16
P	<0,05	0,05	0,05	0,05	=0,05	0,07	<0,05	<0,01	<0,05

For all determinations obtained, IL8 was more significantly elevated in NS compared to S.
Conclusion : In this study, cytokines levels and profiles are not influenced by the type of microorganisms. As expected, high levels of TNFα and IL6 are observed in non survivors. High plasma level of IL8 also appear to be a good indicator of poor outcome.

INFLUENCE OF VOLUME LOADING AND CATHECOLAMINES ON SUSHEPATIC OXYGEN SATURATION (SHO_2) IN SEPTIC SHOCK

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Therapy aiming at improving blood pressure and cardiac index in septic shock (SS) might have deleterious effects on regional blood flow.
Objectives : Compare the influence of volume loading (VL), Dobutamine (Dobu) and Noradrenaline (NA) on sushepatic oxygen saturation (SHO_2) and SVO_2-SHO_2 gradient in treated SS.
Material and methods : In patients with SS. CI (Thermodilution), DO_2, SVO_2, SHO_2, SVO_2-SHO_2 gradient and Lactate (L) were determined before (T0) and after (T1); VL, Dobu and NA.
Results: In 5 patients with treated SS, 16 tests were performed (VL n=8; Dobu n=4; NA n=4). Results are expressed in mean ± SD.

	SVO_2(%)			SHO_2(%)			SVO_2-SHO_2		
	VL	Dobu	NA	VL	Dobu	NA	VL	Dobu	NA
T0	65,4 ±5,9	71 ±3,8	71 ±1	43,3 ±13	51 ±6	60,9 ±7,6	22 ±9	20 ±3,8	10,5 ±6,9
T1	69,2 ±5	70,8 ±3,7	73,2 ±2,7	50,1 ±13	57,6 ±5,6	54,7 ±8,2	19 ±10	13,2 ±3,1	18,4 ±9
p	0,08	NS	NS	<0,05	<0,01	<0,05	NS	<0,01	<0,05

VL, Dobu and NA induced a significant increase in DO_2 [536±149 at T0 vs; 620±135 ml/min/m² at T1 (p<0,05)] but without significant change in SVO_2. SHO_2 was significantly increased after VL and Dobu, but significantly reduced after NA. SVO_2-SHO_2 gradient was not modified by VL, significantly reduced after Dobu and increased by NA. Lactate were not modified.
Conclusions : In these patients with SS, despite similar changes in DO_2 and SVO_2 after VL, Dobu and NA, SHO_2 and SVO_2-SHO_2 did not evolve similarly. Dobutamine seems to selectively increase splanchnic flow while NA reduces it. Regarding splanchnic blood flow, NA should be used with caution in septic shock.

The effects of 546C88 on left ventricular performance in patients with septic shock

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Objective: To evaluate the effects on the nitric oxide synthase inhibitor L-N^G-Methylarginine HCL (546C88) on myocardial performance in human septic shock.
Method: Septic shock was defined as severe sepsis with either persistent hypotension (mean arterial pressure; MAP < 70 mmHg) or the requirement for a noradrenaline (NA) infusion ≥ 0.1 μg/kg/min with a MAP ≤ 90 mmHg. Cardiovascular support was limited to NA ± dobutamine (DB), 546C88 was administered for up to 8 h at a fixed dose-rate of either 1, 2.5, 5, 10 or 20 mg/kg/h iv. During 546C88 infusion, NA was to be reduced and if possible withdrawn, whilst maintaining MAP above 70 mmHg and the cardiac index (CI) as clinically appropriate. Assessments were made at baseline (t = 0); at 1 h from the start of treatment (t = 1); and at the end of treatment (t = 8) with 546C88.
Results: median values (* assessment made at 8 h or when 546C88 discontinued).

546C88 mg/kg/h	Time h	NA/DB rate μg/kg/min	CI L/min/m²	SI mL/m²	PAOP mmHg	SVRI dyn.sec/cm⁵/m²	LVSWI g.m/m²
1.0	0	0.78/11	4.34	41.6	14	1104	31.9
(n = 6)	1	0.78/11	4.55	38.8	14	1121	31.5
	8*	0.43/11	4.68	42.6	17	1169	32.7
2.5	0	0.46/0	4.20	31.9	14	1296	28.6
(n = 6)	1	0.32/0	3.56	29.6	16	1568	29.1
	8*	0.12/3	3.66	29.3	14	1401	26.5
5.0	0	0.23/5	4.76	45.2	15	1126	32.2
(n = 4)	1	0.24/5	3.90	39.1	15	1481	36.7
	8*	0.12/8	3.90	34.7	15	1323	28.3
10	0	0.45/5	4.00	39.2	13	1590	41.4
(n = 5)	1	0.34/10	3.30	32.7	12	1970	32.9
	8*	0.08/13	3.24	40.5	11	1726	38.0
20	0	0.34/6	4.22	40.7	16	1238	33.0
(n = 10)	1	0.24/6	3.17	33.3	17	2028	32.2
	8*	0.07/8	3.41	34.5	18	2176	41.2

(SI – stroke index; PAOP – pulmonary artery occlusion pressure; SVRI – systemic vascular resistance index; LVSWI – left ventricular stroke work index).

Conclusions: 546C88 can restore systemic vascular tone in patients with septic shock enabling NA therapy to be reduced and/or removed. The CI tends to fall whilst LV performance is sustained over time. 546C88 is a novel vasoactive agent for the treatment of septic shock, which is undergoing further clinical evaluation.

The cardiovascular effects of 546C88 in human septic shock

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Objective: To evaluate the cardiovascular effects of the nitric oxide synthase inhibitor L-N^G-Methylarginine HCl (546C88) in patients with septic shock.
Method: Septic shock was defined as severe sepsis with either persistent hypotension (mean arterial pressure; MAP < 70 mmHg) or the requirement for a noradrenaline (NA) infusion ≥ 0.1 μg/kg/min with a MAP ≤ 90 mmHg. Cardiovascular support was limited to NA ± dobutamine (DB), 546C88 was administered for up to 8 h at a fixed dose-rate of either 1, 2.5, 5, 10 or 20 mg/kg/h iv. During 546C88 infusion, NA was to be reduced and if possible withdrawn, whilst maintaining MAP above 70 mmHg and the cardiac index (CI) as clinically appropriate. Assessments were made at baseline (t = 0); at 1 h from the start of treatment (t = 1); and at the end of treatment (t = 8) with 546C88.
Results: median values (* assessment made at 8 h or when 546C88 discontinued)

546C88 mg/kg/h	Time h	NA/DB rate μg/kg/min	MAP mmHg	HR beats/min	SI mL/m²	CI L/min/m²	SVRI dyn.sec/cm⁵/m²
1.0	0	0.78/11	70	119	42	4.34	1104
(n = 6)	1	0.78/11	81	111	39	4.55	1121
	8*	0.43/11	78	112	43	4.68	1169
2.5	0	0.46/0	81	134	32	4.20	1296
(n = 6)	1	0.32/0	87	123	30	3.56	1568
	8*	0.12/3	79	126	29	3.66	1401
5.0	0	0.23/5	76	110	45	4.76	1126
(n = 4)	1	0.24/5	83	105	39	3.90	1481
	8*	0.12/8	74	109	35	3.90	1323
10	0	0.45/5	89	96	39	4.00	1590
(n = 5)	1	0.34/10	91	91	33	3.30	1970
	8*	0.08/13	79	87	41	3.24	1726
20	0	0.34/6	81	114	41	4.22	1238
(n = 10)	1	0.24/6	83	106	33	3.17	2028
	8*	0.07/8	102	87	34	3.41	2176

(SI – stroke index; HR – heart rate; SVRI – systemic vascular resistance index).

Conclusions: 546C88 is a novel vasoactive agent that can sustain MAP in patients with septic shock, enabling NA support to be reduced and/or removed. There is a tendency for the CI to fall during treatment, which may be reflex in response to the increase in systemic vascular tone. 546C88 is a promising new therapy for septic shock, which will now be evaluated in a randomised, placebo-controlled safety and efficacy study.

Effects of 546C88 on selected indices of organ function in patients with septic shock

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Objective: To evaluate the acute effects of the nitric oxide synthase inhibitor L-N^G-Methylarginine HCl (546C88) on selected indices of organ function in patients with septic shock.

Method: Septic shock was defined as severe sepsis with either persistent hypotension (mean arterial pressure; MAP < 70 mmHg) or the requirement for a noradrenaline (NA) infusion ≥ 0.1 μg/kg/min with a MAP ≤ 90 mmHg. Cardiovascular support was limited to NA ± dobutamine. 546C88 was given for up to 8 h at a fixed dose-rate of either 1, 2.5, 5, 10 or 20 mg/kg/h iv. During 546C88 infusion, NA was to be reduced and if possible withdrawn, whilst maintaining MAP above 70 mmHg and the cardiac index (CI) as clinically appropriate. Indices of organ function were assessed at baseline (t = 0); at the end of treatment (t = 8); and 12 h after treatment (t = 20) with 546C88.

Results: median values (* assessment made at 8 h or when 546C88 discontinued).

546C88 mg/kg/h	Time h	Bilirubin μmol/L	Creatinine μmol/L	Urine output mL/h	Prothrombin INR	Platelets $\times 10^9$/L	Arterial pH	Lactate mmol/L
1.0	0	26.5	121	41	1.49	96	7.31	2.60
(n = 6)	8*	47.9	121	50	1.81	80	7.30	2.70
	20	71.5	104	40	1.84	74	7.31	2.15
2.5	0	16.9	102	58	1.56	208	7.18	2.56
(n = 6)	8*	14.5	124	42	1.63	171	7.25	3.10
	20	22.1	230	100	1.16	119	7.29	2.92
5.0	0	101.8	156	36	2.80	64	7.43	5.00
(n = 4)	8*	97.5	150	55	2.70	43	7.43	2.35
	20	79.5	175	123	2.60	37	7.42	2.10
10	0	27.4	194	65	2.00	156	7.33	3.40
(n = 5)	8*	26.0	265	109	2.00	116	7.32	1.73
	20	44.5	301	100	2.10	126	7.36	1.46
20	0	22.4	159	75	1.60	96	7.33	4.06
(n = 10)	8*	26.4	163	108	1.72	73	7.41	3.05
	20	23.7	180	83	1.46	91	7.41	4.50

Conclusions: There was no apparent dose-dependent adverse effect on these indices of organ function either during or after exposure to 546C88. The platelet count tended to fall whilst creatinine appeared to increase over time in all dose cohorts. This novel and promising therapy for septic shock will now be evaluated in a randomised, placebo-controlled safety and efficacy study.

Pharmacokinetics of 546C88 in patients with septic shock preliminary results

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Objective: To evaluate the pharmacokinetics of the nitric oxide synthase inhibitor L-N^G-Methylarginine HCl (546C88) given by continuous infusion for 8 h in patients with septic shock.

Method: Septic shock was defined as severe sepsis with either persistent hypotension (mean arterial pressure; MAP < 70 mmHg) or the requirement for a noradrenaline (NA) infusion ≥ 0.1 μg/kg/min with a MAP ≤ 90 mmHg. Cardiovascular support was limited to NA ± dobutamine. 546C88 was administered for up to 8 h at a fixed dose-rate of either 1, 2.5, 5, 10 or 20 mg/kg/h iv. Plasma was collected from each patient over a 24 h period and analysed for 546C88. Pharmacokinetic parameters were derived from plasma concentration-time profiles using non-compartmental pharmacokinetic analysis.

Results: The table summarises the pharmacokinetic parameters (mean ± SEM) for patients in each dose cohort that received a complete 8 h infusion of 546C88.

Parameter	546C88 Infusion Rate (mg/kg/h)				
	1.0 (n = 5)	2.5 (n = 5)	5.0 (n = 4)	10 (n = 4)	20 (n = 5)
C_{max} (μg/mL)	2.3 ± 0.5	6.4 ± 0.8	25.7 ± 3.8	54.0 ± 5.0	131.7 ± 13.2
$AUC_{0-\infty}$ (μg · h/mL)	18.2 ± 3.7	45.6 ± 6.2	307 ± 19	476 ± 62	1922 ± 526
CL (mL/h/kg)	498 ± 77	470 ± 60	314 ± 16	176 ± 19	104 ± 21
V_{ss} (mL/kg)	1233 ± 403	1207 ± 357	861 ± 20	685 ± 38	922 ± 120
$t^1/_2$ (h)	3.5 ± 0.8	1.8 ± 0.1	4.0 ± 1.9	2.6 ± 0.3	7.1 ± 2.0

(C_{max} – maximum plasma concentration; AUC – area under curve; CL – plasma clearance; V_{ss} – steady state volume of distribution; $t^1/_2$ – plasma elimination half-life).

Conclusion: The pharmacokinetics of 546C88 in patients with septic shock are dose-independent at infusion rates up to 2.5 mg/kg/h. At higher rates, clearance of 546C88 decreases without any marked change in volume of distribution. 546C88 metabolism may be partially saturable at dose-rates above 2.5 mg/kg/h.

546C88 ATTENUATES THE FALL IN BLOOD PRESSURE AND IMPROVES SURVIVAL IN A CONSCIOUS INSTRUMENTED MOUSE MODEL OF ENDOTOXIN SHOCK

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Objectives: Investigate the effect of the NO synthase inhibitor, L-N^G-methylarginine HCl (546C88) on the haemodynamics and survival rate in a conscious mouse model of endotoxin shock.

Methods: Female CD-1 mice (25-35 g) were instrumented under gaseous anaesthesia (isofluorane, 2%) and connected to a swivel tether system for continuous monitoring of blood pressure and drug administration.

Results: After 24 h recovery, endotoxin administration (E. coli, 026:B6, 6-12.5 $mgkg^{-1}$ i.v.) elevated the plasma concentration of nitrite/nitrate (NOx) and caused a progressive fall in mean arterial pressure (MAP) from 101 ± 5 to 59 ± 4 mmHg (n=5, P<0.05) at 12 h, with a survival rate at 24 h, 48 h and 72 h of 80%, 40% and 20% respectively. 546C88 administered as a 24 h continuous infusion (3 $mgkg^{-1}h^{-1}$ i.v., n=5), 4 h after endotoxin, inhibited the elevation of plasma NOx and attenuated the fall in MAP from 105 ± 2 to 70 ± 3 mmHg (n=5) at 12 h, with an improved survival rate at 24 h, 48 h and 72 h of 100%, 100% and 60% respectively.

Conclusions: This study suggests that overproduction of NO is involved in the hypotension and mortality characteristic of septic shock. Inhibition of NO synthase using 546C88 represents a novel and promising treatment for septic shock.

MODERN ETIOLOGIC STRUCTURE OF LETHALITY IN GENERALISED FORM OF PYO-SEPTIC PATHOLOGY

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Microbiological, investigation of material from 59 cadavers(38 children and 21 adults) dead from generalized microde pathology was carried out in 1994, including 15 cases(11child ren and 4 adults of septic pathology in combination with cytomegaloviral infektion(CMVI). Generalized form of microbe pathology in combi nation with CMVI were characterized by excretion of K.pneumonia in children(22.7% of cultu res) as well as in adults(10,4%). Cultures of E.coli(19,5%) and Candida(8,3%) were olso received from autopsy material of children; P.aeruginosa, unspored anaerobes, Proteus Sp., S.aureus, S.pneumonia were found in the few cases. In adults the spectrum of bacterioflora was more limited speaking about the number of species and cultures. In generalized forms of bacterial pyo-septic pathology a wider specific spectrum of causative agents was revealed usua lly with associations. E.coli and K.pneumonia played the leading role in children as well as in adults. In general, K.pneumonia(23,7%cultures) and common E.Coli(18,6%)prevailed according to the date of microbiological investigations of authopsy material in pyo-septic pathology in 1994.

EPIDEMIOLOGY OF SEPTIC SHOCK: WHO DOES SURVIVE ?

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Objectives: In spite of all clinical exertion sepsis is still the reason for high clinical lethality. This study is characterizing the group of patients which survived a septic shock.
Methods: During a period of 12 months all surgical patients on ICU were registrated prospectively. More than 270 parameters for each of them were documented daily in a paradox file.
Results (see table 1): 20 of 286 patients fulfilled the criterion of a septic shock (R. Bone, 1991), 11 of them died at the 21th day, while the surviving group of patients stayed almost 51 days at ICU.

	AGE	Ventilation (days)	APACHE	OP (n)	Catecholamin (first day)
survival	50,3	42,1	19	2,8	4,8
non- survival	61,3	20,5	28	3,8	1,7

Natriumbicarbonate only was given to surviving patients. All other treatment was comparable to the other patients at the unit.
Conclusion: In need to balance an acidosis with Natriumbicarbonate within the scope of a septic shock it is equate with the death of a patient

HEMODYNAMIC EFFECTS OF DIFFERENT HYDROXYETHYL STARCH SOLUTIONS (6% and 10%) IN SEPTIC PATIENTS

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Objectives: To compare the effects of 6 and 10% pentastarch solutions to a human albumin solution on oxygen delivery (DO2) in septic patients.

Methods: This study included 41 septic patients with fever (T > 38°C), tachycardia (HR > 90/min), tachypnea (RR > 20/min) or mechanical ventilation, leukocytosis (WBC>12000/mm^3) or leukopenia (WBC<4000/mm^3) and a clinical source of infection, who required a fluid challenge. In each patient the pulmonary arterial occlusion pressure (PAOP) was < 12 mmHg. Patients were randomized to receive 400 ml of 4% albumin (N=14), hydroxyethyl starch (HES - Mw200/D.S. 0.5) 6% (N=14) or 10% (N=13); 33 patients were also treated with adrenergic agents.

Results Cardiac index (CI) increased significantly only in 10% HES (Table) Hemoglobin (Hb) decreased significantly at 40 min in the same group. There was not significant change in oxygen delivery (DO_2).

	Group	Baseline	40 min	70 min	100 min	160 min
CI	Alb	3.7±1.3	3.8±1.0	3.8±1.0	3.6±0.9	3.7±0.8
(l·min/m²)	HES 6%	3.9±0.9	4.0±0.8	4.2±0.7	4.0±0.9	4.0±1.0
	HES 10%	3.1±1.2	3.7±1.1 *	3.7±1.3 *	3.6±1.1	3.5±1.1
PAOP	Alb	8.0±2.6	11.1±3.1	10.0±2.6	9.2±2.6	9.9±3.2
(mmHg)	HES 6%	8.5±2.2	11.6±3.1	10.7±2.8	9.8±2.7	10.9±3.4
	HES 10%	8.6±2.6	12.5±4.8	10.9±3.9	11.2±4.0	10.6±4.0
Hb	Alb	10.1±1.6	9.4±1.4	9.3±1.5	9.4±1.6	9.5±1.5
(g/dl)	HES 6%	10.1±1.0	9.6±1.0	9.8±1.2	9.4±1.0	9.5±1.2
	HES 10%	10.3±1.5	8.9±1.2 •	9.3±1.5	9.1±1.1	9.7±1.3
DO2I	Alb	471±192	466±107	464±82	445±73	456±90
(ml/min/m²)	HES 6%	537±134	516±104	548±82	509±117	509±124
	HES 10%	430±133	444±133	461±161	435±145	463±154

(*p<0.05); (•p<0.002).

Conclusion: Although all fluids proved to expand blood volume, only the 10% HES solution significantly increased cardiac output in those septic patients. In view of the associated hemodiluting effect, colloid administration does not significantly increase DO2 in critically ill septic patients.

POLYNEUROPATHY OF THE CRITICALLY ILL PATIENT AFTER SEPTIC SHOCK: A PART OF MULTIPLE ORGAN FAILURE.

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Polyneuropathy of the critically ill (PCI) is a well recognized complication, acquired in the course of severe illness.
We undertook a prospective study, to estimate the severity, extension and time of onset of PCI in a selected group of 25 patient with established septic shock (Bone's criteria). All patients received inotropic circulatory support and were mechanically ventilated. None received relaxants or aminoglycosides. PCI was diagnosed by clinical investigation and by EMG, and repeated weekly (axonal degeneration). After 3 days (day 1= onset of septic shock) in 68% of the patients PCI was demonstrable. After 14 days 80% of the patients had PCI. There was a strong correlation between PCI and other MOF and between PCI and encephalopathy (EEG).
We conclude that 1. PCI is a common complication after septic shock. 2. PCI develops early in the course of illness (85% after 5 days). 3. PCI can be considered as a part of MOF, suggesting a common pathogenesis.

REGIONAL ARTERIOVENOUS DIFFERENCES IN PCO2 AND pH CAN REFLECT CRITICAL ORGAN OXYGEN DELIVERY DURING ENDOTOXEMIA

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Objectives: We addressed two questions: 1) Can serial measurements of VAPCO2 and AVpH also reflect the onset of tissue hypoxia during endotoxemia? 2) Are whole body changes in VAPCO2 and AVpH associated with parallel changes in regional circulation?
Methods: In 12 anesthetized, mechanically ventilated dogs exhaled gases were sampled for determination of oxygen consumption (VO2). A catheter was positioned into the pericardial cavity to induce cardiac tamponade. Ultrasonic flow probes were placed around superior mesenteric, left renal and left femoral arteries, and the corresponding veins were cannulated. Group 1 served as control (n=6), Group 2 (n=6) received 2 mg/kg of endotoxin. Thirty min later, tamponade was induced to gradually reduce DO2.
Results: Systemic DO2crit was higher (12.1±2.2 vs 7.9±2.6 ml/kg.min, P <0.05) and critical oxygen extraction ratio (O2ERcrit) was lower (45.1±9.7 vs 74.1±9.1 %, P<0.05) in the endotoxic than in the control group. Mesenteric and femoral DO2crit were higher in the endotoxic than in the control group (8.2±2.5 vs 4.1±0.5 ml/100 g tissue.min and 8.3±2.3 vs 4.6±0.9 ml/min, respectively, both P<0.05). Regional O2ERcrit were lower in the endotoxic than in the control group (mesenteric: 37.1±15.4 vs 71.1±7.4 %, renal: 30.7± 24.6 vs 53.9±28.7 % and femoral: 48.1±9.2 vs 75.3±6.9 %, all P<0.05). VAPCO2 and AVpH followed a similar pattern in both groups, increasing slightly before DO2crit was reached, but dramatically when DO2 fell below DO2crit. In the presence like in the absence of endotoxin, systemic and regional DO2crit calculated from VO2, from VAPCO2, or from AVpH were similar; DO2crit was also significantly higher in the mesenteric and the femoral beds of the endotoxic than the control dogs. Systemic and regional DO2crit could be calculated from the blood lactate levels only in the control group.
Conclusions: During an acute reduction in blood flow 1) VAPCO2 and AVpH can reflect hypoxic threshold in the presence like in the absence of endotoxemia. 2) alterations in organ oxygen extraction capabilities induced by endotoxin can be reflected by regional changes in VAPCO2 and AVpH.

NO DONOR SIN-1 CAN INCREASE SUPERIOR MESENTERIC BLOOD FLOW DURING ENDOTOXIC SHOCK

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Objectives: Enhanced nitric oxide (NO) release has been incriminated in the vasodilation and myocardial depression characterizing septic shock, but the administration of NO blockers has yielded equivocal results. The present study explored the systemic and regional effects of a NO donor linsidomine (SIN-1) during endotoxic shock.
Methods: 14 anesthetized dogs received endotoxin (2 mg/kg iv), followed 30 min later by a saline infusion to keep cardiac filling pressures constant. Oxygen uptake (VO_2) was derived from the expired gas analysis. Regional blood flow was measured by an ultrasonic flowmeter (Transonic).
Results: The control endotoxic group (N=7) maintained low arterial pressure and systemic vascular resistance. The 7 dogs receiving a continuous infusion of 1,2,4 µg/kg.min of SIN-1 starting 30 min following initial fluid resuscitation (each dose for 1 h), had a higher cardiac index (0.23±0.03 vs 0.16±0.08 l/min.kg, $p<0.05$) and lower systemic and pulmonary vascular resistance than the control group (1006±170 vs 1460±445 and 114±38 vs 244±84 dyne.sec/cm5, respectively, both $p<0.05$). Arterial pressure and pulmonary artery pressure were not influenced. SIN-1 significantly increased the mesenteric blood flow from 63±17 to 148±49 % of baseline levels and renal blood flow from 67±25 to 96±24 % (both $p<0.05$) but did not influence femoral blood flow. The relative blood flow was increased in the mesenteric bed (at all doses), and reduced in the femoral bed (at highest dose). Systemic oxygen delivery, VO_2, oxygen extraction and blood lactate levels had similar course in the two groups.
Conclusions: In fluid-resuscitated endotoxic shock dogs, the NO donor SIN-1 increased cardiac index without deleterious effects on arterial pressure, and increased splanchnic blood flow.

PLATELET-ACTIVATING FACTOR ANTAGONIST TCV-309 ADMINISTRATION IN PATIENTS WITH SEPSIS: INFLAMMATORY PARAMETERS AND CLINICAL OUTCOME

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Objectives: Sepsis syndrome is associated with the release of a variety of inflammatory mediators, such as interleukins, tumor necrosis factor and Platelet-Activating Factor (PAF). Administration of PAF, a naturally occuring phospolipid, to laboratory animals has been demonstrated to resullt in pathological changes that closely resemble those found in sepsis. In addition, PAF antagonists of various origins have been demonstrated to attenuate cardiovascular collaps and to protect against lethality in endotoxemia. In the present study the efficacy and safety of the PAF-antagonist TCV-309 was investigated in sepsis syndrome patients. In addition, the putative inflammatory parameters Tumor necrosis factor (TNF), Interleukin (IL) -6, IL-8, and soluble (s) E-Selectin were measured in both TCV-309 and placebo treated patients.
Methods: A randomized, double-blind, multi-center study was undertaken to compare the safety and efficacy of intravenously administered TCV-309 versus placebo (Takeda Chemical Industries Ltd., Osaka, Japan). TCV-309 was used as add-on to conventional therapy in the treatment of patients with severe sepsis and septic shock (1.0 mg/kg body weight intravenously over 2 hrs, twice a day for one week). Day 28 mortality was registered, as well as vital signs, laboratory parameters, hemodynamic parameters, APACHE II Score and MOF score. Plasma samples for the determination of inflammatory parameters were collected twice a day for one week. The study was approved by each Institutional Review Board and written informed consent was obtained for each patient.
Results: A total of 29 patients were included in the study. One patient had to be excluded as a result of protocol violation. Of the remaining 28 patients 12 patients were randomised to receive TCV-309 and 16 to be treated with placebo. There were no significant differences between the treatment group with respect to age, gender, and APACHE II score on admission. However, admission levels of IL-6 and IL-8, considered to reflect severity of disease, tended to be higher in TCV treated patients: 24.59. vs 2.37 ng/mL for IL-6 (P.06) and 0.34 vs 0.04 ng/mL for IL-8 (P.07) in TCV-309 and placebo treated patients, respectively. A remarkable difference in survival, however not significant, was observed at day 7 i.e. the end of TCV treatment (mortality: 2 out of 12 in the TCV group and 7 out of 16 patients in the placebo group). The incidence of adverse events in both treatment groups were comparable. Plasma IL-6 and plasma IL-8 levels tended to decrease more rapidly in TCV treated patients compared to controls (P=.17 and P=.09, for IL-6 and IL-8 respectively)
Conclusions: TCV-309 is safe as add-on treatment in sepsis syndrome patients. The data presented indicate that TCV-309 may enhance survival of sepsis syndrome which will be assessed in a phase III study.

Lipidperoxidation in septicemia: Is there any prediction for the outcome?

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Objective: Oxidation of lipids by free oxygen radicals playes an important role in sepsis. An important source of oxygen radicals is the respiratory burst of phagocytic leukocytes, especially polymorphonuclear leukocytes. Clinically the hallmark of sepsis is the capillary leak, which is mediated in part by oxyradicals. The adult respiratory distress syndrom (ARDS) represents the most studied capillary leak phenomenon in sepsis.
Methods: In 11 patients (6F,5M, aged 20-81y.) with verified septicemia had been included in this study. Beginning from day 1 oxidisable lipidautoantibodies (oLab), neopterin and CRP were determined in the patients serum and compared against the APACHE II Score during the days 1-7. 4 patients, 2F and 2M died during their stay at the ICU, 3 of them in less than 48hours after admission. At the begin surviving patients showed oLab values between 75-119%, non-survivors between 68-104%, compared to neopterin values of 38-75 nmol/l in survivors and 20-250 nmol/l in non-survivors. APACHE II Score didn't show any difference. During the following days oLab showed an increase in survivors, while in non-survivors oLab stayed equal or showed a decrease. No difference between both groups was found in neopterin, CRP and APACHE II Score. As result we conclude, that lipidperoxidation playes an important role during septicemia. OLab as a marker of this process are predictive for the outcome of patients.

2. Pediatrics

General proteolytic and antitriptic activity of plasma in children, survived microsurgical operations

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Objectives: Activation of proteolitic system under influence of damaging factor is non-specific organismes defence. Compensationary increasing of antiproteolitic activity may be reason of trombosis in system of replantates blood vessels. The object of our research – analyze of prognostic value of correlation between General Proteolytic Activity/GPA/ and General Antiproteolytic Activity/GAA/ of plasma.

Methods: GPA and GAA gave investigated during few days in 85 patients. 74 kids/1st group/have operated because of extremities's traumatic damage during the birth and 11 other patients/2nd group/ have survived replantation of extremities's segments.

Results: It has established increasing of GPA plasma level just after operation in 1st group from 2.96 ± 0.11 to 6.89 ± 0.03 mgmol of arginine/min/100 ml of plasma/ more than double initial level/. GAA has also rized from 1270 ± 65 mpg of tripsin before operation to 1871 ± 90 mpg of tripsin after operation. That figures have came back to normal level during 1st postoperational day, those, using of proteolysis inhibitors haven't been necessary. Figures of haemodynamic, acid-base balance, blood's gases, lactate and piruvate have been normal. It has established moderate tendention to hypercoagulation after 6–8 postoperational hours. It hasn't established any microcirculations disorders in operated extremities.

In 2nd group it has been most dangerous moment of inclusion of ishemisated extremities in general circulation. In such cases initialy high/ after the trauma/ GPA level/ 11.12 ± 0.03 mqmol/min/100 ml after replantates inclusion in general circulation has riched 16.66 ± 1.22 mqmol/min/100 ml. GAA has accordingly rized from 2238 ± 46 to 2980 ± 52 mqp of tripsin. It have established signes of hypercoagulation and microcirculations disorders in replantated extremities in 8 from 11 patients after 4–6 postoperational hours. It has demanded of reocorrectors and anticoagulants using. By influence of providing therapy microcirculations and haemocoagulations disorders have regressed during 8–10 hours. Only to the end of 1st postoperational day it has established decreasing of GPA and GAA to 8.38 ± 0.42 mqmol/min/100 ml and to 1850 ± 58 mqg of tripsin accordingly.

Conclusions: therefore, infinding of correlation between GPA and GAA forestalls clinico-laboratories signs of hypercoagulation. It allows to detect in time threat of trombosis in replantats vessels system and to provide prophylaxis measures.

Neonatal ECMO - Czech Experience.

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Introduction.

In spite of the fact that neonatal ECMO has been gradually considered a standard method of solving uncontrollable respiratory failure in newborns in most countries of the western Europe, the introduction of this sophisticated method in countries of the former communist block meets a lot of problem.

Material, methods.

In the course of two years, only 16 newborns, b.w. 2000 - 4300 g, were reffered to neonatal ECMO because of uncontrollable respiratory failure. At the admission the average values of oxygenation index were 51 ±12, and AaDO2 79,6 ±7,6 kPa.

Results.

4 newborns (25%) died shortly after admission or during transport without possibity to further intervention.

5 newborns (31,3%) were treated using high-frequency ventilation (HFO or HFJV), one for conspicuous airway resistance paradoxically with low-frequency IPPB. All ventilated newborns survived. ECMO was applied in 6 newborns (37,9%) and 3 of them survived. The mortality rate of group mentioned was 44%.

Conclusion.

The fact that in the Czech Republic (10 mil. population with natality rate of about 100.000 newborns/year) only small part of patients was reffered to neonatal ECMO has a number of causes. The most important are: unacquaintance of prognostic and indication criteria at forwarding workplaces and the aversion of neonatologist to all new therapeutic interventions. Last but not least, a negative role is also played by current change of health service systems when, under the influence of health-service insurance companies a newborn in serious condition given only a standard intensive care in primary and secondary NICU is literally "the Golden Calf", and therefore these workplaces either do not send him or send him too late to an ECMO Center.

GASTROCOECAL TRANSIT TIME IN CHILDREN AFTER CARDIOVASCULAR SURGERY

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Objectives: To evaluate the influence of cardiopulmonary bypass on gastrointestinal transit.

Methods: Gastrocoecal transit time (gtt) in 10 consecutive children on day 1 after uncomplicated open heart surgery was compared to gtt in 10 children after closed heart thoracic surgery and to healthy controls. Gtt was measured by hydrogen breath testing, using lactulose (o,4g/kg in a 10% aequous solution) as nonabsorbable marker. Exspiratory hydrogen content was measured using a electrochemical system (Stimotron). Patients in both groups had continuous infusion of morphine and midazolam and were comparable in respect to catecholamine dose. Children with a history of toddler's diarrhoea and children with elevated central venous pressure were excluded.

Results: Gastrocoecal transit was delayed in all patients after CPB, no transit was achieved within 480 minutes in 7/10. After closed heart surgery gtt was delayed 138(+-80) Min vs. 56(+-20) compared to controls, but transit was achieved in all aptients within 285 min.

Mean dopamine dose was 2,7mcg/kgMin after CPB and 4,8mcg after closed heart surgery.

Conclusions: After uncomplicated CPB gastrocoecal transit is extremely delayed. The degree of delay is not explained neither by the use of analgetic and sedative drugs neither by the use of catecholamines.

Factors directly related to CPB (e.g. low flow perfusion, hypothermia) may be responsible. These findings are of limited clinical relevance in uncomplicated cases. In critically ill patients delayed enteral feeding may contribute to infectious complications. Studies of therapeutic measures to accelerate gastrointestinal transit therefore are warrented.

IN-VITRO INDUCTION OF ACUTE PHASE REACTION: COMPARISON OF ARTIFICIAL AND BOVINE SURFACTANT

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Study aim: Surfactant, which is being applied into the lungs for treatment of respiratory distress syndrome, can reach the circulatory blood system by absorption. It influences local function of macrophages and lymphocytes and increases the accumulation of neutrophils into the lungs. This could influence the local acute phase reaction in the lungs after surfactant application. The aim of the study was to investigate the influence of natural and artificial surfactant onto the acute phase reaction and the blood clotting system.

Material and methods: a) Measurement of TNF-a, Il-6, LTB_4 and thromboxane B_2-release in whole blood: Each of 1.5 ml heparinised blood of healthy adult volunteers was incubated for 2 hours with either 10 ug/ml LPS, 1 mg/ml bovine surfactant (Alveofact/Thomae), 1 mg/ml artificial surfactant (Exosurf/Wellcome), 10 ug LPS + 1 mg/ml bovine surfactant or 10 ug LPS + 1 mg/ml artificial surfactant. Heparinised blood without additions was used for controls. The concentration of cytokines and eicosanoids was measured semiquantitatively by ELISA or EIA (Dianova/Hamburg) after centrifugation. b) Measurement of platelet aggregation: Each of 1.5 ml heparinised blood of healthy adult volunteers was incubated for 2 hours with either 10 ug/ml LPS, 1 mg/ml bovine surfactant (Alveofact/Thomae), 1 mg/ml artificial surfactant (Exosurf/Wellcome), 10 ug LPS + 1 mg/ml bovine surfactant or 10 ug LPS + 1 mg/ml artificial surfactant. Heparinised blood without additions was used for controls. Platelet aggregation in whole blood was measured by impedance in the aggregometer (Sarstaedt). c) Measurement of the clotting activity: Citrated blood of healthy adult volunteers was mixed with different concentrations of bovine or artificial surfactant and then prothrombin times and partial thromboplastin times were measured. For measurement of the prokoagulation activity the reagent in the Quick test was replaced by surfactant.

Results: Dependant on the dose both surfactants stimulated the release of Il-6 but not of TNF-a in whole blood. There was no suppression of the LPS-induced cytokine-release. Both surfactants did not directly influence the extrinsic blood coagulation system, while both activated the intrinsic activity dependant on the dose. Platelet aggregation was slightly stimulated by bovine surfactant and strongly inhibited by by artificial surfactant. In combination with LPS both factors showed no difference to LPS alone. The release of eiconasoides was stimulated more by artificial surfactant then by bovine surfactant with regard to the cyclooxygenase (thromboxane B_2) and the lipooxygenase (leucotriene B_4) pathways.

Conclusion: We conclude: 1) Bovine as well as artificial surfactant stimulate the cellular immune response. 2) Bovine as well as artificial surfactant activate the intrinsic coagulation cascade. 3) Bovine surfactant stimulates platelet aggregation, artificial surfactant inhibits platelet aggregation..

REFLECTION LIGHT PHOTOSPECTROSCOPY: A NEW KIND OF BLOODGAS MONITORING

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Introduction: Although the use of modern noninvasive methods like measurement of $tcpO_2$, $tcpCO_2$ or SaO_2 leeds to an early information about pathologic alterations of the gas exchange of ventilated patients, these methods cannot replace invasive bloodgas analysis. A new noninvasive method to monitor the capillary gas exchange is the reflection spectrophotometry. To record reflection spectra with a high sensitivity on the surface of tissue we constructed a special microlightguide photospectrometer (EMPHO). This spectrometer enables the investigation of local heterogenities of HbO_2 and Hb content, capillary flow rate and oxygen uptake rate.

Aim of the study: 1) to compare the sensitivity and specifity of the EMPHO with other non-invasive methods of monitoring the gas exchange in neonatal intensive care patients. 2) to investigate the possibility of obtaining informations about the local O_2-uptake and the venous as well as arterial O_2 saturation.

Patients and Methods: We investigated 16 non-selected patients of our pediatric intensive care unit. For continuous monitoring we constructed a special support to fix the end of the microlightguide. During the investigation $tcpO_2$, $tcpCO_2$ and SaO_2 were measured by standard methods. To investigate the local tissue oxygen up-take we recorded 1000 spectres within 2 minutes by moving the lightguide over an described area of the skin of the patient. The resulting 1000 HbO_2 values were sorted by a software package. On the assumption that the low values correspond to the HbO_2 value of the venous ends of the capillaries and the high values to those of the arterial ends we evaluated a virtuel capillary which demonstrates the decrease of HbO_2 from the arterial to the venous end of this microcapillary. The results were compared to the results of arterial, venous and capillary blood gas analysis.

Results: 1) Results of continuous photospectroscopy compared to other non invasive blood gas monitoring methods:

$HbO_2/tcpO_2$ (n=114): Corr.=0,83, p<0,001
HbO_2/SaO_2 (n=222): Corr.=0,11; p=0,1;
$HbO_2/tcpCO_2$ (n=74): Corr=-0,35, p=0,002

2) Correlationsanalysis of HbO2 gradients compared with blood gas analysis:

EMPHO arterial/pO_2 arterial (n=9): Corr.=0,55, p=0,121;
EMPHO capillary /pO_2 capillary (n=21): Corr.=0,54, p=0,012;
EMPHO venous/pO_2 venous (n=12): Corr.=0,37, p=0,233

Conclusion: We conclude: 1) The HbO_2 measured by EMPHO shows a good correlation with the $tcpO_2$ resp. the pO_2, and, of course, a negative correlation to the $tcpCO_2$. 2) It is possible to get informations about the local O_2-uptake and arterial O_2 saturation in the peripheral tissue by photospectroscopy. 3) In combination with non-invasive pH-measurement it seems possible to reduce withdrawal of blood for invasive blood gas analysis.

EARLY APPLICATION OF CONTINUOUS POSITIVE AIR WAY PRESSURE AMONG PREMATURE INFANTS

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Objectives: Improve ventilation, tissue oxygenation and acid base balance among extremly low birth weightand premature infants.

Methods: Fourteen cases were studied, their gestational age ranged from(27-32)ws. Continuous positive air way pressure was applied to six cases at Peep level from (3-6)cm H2o through nasal pronge, (group I), the other 8 cases were managed as routine, (group II). Blood gases, TcPO2, TcCo2, resp.rate, depth and pattern were monitored for assessment of tissue oxygenation and ventilation,

Results: Our rasults showed that early application of CPAP improve ventilation among (83.3%)of cases, while (16.7%)of cases need IMV. The cases of group II need IMV among (75%)of the studied cases during the second or the third day of life.

Conclusions:- This preliminary study showed the importance of early application of CPAP before the onset of Respiratory Distress Syndrom to improve spontaneous ve ventilation, tissue oxygenation and to gecrease the risk of intubation.

Comparative assessment of pediatric intensive care; a national multicentre study.

Reinoud J.B.J. Gemke[1], Gouke J. Bonsel[2], the dutch PICASSO (Pediatric Intensive Care ASSessment of Outcome) study group.

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The performance of all (10) pediatric intensive care units (ICUs) in the Netherlands (6 tertairy and 4 non-tertiary) was analyzed in an open prospective multicenter study. Effectiveness of care was defined as the ratio of observed to PRISM-score derived expected mortality (hence, standardized mortality rate). Efficiency was determined by 2 objective criteria (mortality risk > 1% *or* administration of at least 1 ICU-dependent therapy)*. 1063 consecutive admissions aged ≤ 18 years old were included. Overall, observed and expected mortality were in good agreement ($p > 0.5$). Between hospitals, crude mortality showed wide variations (mean 7.1%, range 1-10%). However, in each center, observed and expected mortality were similar (mean ratio 0.99, range 0.8-1.5). In tertiary care centres, severity of illness corrected mortality in high-risk patients was less than in non-tertiary care centres; paradoxically, in low-risk patients the opposite was found. Probably the large proportion of low-risk tertiary care patients suffering from severe, incurable chronic disease, explains the higher mortality in this group. This indicates that simultaneous assessment of circumstances of dying and of long term morbidity in similar future studies is imperative. The average proportion of efficient ICU days was 72%, however large variations between units were found (range: 22-95%). In conclusion differences in mortality rates among pediatric ICUs were explained by differences in severity of illness. High efficiency rates in combination with adequate effectiveness, found in several centres suggest that admission and discharge decisions might be improved by a better selection of high risk patients requiring ICU-dependent therapies, especially in less efficient centres.

* Pollack MM *et al*, JAMA 1987; 258: 1481-1486.

ARTERIAL BLOOD LACTATE VERSUS SURVIVAL RATE AND LENGTH OF STAY ICU NEWBORNS.

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Objectives: Previously published studies showed that serum lactate levels correlated with outcome of severe ill adult. We hypothesized that critically ill newborns are often incurred hypoperfusion manifested by elevated lactate levels. These initial blood lactate levels should be related to NICU outcome.
Design: Prospective study with Ethical Committee approval.
Setting: The 14-bed Neonatal Intensive Care Unit of a University Hospital
Material and method: A total of 209 consecutive outborn newborns admitted to NICU from 01.10.1991 to 31.12.1992 were enrolled to the study. Babies who died or were discharged from the unit within 48 hours of treatment were excluded from the study. Mean birth weight was 2040g (+/-820g), mean gestatational age was 35 weeks (+/- 3.5 wks), mean age at the admission was 56 h (+/- 110h). Multiple (≥2) organ system failure occurred in 38.3% of babies at the admission. Arterial lactates were measured at the admission, among 22 - 26 hour and 46 - 50 hour of NICU therapy. Outcome was defined as a mortality and length of NICU stay.
Results: Survival rate was 68.4%, mean length of NICU stay for survivors was 17.8 days (+/- 15.1 day). We found high lactate levels at the admission in 82.8% babies (29.2% with levels above 5.0 mmol/l). The mean arterial lactate concentrations for nonsurvivors were significantly higher than for survivors during consecutive days as follows:

time	survivors	nonsurvivors	p
admission	6.38 mmol/l (+/- 4.62)	4.17 mmol/l (+/- 2.38)	p<0.001
22-26h	5.29 mmol/l (+/- 3.88)	3.49 mmol/l (+/- 1.86)	p<0.001
46-50h	6.46 mmol/l (+/- 5.19)	3.00 mmol/l (+/- 1.22)	p<0.001

We found high incidence of lactate concentrations above 5.0 mmol/l for nonsurvivors [$p < 0.001$]. Lactate levels did not predict NICU length of stay for survivors.
Conclusions: Hyperlactatemia is a common finding in severely ill newborns. High lactate levels in the first period of treatment result in worsening NICU survival rate.

TREATMENT OF BRONCHIAL ASTHMA ATTACKS IN PREGNANT WOMEN AND HEALTH STATUS OF NEWBORNS

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Objectives: The purpose of our research was to analyze the frequency of bronchial asthma (B.A.) exacerbations in pregnant women and health status of infants.

Methods: The research was based on the epidemiological investigation and prolonged observation of 23 pregnant women with B.A. during the gestation period. Remission of B.A. before the pregnancy in excess of 5 years was recorded in 9 patients (39.1%), 6 patients (26.1%) reported a 2-3 year remission and 8 patients (34.8%) had a remission lasting less than 12 months before they became pregnant.

Results: Seven patients (30.4%) developed medium attacks in the second half of pregnancy, four patients (17.4%) experienced light attacks of B.A. Asthma attacks were most frequently caused by acute respiratory diseases and stress factors. In two cases with grave manifestation of B.A., the pregnancy ended in abortion within the first 16-18 weeks due to the frequent and heavy choking attacks. To fight B.A. attacks, five patients used β_2-adrenomimetics (salbutamol, becotid) in sprays, six women were administered theophyllinum and salbutamol in the form of tablets during 1-2 weeks. A significant portion of pregnant women with B.A. (78%) exhibited frequent complications during pregnancy (toxemia, late gestosis, threat of miscarriage). Our findings prove that babies born from women with B.A. of domestic and pollen origin had a low body weight (2800-2500 gr), functional immaturity and chronic antenatal and intranatal hypoxia twice as often as the infants born from healthy women without allergic background.

Conclusions: Preventive treatment of women with B.A. prior to pregnancy is required to maintain a stable remission of the disease, which is a key to having healthy children delivered by mothers suffering from B.A.

OXYGEN FREE RADICALS AND NEONATAL INTRACEREBRAL HEMORRHAGE: A NEW HYPOTHESIS

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Introduction. Intracerebral hemorrhage (ICH) is a common event in human prematurity, affecting about 25% of newborns weighing below 1500 g who are born before 32 weeks of gestation. However, little is known about the pathogenesis of ICH with exception of the prematurity of the brain itself, (birth) trauma, and asphyxia. The postischemic production of oxygen free radicals (OFR) during re-oxygenation as a cause of brain damage has been demonstrated in animal research. Since almost all preventive antioxidant activity of plasma is associated with ceruloplasmin and transferrin we investigated the association of such iron-oxidizing resp. iron-binding proteins and ICH.

Methods. In 17 premature asphyxiated newborns we measured serum levels of iron, transferrin, ferritin, and ceruloplasmin within 12 hours postpartum. Total iron binding capacity (TIBC) and transferrin saturation (TS) were calculated.

Results. Seven neonates (group 1) suffered ICH within 3 days of life. Group 2 (n=10) did not develop ICH. Data concerning iron-binding and iron-oxidizing proteins are given below (*, $p<0.05$; **, $p<0.01$ in Wilcoxon rank test for independent samples; group 1/group 2). Iron (µmol/L): 24.8±8.5 / 19.3±9.1; transferrin (g/L): 2.05±0.14 / 2.24±0.22*; ferritin (µg/L): 133.8±53.8 / 144.6±48.6; TIBC (µmol/L): 45.8±3.1 / 50.1±4.9*; TS (%): 54.3±17.6 / 38.4±17.7*; ceruloplasmin (mg/L): 89.9±18.9 / 126.3±30.7**.

Discussion. We could demonstrate significantly reduced levels of both, iron-oxidizing and iron-binding proteins, in premature asphyxiated newborns prior to development of ICH. An increase of superoxide after hypoxia in the presence of iron ions facilitates the formation of the highly reactive hydroxyl radicals. Our data support the theory that ICH may be caused by OFR, which can damage any sensitive tissue including growing endothelial cells. The estimation of transferrin-saturation and measurement of ceruloplasmin levels might help to identify an infant at risk before the onset of ICH.

First clinical experience with a new pediatric cardiac assist system – the medos® HIA-VAD®

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With the new Medos® HIA-VAD® cardiac assist system the missing tool in the armamentarium of cardiac surgeons is available in two pediatric sizes: 10-ml and 25-ml pump volume. The right sided pumps are 10 % smaller for biventricular use.

Between February 1994 and May 1995 we implanted this assist system in 6 children. The indications and demographics are indicated in the following table (Left ventricular assist device-LVAD, right VAD-RVAD univentricular VAD-UVAD, post cardiotomy cardiac failure-PCF, dilated cardiomyopathy-CMP, Bland White Garland syndrome-BWG, Tetralogy of Fallot-TOF, hypoplastic left heart syndrome-HLHS).

patient	DC	HJ	LJ	KT	SJ
age	5 ys	3 mths	2 ys	6 ds	6 mths
pump size	25 ml	10 ml	25 ml	9 ml	9 ml
duration	5 ds	8 hrs	3 ds	25 ds	17 ds
survivor	yes	yes	yes	no	no
mode	LVAD	LVAD	RVAD	UVAD	LVAD
indication	bridge	PCF	PCF	PCF	bridge
preop	CMP	BWG	TOF	HLHS	CMP

In all patients we saw an initial recovery of kidney, liver and heart parameters and a decrease of dosage of catecholamines in the immediate post-implant period. The reasons of death in the non-survivors were bleeding and multi-organ failure, respectiely. However, we need to improve the perioperative management of these very delicate patients in order to optimize the results. Especially time of implantation and postoperative anticoagulation management are very crucial issues.

Nevertheless, we conclude that this new assist system is very reliable for both short and midterm pediatric implantation.

CLINICAL EXPERIENCE WITH NITRIC OXIDE IN PAEDIATRIC CARDIAC SURGERY

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Objectives: Evaluate the effect of Inhaled Nitric Oxide (NO) as pulmonary vasodilating agent in the postoperative period after correction of congenital heart defects in 3 infant.

Patient n.1: 4 kg, 7 months, Down syndrome underwent repair of atrioventricular septal defect (AVSD). After surgery the pulmonary artery pressure (PAP) slowly rose to the systemic despite maximal conventional therapy (fentanyl 4 mcg/Kg/h, hypocapnia of 27 mmHg and metabolic alcalinization). NO was delivered into the inspiratory branch of the breathing circuit at 10 ppm, and the gas analyser for NO and NO2 (Polytron Drager) were situated at the espiratory branch; a rapid decrease of PAP to 1/3 of systemic was obtained with a dramatic improvement. NO was continued at 5 ppm for six days and the baby was extubated 10 days after surgery and discharged from the ICU 5 days after.

Patient n.2 : 4.5 kg, 6 months, underwent repair of AVSD. The day after surgery the systemic oxygen saturation was 76% with a PAP at 75% of systemic. Two hours of conventional therapy failed to improve the patient and NO administration was started at 10 ppm, SO2 dramatically increased to 95%, but the PAP dropped only to 50% of systemic. Nevertheless the clinical conditions improved and the NO administration could be reduced at 5 ppm in the following 6 days. She was extubated 8 days after surgery and discharged from the ICU 20 days after.

Patient n.3: 12 kg, 3 years, underwent heart transplantation for congenital heart disease with moderate hypoplasia of pulmonary arteries. At the end of cardiopulmonary bypass the transpulmonary arterio-venous gradient was higher than 7 mmHg and we speculated that was due to a degree of pulmonary vasocostrictiont. The usual dose of NO was utilised, however no significant modification of pulmonary pressure or systemic oxygen saturation was noted, and after 1 h NO was discontinued. The patient was carried to the ICU with maximal inotropic support, extubated after 4 days and discharged from the ICU after 15 days.

In all patient no major adverse effect related to NO administration was noted.

Conclusion: In our experience NO as a pulmonary vasodilating agent is effective and easily adjustable to the patients requirements, however its use remains limited in those patient in whom the amount of fixed pulmonary vascular resistance is predominant.

ECMO FOR COMPLETE TRACHEAL DISRUPTION TWO UNUSUAL CASES:

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We report the use of ECMO support in two unusual cases of severe tracheal disruption in which it had become impossible to achieve adequate ventilation.

Case 1: Severe tracheal laceration due to aspiration of a sharp foreign body: A previously healthy 13 month old toddler was referred for ECMO following aspiration of a porcelain foreign body (with razor sharp edges) which had become embedded in the right mainstem bronchus with massive extrusion of air. This was removed on veno-arterial ECMO support, as the patient was unventilatable prior to bronchoscopy due to ongoing airleak. ECMO was continued after bronchoscopy to permit airway healing without the presence of an endotracheal tube. Unfortunately, an extensive pulmonary haemorrhage on day 4 of ECMO necessited re-exploration of the airway. This revealed a posterior tracheal tear from the cricoid to the middle of the right lower lobe. Following repair the patient was left on ECMO support together with high frequency oscillation ventilation (HFOV), the latter being used to minimise potential airleak and maximise alveoli recruitment. ECMO was weaned after 17 days (420 hours) - the patient was extubated 7 weeks later.

Case 2: Tracheal wound dehiscence due to sepsis - tracheal transplant on ECMO: A 4 month old infant with a clinically significant congenital long segment tracheal stenosis and left pulmonary artery sling underwent resection of the stenosis, followed by primary reanastomosis. This was complicated, 5 days later, by severe mediastinitis and complete dehiscence of the anastomosis. An autologous pericardial patch was used to repair this, however, the tracheal wound again dehisced 4 days later making mechanical ventilation impossible. In view of ongoing sepsis and a severely disrupted trachea ECMO was the only possible form of support. Following resolution of the local sepsis (4 days) a definitive procedure in the form of a tracheal homograft (transplant) was undertaken on ECMO. The patient was managed on ECMO and HFOV for a further 3 days, the HFOV being used to optimize rapid lung inflation. Unfortunately this patient died 9 months after weaning from ECMO due to complete disintegration of the homograft, which was not deemed reparable.

Conclusions: **1)** ECMO can be used in the acute management of oxygenation when there is major airway disruption making mechanical ventilation impossible. **2)** HFOV was a useful adjunct in aiding recruitment of lung volume on ECMO in these two patients.

AIR TRANSPORT OF PAEDIATRIC INTENSIVE CARE PATIENTS

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We report on the air transport of 32 paediatric intensive care patients. These transports fall into three categories: **1)** Retrieval of critically ill neonates and paediatric patients referred for either ECMO or inhaled nitric oxide (INO) (n = 12). One patient was transferred on INO. Mean transfer time 2.2 hours (SE ±0.6hrs). **2)** Long distance international transport using chartered aircraft (n = 11). The indications for these transfers included both urgent retrievals for cardiac surgery and semi-elective transfer of stable patients back to their referring unit following treatment in tertiary centres. Mean transfer time 4.4 hours (SE ±0.4hrs) **3)** Long distance international transport using commercial aircraft (n = 9). Indications for transfer were either semi-elective retrieval for tertiary treatment or the return of stable chronically ventilated patients to their referring hospitals. Mean transfer time 14 hours (SE ±1.5hrs, longest 24 hrs). The transport team consisted of a paediatric intensive care doctor of at least registrar grade and a registered sick childrens nurse with intensive care experience. The administrative components of the transfer (ambulances, airlines, customs) were managed in collaboration with companies specializing in air ambulance transfers. Outcome: All the patients were safely transported to their destination without mortality or morbidity. Complications during transfer included: **1)** *Patient complications* - semi-elective endotracheal tube change and central access needed in the only patient brought to the commercial aircraft by the referring hospital (all others retrieved directly from referral hospital), seizure in patient with known encephalopathy, severe cyanotic spells in patient with Fallots Tetralogy who was retrieved for urgent surgery for this indication **2)** *Mechanical complications* - ventilator failure, incubator battery failure, oxygen regulator failure - all occurred with equipment sent from referral hospital, this was unfamiliar and unchecked by our transport team - it was not the decision of the transfer team to use this equipment on this single occassion. **3)** *Administrative complications* - confiscation of incubator battery by airport security police, excessive delay by custom officials (2 hours) in the airport. The incidence of such problems were felt to be low and unpredictable. **In conclusion:** mechanically ventilated paediatric patients can be safely transported on both chartered and commercial airlines. These transports are best accomplished by trained intensive care medical and nursing staff with the backing of an air ambulance organization competent in arranging the necessary administrative details. It is essential to use your own equipment and to retrieve the patient directly from the referring hospital to minimise potential complications.

THREE PATTERNS OF RESPONSE TO INHALED NITRIC OXIDE FOR PERSISTENT PULMONARY HYPERTENSION OF THE NEWBORN

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Background: Persistent pulmonary hypertension of the newborn (PPHN) consists of a heterogenous group of diseases ranging from transient reversible pulmonary hypertension to fixed primary malformations of the lung (primary pulmonary dysplasia-PPD). Inhaled Nitric Oxide (INO), a selective pulmonary vasodilator, has been proposed as a treatment for severe PPHN.

Objective and Methods: INO was administered to 23 near term neonates with severe persistent PPHN, oxygenation index > 25 and echocardiographic evidence of pulmonary hypertension, in order to further determine the clinical role of INO in the treatment of PPHN. The response to INO was also analysed retrospectively to examine whether this could be of diagnostic value in differentiating at an early stage patients with reversible from fixed causes of PPHN

Results: Twenty one of the 23 patients studied responded to the initial trial of INO (20ppm x 20 minutes), as defined by a greater than 20 percent improvement in PaO2 as well as a fall in the OI to < 40. These 21 patients were continued on INO therapy, with 3 patterns of response emerging:
Pattern 1 babies (n=8) continued to show a sustained response to INO and were successfully weaned from it within 5 days - all survived.
Pattern 2 babies (n=9) failed to sustain their response to INO over 24 hours, as definded by a rise in the OI > 40. Six survived, five with ECMO.
Pattern 3 babies (n=3) had a sustained dependence on INO for 3 - 6 weeks. All three died and lung histology revealed severe primary pulmonary dysplasia (PPD). Patients with PPD (pattern 3) not only required INO for longer periods of time than did the sustained responders (pattern 1), but also required significantly higher doses of INO during their first 5 days of INO therapy.

Conclusion: INO may reduce the need for ECMO, however, early responses to INO may not be sustained. Neonates with PPD may have a decreased sensitivity and differing time course of response to INO when compared with patients who have PPHN in developmentally normal lungs.

OUR EXPERIENCE WITH ANAESTHESIA FOR PAEDIATRIC ELECTROMYOGRAPHY

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Objective. To test a " heavy sedation " regimen of anaesthesia for the purpose of paediatric electromyography

Design. Non-randomized , non-blinded human trial in the seting of an university hospetal.

Materials and Methods. 110 children , ASA I-II , median age 6 years , range 9 - 13 who undervent electromyography required anaesthesia. They recieved low-dose Ketamine + Diazepam or Midazolam via musculary route(25 children , age 0 - 3 yrs , Ketamine 2,5 mg/kg , Diazepam 3-6 mg total dose) or per os (85 children , Ketamine 5-7 mg/kg , Diazepam 0,3 mg/kg or Midazolam 0,4 - 0,5 mg/kg)

Results. 20 - 25 minutes after medication a state of heavy sedation with weak spontaneos and stimuli-provoked movements was achieved in all children , that lasted 30 - 60 minutes and allowed adequate needle EMG and nerve conduction investigation. 11 children recieved additional 0,6 - 1,0 vol.% Halothane during the placement of the needle. Non - invasive blood pressure , breath and heart sounds and Hb SaO2 by pulse oxymetry were monitored. None of the older children disclosed memories of pain when asked after they regained adequate verbal contact. No complicationes were observed.

Conclusions. The regimen described provides a safe and effective way of anaesthesia in paediatric electromyography , ensuring both appropriate investigation and abolishment of pain.

ANTENATAL MATERNAL STEROIDS REDUCE THE RISK OF PERIVENTRICULAR-INTRAVENTRICULAR HEMORRHAGE IN VERY PREMATURE NEONATES TREATED WITH NATURAL SURFACTANTS.

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Objectives: The aim of the study was to evaluate the association of periventricular-intraventricular hemorrhage (P-IVH) in surfactant treated premature neonates with pre- and postnatal variables.
Methods: The population of the study was 88 neonates admitted during the years 1990 to 1992, with gestational age ≤ 32 weeks and severe respiratory distress syndrome (RDS) (mechanical ventilation and arterial-alveolar oxygen tension ratio (a/APO_2) <0.22), who received rescue therapy of at least two doses of natural surfactants (Alveofact or Curosurf) and examined with ultrasound and/or autopsy for the presence of P-IVH (Papile´s classification). The examined factors in each neonate were the following: gestational age, birth weight, sex, multiple pregnancy, antenatal maternal steroids (complete and incomplete course of betamethasone), a/APO_2 before the administration of the 1st dose of surfactant, delivery, Apgar score at 5min, type of surfactant, pneumothorax and patent ductus arteriosus. The statistical methods used were x^2 and one-way analyses of variance followed by logistic regression models.
Results: The incidence of P-IVH was 31.8%. Three factors were found to have an independent relation to P-IVH (final logistic regression model): gestational age, a/APO_2 before surfactant administration, and antenatal administration of maternal steroids (complete and incomplete courses). For every 2 weeks of lower gestational age the neonates had an almost doubled associated risk of P-IVH (OR: 1.92, 95% CI:1.14, 3.22). For every 0.02 on average decrease of a/APO_2 before surfactant administration the risk of P-IVH in the neonates was 1.27 times higher (95% CI: 1.02, 1.58). The neonates whose mothers received antenatally steroids had only one tenth of the risk of P-IVH of the neonates whose mothers had not (OR: 0.10, 95% CI: 0.01, 0.82).
Conclusions: Our results suggest that the antenatal administration of maternal steroids, even less than 24 hours before delivery, reduce the risk of P-IVH in very premature neonates treated with natural surfactants, whereas the small gestational age and the lung immaturity still remain the main risk factors for the development of P-IVH.

MANAGEMENT OF ACCIDENTALLY INGESTED FOREIGN BODIES IN CHILDHOOD : THE EXPERIENCE OF 103 CASES.

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We analysed retrospectively the management of 103 (51 boys , 52 girls) accidental ingestions of foreign bodies in children (mean age : 2.8 years, range : 7 months - 10 years). No child had ingested more than 1 foreign object. The majority of the ingested foreign bodies were : coins (n : 44), toy parts (n : 11), jewellery (n : 3), batteries (n : 16), "sharp" materials such as needles and pins (n : 21), "large" amounts of food (n : 8). Impaction of food occurs more frequently in children after oesophageal reconstruction in cases of oesophageal atresia. Although according to literature "Coca-Cola" is reported to be effective, this was not seen in our experience.
28/103 patients had minor transient symptoms at the moment of ingestion, such as retrosternal pain. Only 4 children experienced severe manifestations (cyanosis, dysphagia). In these children, endoscopy revealed oesophageal and gastric erosions. Children were seen at the emergency ward within a few hours after the accident (mean : 3 hours, range 20 min. - 28 hours).
Chest and/or abdominal X-ray was performed as first-line investigation (93/103 objects were radio-opaque), and revealed an (unexpected) oesophageal impaction in 6 children. In 87/103 the foreign body was in the stomach. Batteries, sharp objects and objects trapped in the oesophagus were removed, either by endoscopy or by magnet-extraction whenever possible. The outcome of the patients was excellent. No complications were observed.
Extraction is recommended in symptomatic patients, and whenever the foreign body is trapped in the oesophagus, or if the foreign object is "sharp" or a battery.

Management of malignant diphtheria in children

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Objectives: Two strategies were used for management of malignant diphtheria in children aged from 0.5 to 13 years.

Methods: Protocol N1 consisted of intravenous administration of diphtheria antitoxic serum, prednisolone (2 mg/kg bw/day), plasmapheresis and supportive care. Protocol N2 included the use of antitoxic serum against the background of high-dose dexasone (2–3 mg/kg bw/day), hemocarioperfusion and a preventive use (before the clinical manifestation of myocardial damage) of inotropic medications, inhibitors of angiotensin-converting enzyme and pentoxyphylline. Each of protocols included the monitoring of serum toxin (diphtherin) levels.

Results: The group of patients treated according to the protocol N1 consisted of 17 children with malignant diphtheria, 11 of them with severe malignant diphtheria (grade 2 and 3). All patients exhibited the circulation of toxin during at least three days after the start of treatment. All 11 patients with severe grade of disease demonstrated heavy cardiovascular disturbances associated with malignant diphtheria. Of the 11 children in the group died seven. The children of the second group were treated according to the protocol N2. Out of total of 22 patients of this group. 11 patients had severe malignant diphtheria. In all children a significant reduction in serum toxin level was revealed after hemocarboperfusion. In all but one case the satisfactory control of cardiovascular function on was achieved. Of 22 children admitted to the trial 21 survived, one child with malignant diphtheria of grade 3 and congenital filbroelastosys of the left ventriculum died. The severity of neurological complications was similar in each of groups.

Conclusions: The use of hemocarboperfusion, high-dose dexasone and early prevention of heart failure as a adjunct to the standart treatment has been shown to be of benefit in the management of malignant diphtheria.

Treatment of severe non-neonatal ARDS in children with surfactant

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Surfactant therapy seems a promising approach for the treatment of the biochemical and biophysical abnormalities of the pulmonary surfactant system in severe ARDS. **Patients and Methods:** Over a 18 months period 10 non-neonatal pediatric ARDS patients (age 1-38 months) in a "pre-ECMO"-situation (OI 40 over 4 h) were treated with bovine surfactant (Alveofact®). The underlying conditions of ARDS were pneumonia (5), sepsis (2), immunosuppression (1), near drowning (1), neurogenous ARDS (1). A total of 20-120 mg/kg b.w. was applied in several fractions. Before surfactant therapy, we first tried different ventilation (best PEEP-finding, inversed I/E-ratio, HFO-ventilation) while monitoring the pulmonary mechanics. For hemodynamic stabilisation both norepinephrine and epoprostenol were used to optimize pulmonary perfusion for max. 4 hrs. If there was no improvement of the OI by at least 10, further treatment with surfactant was initiated. In addition to surfactant all patients received a treatment with dexamethasone of 1 mg/kg in 2 doses. Patients with no benefit (OI remained unchanged or increased within the max. 2-4 hrs) were taken on ECMO. **Results:** Nine patients improved within 4 hours after surfactant therapy: The OI decreased from a level of 41 (mean, range 22-100) before our treatment to a level of 16 (mean, range 6-60) thereafter. In 6 patients we were able to continue the positive effects of our treatment and they could be weaned of the respirator within 3-10 days. The other 3 patients got worse despite respiratory improvement, they suffered of multiorgan failure of more than 3 organ systems. The last patient did not benefit from surfactant, he had to be put on ECMO, but died because of a complication (hemopericard)after 10 days. The autopsy of the ECMO-patient showed a pulmonary fibrosis, but the other 3 death were not due to pulmonary failure. **Conclusion:** A different sequential ARDS treatment integrating surfactant therapy can reduce the number of patients requiring ECMO. But ECMO as a therapeutic tool should be available in centers involved in ARDS treatment.

Trial of inhaled prostacyclin in 2 children with secondary pulmonary hypertension

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Selective reduction of elevated pulmonary vascular resistance by inhaled Prostacyclin (PGI) has been reported in adults with acute lung injury, neonates with persistent pulmonary hypertension and in one infant with idiopathic pulmonary hypertension. We report on the effect of aerosolized prostacyclin in two children with secondary pulmonary hypertension.

Patient 1: In a boy with Down's syndrome an AVSD had been surgically corrected at 11 month of age. At 5,6 yr of age a catheter examination revealed a pulmonary vascular resistance of 70 % of systemic vascular resistance in room air and at an FiO2 of 1.0. Prostacyclin (0.5 mcg/ml) was administered with a jet nebulizer at an FiO2 of 0.21. PVR declined to 0.4 systemic vascular resistance and returned to baseline after stopping PGI-inhalation. Subsequent intravenous infusion (5 ng/kg min) had to be stopped after 5 minutes because of systemic arterial hypotension.

Patient 2: A 8 month old male infant with bronchopulmonary dysplasia developed suprasystemic right ventricular pressure inspite of therapy with oxygen and nifedipin. While he was spontaneously breathing 60 % oxygen via face mask PaO2 was 37 mmHg, arterial pH was 7.35. Systolic arterial pressure was 85 mmHg, a RV-RA gradient of 100 mmHg was measured by CW-Doppler. While FiO2 was maintained aerosolized prostacyclin was administered over 30 minutes. RV-RA gradient was 70 mmHg, systemic blood pressure 75 mmHg, PaO2 58 mmHg. Two hours later nitric oxide (20 ppm) was inhaled at an FiO2 of 0,6. RV-RA gradient declined from 100 to 65 mmHg, systemic systolic blood pressure remained stable at 105 mmHg.

Discussion: Sporadic experience shows that aerosolized prostacyclin selectively reduces elevated pulmonary vascular resistance in some patients. In patient 2 the poor response to inhaled PGI1 compared to inhaled nitric oxide may be explained by the fact that the action of PGI is not independent from endothelial function, limiting it's effect in severe vascular disease.

SURVIVAL AND FACTORS INFLUENCING THE OUTCOME OF BABIES UNDER 1000gr.

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During the last two years (1993-94), 51 infants weighing less than 1000gr. admitted to our referral unit. Thirty four of them (67%) survived, (28% of infants weighing 500-700g and 78% of infants weighing 701-1000gr survived) for the years 1986-87-88 the survival of these infants was 53% and for the years 1976-77-78, 14% ($p<0.01$). We analyzed the perinatal and neonatal factors influencing the outcome of these infants. The comparison among neonatal survivors (1) to neonatal deaths (2) shows: Gestational age: 27.6 w (1) to 26.4 w (2) (S). Birth weight: 923.5g (1) to 724.7 (2) (S). Apgar score: 7,90 (1) to 7.56 (2) (NS). Presentation and mode of delivery: Breech presentation is associated with higher incidence of neonatal deaths. I.V.H. (at the age of 8 weeks): No one of the survival infants had evidence of I.V.H. Respiratory problems: Intubation, at the admittance of the infants 32.3%(1) to 95% (2) (S) Use of surfactant: 70% (1) to 95% (2). BPD observed in 62% of the babies and only one was dependent on oxygen at home. Antenatal Betamethasone was given in 20% of the mothers.
In conclusion: 1) A great improvement in the survival rate observed in these infants the last 20 years in our unit. 2) Factors with positive effect are increasing gestational age and birth weight, the absence of I.V.H. and the use of surfactant. The breech presentation and the severe respiratory problems increase the incidence of death.

* S: Statistically significant ($p<0.01$)
NS: No statistically significant

NON-INVASIVE BRAIN TEMPERATURE MEASUREMENTS IN NEONATES

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Objectives: Animal experiments demonstrated, that brain temperature determines the amount of neuronal damage caused by hypoxia and that mild hypothermia may have a protective effect. Until now there is no method described and evaluated to measure brain temperature in neonatal intensive care units. We non-invasively measured brain temperature analogues, nasopharyngeal (Tnasoph) and zero-heat-flux temperature (zhT) at the temple whereby under zero heat flux surface temperature represents deep head and thus brain temperature. The aim of our study was to investigate the practicability of the method, the relationship of the two brain temperature analogues to rectal temperature (Trect) and their dependence on insulation, thermal environment, body activity and time course.
Patients and methods: We investigated 19 healthy preterms less then 2 weeks postnatal age (gestational age 31.5 ± 2.1 wks; x ± SD, weight 1653 ± 370 g) in an incubator. Tnasoph was measured by a thermistor within a feeding tube, advanced to the nasopharynx, zhT temple by a thermistor and a heat flux transducers both covered by an insulating pad, and Trect. Thermal environment was characterised by operant temperature (Tair .0.4 + Twall. 0.6). Body activity was video taped. Measurements were performed during the following interventions: **i)** insulation increased by turning the temple with sensors onto the mattress (15min). **ii)** insulation increased by a cap (30 min), iii) 30 min after its removal, **iiii)** increased operant temperature by 1.6 ± 0.5°C (60min).
Results: Tnasoph and zhT temple correlated statistically significant in each individual (max. correlation coefficient r = 0.95) and inbetween individuals. ($y = 0.87 \cdot x + 4.8$; $r = 0.72$, $p < 0.0005$). Both Tnasoph and zhT temple closely correlated with Trect , the slopes varying between 0.87 and 1.8. (Tnasoph vs. Trect: $y = 1.2 \cdot x - 8.4$; $r = 0.86$, $p < 0.0001$; and zhT temple vs. Trect: $y = 1.8 \cdot x - 29.8$; $r = 0.79$, $p < 0.0002$). ZhT temple increased by 0.51 ± 0.2°C when insulation was increased by turning the temple with sensors onto the mattress , increased by 0.11 ± 0.2°C by the cap and decrease by 0.02 ± 0.2°C after taking it off. ZhT temple had increased by 0.1 ± 0.2°C within 60 min (both times with temple on the mattress and without the cap). Neither increased operant temperature nor body activity significantly altered zhT temple and Tnasoph.
Conclusion: Measuring Tnasoph and zhT temple appears as a practicable method to obtain brain temperature analogues. Both variables were closely related to each other thus exchangeable. Both Tnasoph and zhT temple were related to, but not identical with Trect. Consequently Trect is no substitute of brain temperature even in healthy newborns. Tnasoph and zhT temple were found to be very constant over time and not significantly affected by additional insulation, increased environmental temperature and body activity. This observation emphasises the relevance of brain temperature increases upto 1.5°C observed in neonates with cerebral hypoperfusion.

INTRAVENTRICULAR ADMINISTRATION OF FIBRINOLYTIC DRUGS FOR POSTHEMORRHAGIC HYDROCEPHALUS OF THE NEWBORNS.

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13 newborns with posthemorrhagic hydrocephalus /PHH/ were treated by means of fibrinolytic therapy. In 12 PHH followed intraventricular hemorrhage and in one vascular malformation. Initially continous streptokinase administration/72h/ via external ventricular shunt was performed/9 patients/. In 4 last patients we have switched to intermittent administration of human recombinant fibrinogen activator/Actilyse-Boehringer/, performed every 2nd day/total-3-5 times/ via subcutaneous port /Rickham device/. Repeated spinal taps were done to reduce intracranial pressure and facilitate drug distribution to subarachnoid space. 5 patients died due to critical conditions not related to their neurological problems. Of the survivors, only in 1 case permanent ventriculoperitoneal shunt was needed. Follow-up/2 years for the first patients/ shows satisfactory development of the infants. Early fibrinolytic treatment of PHH is a promising alternative to conventional methods of treatment.

COMPLEX THERAPY OF ACUTE POISONING AT CHILDREN WITH USE OF HEMOCARBOPERFUSION, HYPOCHLORITE OF NATRIUM AND HYPERBARIAL OXYGENATION.

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Aim: To prove the effectiveness of the proposed complex therapy of acute poisoning at children.

Methods: From January I 1993 till December 31, 1994 112 children with acute poisoning were under treatment. Most of them were in the age group from I to three years old.(62%). All patiaents were under intensive detoxication therapy, which included the antidote therapy, forced diuresis, hemodilution, gastrolavement, hyperbarial oxygenation (GBO), hemosorption.(GS)

Results: One child of I year of age died. Hemosorption was applied urgently in cases of heavy acute medicamental poisoning. In cases of mushroom poisoning GS is necessary to be applied till clinical signs of catastrophe appear and undoubtedly at first signs of hepatic and kidney insufficiency. A very positive effect was achieved at applying the method of indirect endochemical detoxication by hypochlorite of natrium, especially at children with carbon monoxide poisoning and mushroom poisoning. Most of the children were treated with GBO therapy.

CONCLUSION: In heavy cases infusive therapy with forced diuresis, hemodilution, with further GBO-GS-GBO was most effective, as well as hypochlorite natrium infusion-GBO-during the first day. Due to this treatment indicators of leukocyte index of intoxication were normalized. Concentration of average molecules, circling of immune complexes & general immunological anylisis also normalizes.

DIAGNOSIS, PREVENTION AND TREATMENT OF SERIOUS INFECTIONS AND SEPSIS IN NEWBORN AND INFANTS

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Objectives: Evaluate the immune system parameters: intensity of oxidative reaction of phagocytes measured as hemiluminescent response and ability to reduce nitro-blue thetrasolium (NBT), immunoglobulins, C3 and C4 components of complement, in newborns and infants suffering serious infections and sepsis treated in The ICU.

Methods: In Children with serious infections of the respiratory, urinary, CNS, and gastrointestinal system both: clinical (clinical examination, standard biochemical and microbiological analyses) and immunological parameters were examined. Hemiluminescent response of the phagocytes was determined by the method of Tono Oka, the ability of the phagocytes to reduce NBT by the modified method of Pick, immunoglobulins, C3 and C4 component of the complement were determined by radial immunodifusion.

Results: 29 newborns and 25 infants suffering sirious infections have shown high oxidative metabolic activity both with opsonised and unopsonised test of hemiluminescence. Newborns have shown dilay in the hemiluminescent response, with low opposing activity of the serum (low or absent hemiluminescent response with unopsonised cells of yast). High initial values of the hemiluminescent response were seen in newborns with fethopaties (CMV, Herpes simplex, Toxoplasmosis). The newborns and infants with the most severe clinical forms of infections have shown decreased hemiluminescent response, which was a bad prognostic signs. Those children had shown negative NBT test without PMA prestimulation, while in the other patients the results of NBT was variable. The values of immunoglobulines were mostly high, particularly IgM in newborns with fethopaties. The C3 and C4 complement level was low mainly until the age of six monts.

Conclusions: The children with high hemiluminescent and NBT response, low level of IgM and high level of IgG, C3 and C4 components of the complement had shown better response to treatment.

Monitoring of Cerebral Oxygenation during extracorporal circulation (ECC) in children undergoing cardiac surgery. (Pilot study)

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Neuropsychological morbidity following cardiac surgery could be prevented by early detection of cerebral hypoxia during extracorporal circulation (ECC). Near infrared spectroscopy (NIRS) allows non-invasive measurement of change in cerebral oxygenation and hemodynamics.
In 6 children (age range 1,5 to 17 years) undergoing surgical correction of congenital heart defects continuous spectroscopic measurements of changes in the cerebral concentration of the oxygenated (HbO2 [μmol/L]) and the reduced form of hemoglobin (Hb, [μmol/L]) were performed by means of NIRS (NIRO 500, Hamamatsu, Japan). The cerebral blood volume Hbt (Hbt [μmol/L) was calculated according to the formula Hbt = HbO2 + Hb. The mean of 3 spectroscopic measurements for each of the following periods were compared statistically: A: before ECC, B: after aortic cannulation, C: 30 min. after the begin of ECC, D: end of ECC, C: 30 min. after ECC (Mean ± SD).

	A	B	C	D	E
HbO2	0,67±0,5	1,0±2,3	*-11,5±2,7	-1,16±5,0	0,16±5,6
Hb	1,16±0,6	1,5±1,7	+2,83±2,0	-0,83±1,3	0,66±2,6
Hbt	1,83±0,87	2,5±1,36	**-8,33±3,0	-2,0±3,9	0,5±5,0

A->C: * $p < 0,05$ ** $p < 0,05$

This pilot study suggests that 30 min. after the begin of ECC there is a significant decrease in cerebral oxyhemoglobin with subsequent restoration 30 min. after ECC. Continuation of the study is necessary to evaluate the clinical significance of these observations.

NEONATAL SCREENING OF FETHOPATIES AND PREVENTION OF SEVERE NEONATAL INFECTIONS AND SEPSIS

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Objectives: Clinical parameters and phagocyte functions were investigated in the neonatal period among children from alterated pregnaces, premature children and small for date children and healthy term children as a control.

Methods: Both, clinical (clinical examinations, standard biochemical, and microbiological analyses) and immunological parameters were examined. Hemiluminescent response of the phagocytes was determined by the method of Tono Oka, the ability of phagocytes to reduce NBT by the modified method of Pick. The level of IgM was determined by radial immunodifusion.

Results: The examination was conducted in 100 newborns (25 newborns from alterated pregnances, 25 premature children, 25 small for date children, and 25 healthy term children). The hemiluminescent responce in neborns from alterated pregnaces, premature and small for date children was lower than in the healthy term children. The negative NBT test was more often seen in those children too. The children with fethopaties (IgM positive on birth) had high initial values of maximal hemiluminescent response.

Conclusions: The results of those investigations were used for determining high risk group of children for severe infections and sepsis.

BRONCOSCOPY IN NEWBORNS WITH OESOPHAGEAL ATRESIA AND TRACHEO-OESOPHAGEAL FISTULA

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Objectives:. Infants with oesophageal atresia (EA) were routinely submitted a brief preoperative broncoscopic examination to prevent early broncopulmonary complication. The endoscopic findings allowed to: identify level of tracheo-oesophageal fistula (TEF); diagnose the unusual variants and proceed to selective transtracheal fistula cannulation to prevent or minimise gastric distension and its detrimental effect on ventilation.
Methods: From January 1990 to April 1995 we retrospectively reviewed 39 consecutive cases of EA, 33 with and 6 without TEF. We evaluated 14 female and 25 male, average birth weight was 2.5±0.6 Kg and gestation weeks 37.2±2.7. Twelve were premature, 8 small for gestational age and 22 had other congenital anomalies. 33 infants had TEF: 1 in the upper and 30 in the lower pouch, 2 had "H" fistula. They were allowed for 66.7% (26) in I and for 33.3% (13) in II Montreal's risk group. The procedure was carried out in the operating room in general anaesthesia with preserved spontaneous breathing just before surgery by 2.5-3 Storz's rigid broncoscopic.
Results: Seven children with EA had a gasless abdomen, the endoscopic procedure excluded (6) or diagnosticated an upper pouch fistula (1). In patients who suspected "H" fistula (2) broncoscopy has strong advocated method to make diagnosis and established cervical approach. From July 1992 14 newborns with EA and lower pouch TEF received a selective transtracheal incannulation. We were not able to proceed just in 1 case with congenital subglottic stenosis. In these patients we provided gastric drainage by radiopaque and flexible 3-4 French catheter. The knowledge of the precise anatomic position of TEF consent to adjust the tip of the endotracheal tube in order to achieve best ventilation. The presence of the catheter through the fistula helps the surgeon to identify it quickly. No complications were correlated to the procedure and no babies had early pneumonia. Alimentary continuity was achieved in all patients (30 primary anastomosis, 2 resections of TEF, 6 oesophagocoloplasty and 1 died with gastro-oesofagostomy). The late mortality 7.7% (3) was only directly related to the severity of associated malformations.
Conclusion: The advantages of this technical approach are unquestionable for the anaesthesiologist and the surgeon. In our experience the procedure improves perioperative management of babies and appears to be safe.

Relation between cytokines, prethrombotic markers and endotelial injury markers in children with septic shock

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Objectives: To establish the relationship between cytokines (TNF, IL-1, IL-6) prethrombotic markers (D.D., PCam) and endothelial injury markers (TM, uWF) in pediatric patients with sepsis and bacteriemia without shock, and patients with septic shock.

Design and methods: Prospective study, 18 children (9 months-16 years) were admitted in our PICU in 1994 with the following diagnosis: bacteriemia (4) sepsis (4) and septic shock (10) according to Jacob's R F criteria.

Measurements: IL-1, IL-6, TNF, TM, vNF, D. D. PCam and routine laboratory data on admision, 12, 24, 48 hours and on discharge. The PRISM (Pediatric Risk of Mortality Score) was also recorded.

Results and conclusions: Two patients in the septic shock group died. Significant differences were found between non-shock and septic shock patients in relation to Tm, DD, PCam, IL-2, IL-6 and TNF. High levels of TNF and IL-6 are closely associated with the severity of septic shock with purpura in children. Low levels of PCam on admission were associated with severe shock.

PERITONEAL DIALYSIS IN PAEDIATRIC PATIENTS FOLLOWING OPEN HEART SURGERY

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Objective: To evaluate the reintegration of renal function and the outcome of paediatric patients on peritoneal dialysis (PD) following open heart surgery and to present some effects of PD on the cardiovascular function.
Design: Prospective study
Setting: 15 bed multidisciplinary paediatric intensive care unit in the university hospital.
Patients and Intervention: 13 consecutive patients (age 1 - 56 months) treated by PD following open heart surgery from January 1993 to December 1994.
Results: In 13 patients who underwent open heart surgery, hypervolaemia with or without oliguria was the most frequent reason to start PD (77%). In 10 patients PD lasted less then one week and there were no complications; in 3 patients it lasted 13 - 29 days (one child had a peritonitis).
Instillation of dialysis fluid into the peritoneal cavity was associated with a significant increase in central venous pressure. There were no significant changes in cardiac output or arterial oxygen saturation.
In all patients PD diminished fluid overload or improved the metabolic status.
5 patients (38%) survived the postoperative course and all had complete reintegration of renal function.
Conclusion: PD is a useful method to treat the fluid overload and acute renal failure in paediatric patients following open heart surgery with the effects of little importance on the cardiovascular function.

COMPUTER-AIDED INTERPRETATION OF PULMONARY PARAMETERS IN NEWBORNS USING PERCENTILES*)

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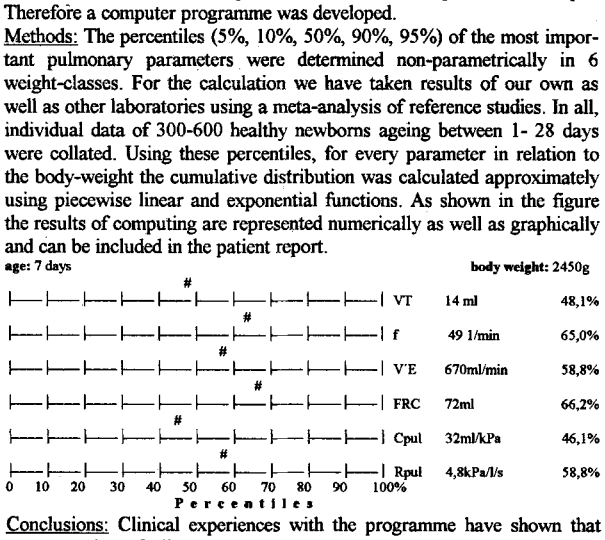
Objectives: With the marketing of computerised systems for lung function testing in newborns, there has been an increasing interest in clinical approaches. Percentile curves of pulmonary parameters permit an appropriate and clinically useful interpretation. However, the manual evaluation of the results using different curves is an impractical technique. Therefore a computer programme was developed.
Methods: The percentiles (5%, 10%, 50%, 90%, 95%) of the most important pulmonary parameters were determined non-parametrically in 6 weight-classes. For the calculation we have taken results of our own as well as other laboratories using a meta-analysis of reference studies. In all, individual data of 300-600 healthy newborns ageing between 1- 28 days were collated. Using these percentiles, for every parameter in relation to the body-weight the cumulative distribution was calculated approximately using piecewise linear and exponential functions. As shown in the figure the results of computing are represented numerically as well as graphically and can be included in the patient report.



Conclusions: Clinical experiences with the programme have shown that representation of all measured parameters on standardised 100% scales allows an easy interpretation at first sight and improves the detection of pathologic patterns in the parameters.
*)Supported by BMFT, FP "Risikoneugeborene"

POOR OUTCOME PREDICTION BY THE PRISM SCORE IN A THIRD WORLD PAEDIATRIC INTENSIVE CARE UNIT POPULATION.

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Background The use of PRISM or other scoring systems in the ICU is of great importance for evaluating the efficacy and efficiency of a particular ICU. The PRISM score was developed and validated in the USA and Europe but scoring systems should generally be used only in populations similar to the reference population from which the prediction model was developed.
Aim To determine the applicability of the PRISM score in a South African ICU.
Patients & Methods We analysed PRISM, demographic and clinical data collected prospectively from 1528 consecutive paediatric ICU admissions from January 1989 to June 1994. The prediction of actual mortality by PRISM was evaluated by means of the Hosmer & Lemeshow goodness-of-fit test and receiver operating characteristic (ROC) analysis. The components of the PRISM logistic regression equation (PRISM score, operative status and age) and the 14 physiological variables making up the PRISM score were subjected to discriminant analysis to determine their association with outcome.
Results Compared to other ICU populations, our patients were younger, were mostly non-surgical emergency admissions, stayed longer in ICU, and were more severely ill with a higher admission PRISM (29%) and overall mortality (32%). Respiratory and septic diagnoses predominated. The goodness-of-fit test showed a significant failure of PRISM to accurately predict mortality over a wide range of expected mortality ($Chi^2[5] = 195$, $p = 0$). PRISM underpredicted mortality at lower PRISM scores, but overpredicted mortality in patients with high PRISMs. Similarly ROC analysis indicated a poor predictive power ($A_z = 0.73 \pm 0.01$), with an area under the curve significantly less than that for the PRISM reference population ($p = 0$). PRISM showed equally poor discriminatory function at all age groups and diagnostic categories. Discriminant analysis showed that age and operative status were not significantly associated with outcome, and only 5 of the 14 physiological variables comprising the PRISM score (systolic blood pressure, PaO_2:FiO_2 ratio, Glasgow Coma Score, pupillary reaction and partial thromboplastin time) were significantly able to predict outcome.
Discussion The PRISM score is not accurate in our patient population and needs to be recalibrated in view of the poor discriminatory function that we have shown. A simple recalibration of the logit equation may not be possible, however, because of the poor predictive performance of 9 of the 14 base variables, and a more extensive recalculation may be necessary. Part of the inaccuracy derives from the different demographic characteristics of our ICU population and a different pattern of diseases. There is no evidence that inferior medical or nursing care contributed significantly to the poor-predictive power of PRISM. The PRISM score is therefore not population and disease independent and should be used with caution in third world populations.

NUTRITIONAL INADEQUACY IN PAEDIATRIC ICU PATIENTS - AN INDEPENDENT RISK FACTOR FOR MORTALITY NOT ASSESSED BY PRISM.

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Background The PRISM score is designed to assess the likelihood of death in paediatric ICU patients, using only acute physiological disturbances, age and operative status to predict mortality. There is no evaluation of chronic health status, including malnutrition. This may significantly affect its ability to accurately predict outcome in a population where malnutrition is common.
Aim To determine the influence of nutritional insufficiency, as indicated by a low weight-for-age, on outcome prediction by PRISM.
Patients & Methods We analysed PRISM, weight and demographic data collected prospectively from 1528 consecutive paediatric ICU admissions over a 6 year period. A proportional weight (Pwt) was calculated as a percentage from the 50th centile of the WHO weight-for-age growth charts. The Pwt was compared for survivors and non-survivors, and mortality compared for Pwt categories (WHO Wellcome classification). Multivariate statistical techniques were used to identify associations with non-survival and to develop a modified logistic regression equation including a measure of nutritional status. Receiver operating characteristic (ROC) analysis was performed including and excluding patients with low Pwt for the original and modified equations.
Results Non-survivors had a lower weight than survivors (6.8kg and 8.3kg medians $p = 0.63$), a lower Pwt (85% and 90% medians $p = 0.67$). The incidence of malnutrition in our ICU population was 33%. The mortality of malnourished patients was significantly increased ($p = 0.001$), with a good correlation with the degree of malnutrition. The accuracy of PRISM was significantly improved when malnourished patients were excluded from the analysis (ROC value increased from 0.72 to 0.79). Logistic regression and discriminant analysis identified a significant association between PRISM, Pwt and outcome; age and operative status were not significantly related to mortality. The use of a modified equation including the raw PRISM score, Pwt category and age can significantly improve the discriminatory power (A_z developmental sample 0.82, A_z validation sample 0.81). The modified formula is: *logit* = -2.864 +0.134*PRISM score - 0.006*age + 0.463*weight category, where the probability of mortality is exp(*logit*)/1 + exp(*logit*).
Discussion Although we can improve the prediction of mortality by a modified or recalibrated formula, this still does not compare with the reference PRISM population. The need for validation of the score itself, in the association with outcome of the acute physiological variables themselves, is thus apparent. We conclude that while the original PRISM formula can be improved significantly, a modification of the basic variables in this and other third world populations may be essential. A high incidence of malnutrition is an independent risk factor of mortality, and an important cause of the poor discriminatory performance of PRISM. In order to improve the accuracy of PRISM, nutritional status should be taken into account.

ASSESSMENT OF MORTALITY RISK IN CHILDREN: VALIDATION OF THE PRISM SCORE IN A ITALIAN SAMPLE: RESULTS FROM GIVITI

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PRISM (Pediatric Risk of Mortality) score is a well known, already validated scoring system that quantifies severity of illness based on 14 routinely clinical and laboratory variables measuring physiological instability. Once computed the score by summing up the weights corresponding to the most abnormal value recorded during the first 24 hours, the overall risk of mortality can be predicted by using the coefficients estimated by a logistic regression where PRISM score is the main independent variable. (Pollack MM et al. - Pediatric risk of mortality (PRISM) score. Crit. Care Med. 1988; 16:1110-1116).
To assess the applicability and validity of PRISM in the Italian setting we launched out a prospective data collection in a sample of 33 pediatric ICUs. Measures of calibration (goodness of fit statistics) and discrimination (receiver operating characteristics and area under the ROC curve) are planned to be adopted in the cohort of patients recruited during 1 year period. As the validation study started on July 94, data collection is still on going and validation analyses will be carried out on July 95. Up to now 23 centers recruited 1116 cases.
At present, characteristics of the sample recruited are the following: most of the patients were male (62%); the mean age is 3 years with 30% of patiens having less than 30 days; more than half were medical cases (59%) admitted from emergency room or from hospital floor (51%); 52% cases were admitted with an organ failure while 48% to be intensively monitored. ICU-mortality was 11%.
The paper will present final results of calibration and discrimination analyses that will be carried out in the whole sample and across subgroups known to differ in terms of clinical relevance and prognosis. If calibration and discrimination assessment will produce not satisfactoty findings, a customization of the current coefficients will be made allowing a formal comparision of previous and new parameters.

INHALED NO TO ASSESS PULMONARY VASCULAR REACTIVITY: A DIAGNOSTIC TEST

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Objectives: To assess the value of inhaled NO to differentiate between pulmonary vascular constriction or fixed anatomical obstruction.
Methods: We assessed the response to 40 ppm inhaled NO in 12 patients(9 M, 3 F, median age 4.5 months, range 1day to 17years) with signs of increased pulmonary vascular resistance. There were 5 pre and 7 postoperative patients. Patients were divided into responders(+) or non-responders(-). A positive response was defined as a 20% reduction in pulmonary arterial pressure and pulmonary vascular resistance(PVR) or in the presence of a left to right shunt, a fall in PVR accompanied by increasing pulmonary blood flow.
Results:

	diagnosis	NO		diagnosis	NO
1	post-op PAT/VSD	+	7	post-opPAT/VSD	-
2	pulmonary venous hypertension	+	8	tpost-op PAT/VSD	-
3	primary pulmonary hypertension	-	9	pre-op TAPVC	+
4	pre-op VSD	+	10	post-op TAPVC	-
5	pre-op ASD/PDA	+	11	post-op TAPVC	+
6	left atrioventricular valve atresia	+	12	MUSTARD	-

PAT: pulmonary atresia VSD: ventricular septal defect ASD: atrial septal defect
PDA: patent ductus arteriosus TAPVC: total anomalous pulmonary venous connection

The responders(7/12) were characterised by left to right shunts or pulmonary venous hypertension(4/7). Patient#11 was weaned from ECMO with inhaled NO. Patient#2, without congenital heart disease, underwent a lung biopsy which confirmed reversible pulmonary vascular changes. Patient#1 had a pulmonary hypertensive crisis which responded to NO.
All non-responders(5/12) had evidence of anatomic obstruction to pulmonary blood flow (#7,10,12)or a low PVR(#8) on subsequent cardiac catheterisation. In patient #3, lung biopsy confirmed severe obliterative vascular disease.
Conclusions: Inhaled NO appears to be an effective pulmonary vasodilator. A failed response may be evidence of either irreversible pulmonary vascular disease or a residual anatomical obstruction which may be surgically remediable in the postoperative cardiac patient. Therefore, inhalation of NO may be a useful diagnostic test to differentiate between fixed anatomical obstruction and reversible vasoconstriction.

BASIC AND ADVANCED PEDIATRIC RESUSCITATION COURSES

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Objectives: Evaluate the initial experience with Basic and Advanced Pediatric Resuscitacion Courses (PRC) in Spain.
Methods: From February 1994 to April 1995 we organized 2 Basic PRC ,8 hours of duration, and 7 Advanced PRC, 30 hours of duration. PCR are based in the Guidelines for Paediatric Life Support of European Resuscitation Council. Distribution of the time was: theoric formation 35 %, practice and practice evaluation 60 %, and theoric evaluation 5%. We used as instructional equipment; infant and child manikins, infant and child intubation heads, pediatric leg and chiken femurs for intraosseous access, pediatric arm for intravenous access, cardiac rhythm simulator and defibrillator. The practical training was made in 6-8 students groups.
Results: 49 students , 20 paramedical personal and 29 school teachers participed in the Basic PRC. 193 students (pediatric residents, pediatrician, pediatric nurses and emergency physicians and nurses) participed in Advanced PRC. Initial theoric evaluation was 5.5 in Basic PRC and 6.8 in Advanced PRC. Final theoric evaluation was 8.2 in Basic PRC and 8.7 in Advanced PRC. After practical training students achieved a sufficient practical psychomotor skills in pediatric resuscitation.
Conclusions: Basic and Advanced Pediatric Resuscitation Courses are the best method for theoric and practical education in pediatric life support.

RESPIRATORY DISTRESS IN A PEDRIATIC INTENSIVE CARE UNIT. REGARDING 114 CASES.

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AIM: To analyze the incidence and later evolution of the SDRA in a Polyvalent Intensive Care Unit.

MATERIAL AND METHOD: The study was performed in a PICU of 18 beds in a Children Hospital with 282 beds. We reviewed 114 patients with SDRA from January 1977 to December 1994.

RESULTS: During these 18 years, the incidence of SDRA was 1.3% of the total of admissions.
The most common etiology was meningococcic septic shock. Since 1989, there is a decrease of its incidence, (from 24% to 11%) and an increase of pneumonia and immunodeficiencies.
Mean age of our patients was 2.7 years (61% males , 39% females).
Total mortality by SDRA was 59% and there is an increase up to 72% since 1989
Mean time of stay of the dead was 4,3 days and 12,4 days those who survived.

CONCLUSIONS:
Although during the late years we offer in the PICU a better attendance quality to the patients with SDRA and the mean stay is longer, both for those who die and for those who survive, mortality of patients with SDRA have increased.
The incidence of SDRA secondary to the septic shock of a meningococcic etiology have decreased. On the contrary, the SDRA secondary to infections by opportunistic germs in patients with congenital immunodeficiencies or acquired immuodeficiencies have a tendency to increase.
In our series, this change of aetiology is the responsible for the increase in mortality.

SEVERE TRAUMATISM IN PAEDRIATIC INTENSIVE CARE.

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AIMS: To assess the incidence, etiology, clinical course, sequelae and mortality of the patients admitted to a Paedriatic Intensive Care Unit with the diagnosis of severe traumatism.

MATERIAL AND METHOD: 60 cases of severe traumatism in children admitted to our ICU in the period from January 1990 to June 1990 were reviewed.
Age of patient ranged from 4 months to 9 years, 65% were males. In our series, 53% of cases suffered traumatism due to a traffic collision and 38% had a fall from a considerable height. Only in one case was traumatism due to violence to the child.
We assessed the First Assistance received in 76% of cases: where was it performed, interval of time since the accident, and steps taken. These data were also studied in relation to the latter evolution.

RESULTS: 75% of our patients suffered cranioencephalic traumatism (CT); in 53% it was an isolated picture and in 22% of cases was associated to other lesions. There was participation of thoracic and/or abdominal organs in 16% of cases. 10% of cases presented important maxillofacial involvement. Only one case presented serious cervical medullar lesion.
Mortality in our series was 3.3%. In 8.3% important sequelae remained. All of these patients presented TEPAS on admission equal or lower than 4. 16% of those with traumatises had slight sequelae. 71.6% of the total evolve towards healing.

CONCLUSION:
A polytraumatized child is a patient that benefits considerably of it admission in a Paedriatic ICU.
The rapidity in receiving First Aid and its quality are essential to avoid sequelae and to make mortality decrease.

Improvement of lung perfusion during inhalation of nitrogenoxid(NO) and prostacyclin in a 14 year old lung transplanted girl

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After unilateral lungtransplantation 20% of the patients develop a lung failure with decrease of perfusion and increase of pulmonary blood pressure in the transplantated lung. The improvement of perfusion is an importent task in the postoperative period.
Case report: A 14 year old girl with idiopathic pulmonary fibrosis received a left sided single lung transplantation. During the early postoperative period occured a higher demand of oxygen and an increasment of the pulmonary vascular resistence in the left lung. The pulmonary ventilation and perfusion scintigraphy indicated in comparison with the right lung a reduced perfusion of only 30% in spite of a ventilation of 70% of the transplanted lung.
To improve the perfusion of the transplant we administrated per inhalation prostacyclin in a maximal dose of 20 ng/kg/min. The arterial blood pressure decreased but the perfusion continued nearly at the same level. During the following administration of 10 ppm NO in the respiratory air we achieved a significant reduction of the respiration pressure from 40 to 32 mm H_2O and of the pulmonary arterial pressure. The perfusion in the transplanted lung increased to 70% of the total pulmonary perfusion. After 3 days of administration with NO we were able to withdraw the artifical respiration without any following complications.

Conclusions: The perfusion of transplanted lungs is a major problem in the postoperative period. This case demonstrated the advantage of NO towards the inhalativ application of prostacyclin. NO showed a significant improvement of perfusion in the transplanted lung of a 14 year old girl.

SURFACTANT APPLICATION IN CHILDREN WITH ACUTE RESPIRATORY DISTRESS SYNDROME

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Background: The clincal benefit of exogenous surfactant application has been estalished unequivocally in the respiratory distress syndrome (RDS) of the newborn but not in the acute respiratory distress syndrome (ARDS) of older children. Surfactant deficiency or functional defectiv surfactant can be demonstrated in many cases. Therefore, the application of exogenous surfactant may be beneficial, but to date, there exists no experience with respect to timing and dosing in children.
Objectives: Retrospective evaluation of children with ARDS treated with exogenous surfactant in the PICU (1992 through 1995) in a single institution with regard to effect of surfactant as well as dosis and timing.
Results: A total of 11 children with ARDS were treated with bovine surfactant (Alveofact®), 9 cases were evalable. The median age was 1.3 years (range 2 weeks to 4.9 years). In six cases ARDS was associated with pneumonia, in two cases with lung hemorrhage; in one case isolated ARDS followed hemihepatectomy. The first surfactant application was performed with a median latency of 22 days (range 3-68 days) after first symptoms of ARDS witha median doseof 84 mg/ kg (range 42-133mg/kg). In 9 patients 28 doses of surfactant were applied. During the hour before therapy, the median PaO2 / FiO2 -ratio was 70-65. Within 30 min. after application of exogenous surfactant the PaO2 / FiO2 -ratio increased to 90 with successive decrease over a period of 8 hours to 75. Accordingly, an increase in PaO2 and oxygen saturation and (less significant) a decrease in ventilation parameters could be observed.
Analysis of broncho-alveolar lavage before surfactant application in children receiving repeated doses revealed in most examined cases either clear surfactant deficiency or pathological function. 2 of 9 treated patients survived (3 of the 11, respectively). 13 of the 28 surfactant doses were applied in the 2 surviving patients.Conclusions: The application of exogenous surfactant in children with ARDS caused a significant increase in oxygenation, which declined over a period of 8-12 hours. The effect often could repeatedly reproduced, in one case after 11 applications. The increase in oxygenation often allowed the reduction of FiO2 and/or the inspiratory pressure. No side effects were observed after exogenous surfactant application.In many cases the application of surfactant was too late after first symptoms of disease (median latency 22 days). ARDS mostly due to pneumonia seemed to respond to surfactant therapy less well or not at all.

OUTCOME OF CRITICAL ILLNESS IN CHILDREN IN DISTRICT GENERAL HOSPITALS' INTENSIVE CARE UNITS

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A recent report by the British Paediatric Association stated that virtually all critically ill children in the UK should be managed in a paediatric intensive care unit (PICU).[1] In the South West region the majority of critically ill children are cared for in a district general hospital's (DGH) ICU; our own being 130 and 240 km from the nearest PICU. There is little published work from such centres on paediatric outcome and we therefore analysed the outcome of 237 children admitted to two similar DGH ICUs from 1993-94.

The median number of children (16 or under) admitted was 56 per year (range 48-80).

The age distribution of admissions and deaths were:

Age Range (years)	0-1	1-2	2-5	5-10	10-16
Admissions Number (%)	42(18)	29(12)	43(18)	48(20)	75(32)
Deaths	1	2	2	1	6

The diagnostic groups of admissions by number and (%) were:

Respiratory	88(37)	Metabolic	8(3)
CNS	48(20)	Sepsis	4(3)
Post-operative	35(15)	GI tract	3(1)
Trauma	39(16)	Burns	3(1)
Cardiac	8(3)	Haematology	1(1)

Twelve patients (5%) died. These were 4 meningitis, 2 head injury, 2 sub-arachnoid bleeds, 1 status epilepticus, 1 leukaemic, 1 drowning, and 1 multiple trauma. Calculated from the admission day paediatric risk of mortality score (PRISM),[2] the probability of death (p) ranged from 0-100%. Of the 12 deaths, 11 were predicted by PRISM analysis except for the leukaemic patient (p 1%) who died from haematological complications following chemotherapy. Two children predicted to die (p 43% & 73%) survived.

The median length of stay was 2 days (range 1-34 days).
98 patients(50%) received ventilatory support and 10 patients(4%) were transferred to specialist units (5 neurosciences, 3 liver, 1 cardiac, 1 burns).

Conclusions: This data supports the view that many paediatric patients are being adequately treated in a DGH ICU. Meningitis and other neurological illness caused the majority of deaths and respiratory problems caused most admissions. Most deaths (9 of 12) occurred within a few hours of admission.

1. The care of critically ill children. British Paediatric Association. December 1993.
2. Pollack MM et al. Crit Care Med 1988;16:1110-1116.

PERMANENT JUNCTIONAL RECIPROCATING TACHYCARDIA IN THE NEWBORN AND YOUNG INFANT. MEDICAL TREATMENT OR CATHETER ABLATION ?.

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Permanent junctional reciprocating tachycardia (PJRT) is the most common incesant supraventricular tachycardia (SVT) in children. It is usually drug resistant and its onset in early life has been associated with dilated cardiomyopathy. We report our clinical experience with 3 patients detected antenatally and another diagnosed at 2 months of age.
Method.Diagnosis: negative p waves were detected in leads II,III and F, P'R > RP' and there was not warm-up at tachycardia onset.Clinical records, EKG,X-Rays, Echo and Holter were reviewed. EP studies were undertaken only with therapeutic purposes.
Results. In a 10 year period 13 patients under 14 y of age fullfilled diagnostic criteria; 3 were detected prenatally (25-34 weeks) and one was diagnosed at age 2 mo. The 3 fetuses had intermitent SVT during gestation. All 3 of them had PJRT in the first month of life at rates between 180 and 240 bpm. They were admitted to the ICU but did not develop signs of heart failure. They were controlled with Digoxine (D); D and Quinidine; D and Propafenone in 2 to 20 days. One was in sinus rhytm until age 4y; he then showed persistent PJRT over 70% of the day on repeated Holters and underwent successful radiofrecuency catheter ablation (RFCA).The other two patients showed initially a lowering of tachycardia rate followed by sinus rhytm for over 90% of the day (follow-up 2mo and 4 y). The 2 mo. old infant was admitted to the ICU in severe cardiac failure. Echocardiogram showed marked systolic dysfunction (shortening fraction 15%) Treatment with digoxine, amiodarone and propafenone were unsuccessful despite lowering heart rate to 185; RFCA was performed at 3 m. of age with restoration of sinus rhytm and rapid recovery of contractility. All patients were given ATP at admission with transient (15 to 35 sec) recovery of sinus rhytm.
Conclusions. Clinical course of PJRT is variable. ATP is useful only as a diagnostic tool. Initial treatment with Digoxine + Amiodarone or propafenone is adviced. RFCA is a very useful therapeutic modality and can also be performed in young infants

LIFE THREATENING POSTOPERATIVE JUNCTIONAL ECTOPIC TACHYCARDIA IN CHILDREN. TREATMENT WITH HYPOTHERMIA.

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Ectopic junctional tachycardia (EJT) is one of the most dangerous arrhythmias in the postoperative setting of congenital heart defects since it does not respond to antiarrhythmics or defibrilation.
The object of this presentation is to report on two patients who presented EJT in the early postoperative period and developed intense congestive heart failure which could be controlled after treatment with moderate topical hypothermia.
Two patients, 8m and 2y, diagnosed of Atrioventricular Septal Defect and Tetralogy of Fallot developed intense heart failure in the early postoperative period. Tachycardia rate was 215 and 225 bpm. Medical drug therapy included weaning from vasoactive drugs, IV digitalization and IV amiodarone treatment. There was not response. They were both surfaced cooled by placing plastic bags filled with cold water over the patient's chest and abdomen. Temperature was monitored to obtain a central temperature of 34ºC. There was a gradual decrease in heart rate in the following hours (130-150bpm) paralel to the degree of surface cooling and clinical course estabilized.Both recovered normal sinus rhytm in 48 to 72 hours. There were not significant arrhytmias after the procedure and postop. was uneventful.
Conclusions. Moderate hypothermia is a very useful manuever for the treatment of drug resistant EJT. Since it lacks side effects of other antiarrthymics we beleave it should be the treatment of choice for the treatment of EJT in the postoperative patient.

THE EFFICACY OF EXCHANGE TRANSFUSION IN THE TREATMENT OF NEONATAL SEPSIS.

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Present understanding of the pathogenesis of sepsis, based on the theory of systemic inflammatory reaction, has risen new interest in the more invasive methods of treatment, like plasmapheresis, leucapheresis and exchange transfusion (ET).

Objectives: Evaluate the effect of ET in the treatment of neonatal sepsis.

Material and methods: From September 1 to December 31, 1994 a prospective study was carried out, where the severest cases of bacteriologically proven neonatal sepsis (n=9) were treated with ET. In total 15 newborns were treated for culture positive sepsis in the intensive care unit during this study period. Diagnosis of sepsis was based on the clinical criteria of suspected neonatal sepsis, used by MC Harris et al., laboratory data and positive blood culture. Newborns with severe congenital malformations were excluded. ET was carried out with fresh (less than 24 hours old) Adsol-conserved erythrocytes, from which buffy coat had been removed, and same donors plasma, using a slow continuous two-site technique. The mean volume of ET was 164.3 ml/kg. The effect of ET was assessed as a change in the Score for Acute Neonatal Physiology (SNAP), general treatment results were compared with a historical control group of 26 newborns, treated for culture-positive sepsis in the same ICU during the first eight months in 1994. Students T-test and chi-square test were used in statistical analysis of the data.

Results: With the use of ET a significant decrease in mortality was achieved: 1 death of 15 cases during the study period, compared to 9 deaths among the 26 controls ($p<0.05$). No baby, receiving ET, died. The incidence of severe complications did not differ in the two groups. The SNAP-score showed quick improvement by the first post-transfusion day ($p<0.05$) and the effect persisted during the five following days.

Conclusions: We conclude, that the use of ET in the treatment of critical cases may help to lower the mortality of neonatal sepsis. It provides a quick improvement in the clinical condition of septic neonates.

INTRATHECAL THERAPY FOR BACTERIAL MENINGITIS

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The *Streptococcus pneumoniae*, among the Gram positives, represents the main causative organism of bacterial meningitis in children, with the majority of deaths occurring within hours of admission. The third generation cepahlosporins were indicated as antibiotic of first choice, and some literature reports have demonstrated no significant differences in clinical course of patients treated with ceftriaxone and of those treated with ampicillin and chloramphenicol. The Authors report the case of an infant, male, 18 months old, submitted to a neurosurgical intervention. After 2 days the infant became febrile and lethargic and a bacterial meningitis by *Streptococcus pneumoniae* was diagnosed, in spite of he was given the ceftriaxone therapy. An amelioration was found only when a systemic treatment with vancomycin was added. After 2 days an intrathecal administration of vancomycin 40 mg/day was started: the normalization of the spinal fluid profile was noted two days later and the infant recovered progressively. The follow-up after eight months doesn't evidentiate motosensorial sequelae. The individuation of *Streptococcus pneumoniae* strains beta-lactam antibiotics resistant requires alternative therapeutic regimens: the severity quoad vitam and quoad valetudinem of these infections justifies an intrathecal therapy, especially failing a prompt answer to the systemic treatment.

THE GRANULOCYTE-COLONY STIMULATING FACTOR (G-CSF) IN INTENSIVE CARE UNIT.

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The Granulocyte-colony stimulating factor (G-CSF) is largely employed in granulocytopenic patients. Experimental studies have demonstrated the effectiveness and safety of the therapeutic use, nevertheless the human employ is reported almost exclusively in neoplastic patients submitted to chemotherapy and in patients with fungal or *Pseudomonas spp* infections. The Authors report the data concerning three non granulocytopenic children: in the first, a girl 7 years old, affected by *Pseudomonas aeruginosa* pyelonephritis, the antibiotic therapy was not tolerated in consequence of renal and hepatic failure. The second patient, an infant 6 months old, has been treated with sulbactam-ampicillin, ceftriaxone and chloramphenicol because of *Haemophilus influentiae* meningitis; a late neurological aggravation required the antibiotic therapy recommencement. The last, a 17 years old insulin dependent diabetic boy, was affected by *Candida spp* systemic infection; the antifungal therapy was not practicable in consequence of renal and hepatic involvement. In all the G-CSF was administred subcutaneously at the dose of 5 γ /Kg/d for 7 days. A significant increase of granulocytes was ever noted already after the second administration until 24 hours after the last dose. Clinical signs, fever and biochemical values are promptly in-fluenced positively and all patients are restored to health. No side affects were noted. The granulocyte colony stimulating factor, at indicated doses, can prove of great help in critical patients, in who the antibiotic or antifungal therapies can result toxyc or cannot be tolerated.

THE BURNOUT IN A PEDIATRIC INTENSIVE CARE UNIT.

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Objectives: To evaluate the incidence of the burnout (BO) of the staff in a PICU in a University Hospital.

The BO is a syndrome characterized by many factors like emotional stress, lack of personality and reduced work ability. This syndrome represents a kind of abnormal response in the working habitat, above all, where psychological and personal characters are mostly involved. The symptoms of BO are represented by demoralisation, demotivation, incapability, boredom, isolation up to organic disturbances, like migraine, insomnia, dizziness and gastrointestinal disturbances. The major incidence of this syndrome was found in the hospital staff, especially among the nurses, working in an atmospher of high emotional risk, just like in an intensive care unit.

Methods: From January '95 till April '95, all the staff of the PICU of the A. Gemelli Hospital of Rome, underwent a test to evaluate the BO. The test used was taken from the book "Burnout : From Tedium to Personal Growth", by Pines and Aronson.

Twenty seven people were studied (19 females, 8 males), out of which 7 doctors, 7 residents and 13 nurses. It was considered significant as mild BO, a score between 3-4 and as severe, the score of BO > 4.

Results: 10 subjects (37%) resulted positive for BO, out of which 8 were females (80%) and 2 were males (20%). The subjects with mild BO were 7/10: 1 was a doctor, 3 residents and 3 nurses. The subjects with severe BO were 3/10, out of which 1 resident and 2 nurses.

Conclusion: The results obtained show that BO is a condition well represented in the staff of our PICU. The category most at risk seem to be the nurses (5 subjects), as well as residents (4 subjects), as in literature, which shows a major incidence of the syndrome in younger subjects and having a limited partecipation of functional decision. The results obtained obliged us to start a programme of serial controls so that the subjects most exposed can have a necessary psychological support to react adequately to this condition.

BRAIN ABSCESS BY POLYMICROBIAL ANAEROBIC ETIOLOGY IN IMMUNOCOMPETENT INFANT.

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Brain abscesses were observed in pediatric patients by extension from contiguous infected foci (sinusitis, mastoiditis), by penetrating wounds or, more rarely, by hematogenous spread in cyanotic congenital heart diseases with right-to-left blood shunting. The Authors report the case of an infant, male, submitted in neonatal period to a pulmonary artery banding for a complete atrioventricular canal. At the age of 3 years, and nine months after a diagnostic cardiac catheterization, the infant was admitted in hospital because of seizures. The CT scan confirmed the presence of multiple brain abscesses and an antibiotic therapy was started with sulbactam-ampicillin and amikacin, intravenously. The persistence of clinical pictures required a surgical drainage of the larger cavitary lesion, and the admittance in Pediatric Intensive Care Unit. Cultures performed in conventional microbiological media for aerobic and anaerobic organisms remained sterile. On the contrary the pus inoculation on the Vital Ana™, BioMerieux, permitted to evidentiate a polymicrobial etiology by *Bacteroides gracilis, Fusobacterium nucleatum* and *Peptostreptococcus micros* already after 120 hours of culture.
The isolation of anaerobic organisms can result very difficult, and when anaerobic culturing technique is not optimal, the abscesses mistakenly are considered sterile. The long period between the heart catheterization and the clinical findings let us suppose that the events are not surely connected. On the contrary, the poor oral hygiene can be implicated.

INCREASED ^{99m}Tc-DTPA CLEARANCE AFTER EXPOSURE TO NITRIC OXIDE

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Introduction: Use of inhaled nitric oxide (NO) as a modulator for optimizing ventilation-perfusion or lowering pulmonary artery pressure is becoming increasingly common. NO is a free radical but little toxicological research has been published. Clearance of nebulized ^{99m}Tc-DTPA is known to be a sensitive indicator for early function impairment of the alveolo-capillary barrier. We investigated whether exposure to NO increased clearance of ^{99m}Tc-DTPA from the lung.
Methods: Three groups of 5 White Sealand rabbits (BW 3.5 kg) were anesthetized, tracheotomized and paralyzed. 2 groups were ventilated for six hours at pressure regulated volume control, set to deliver 10 ml/kg with a frequency of 30/min, I/E ratio = 1:2 and PEEP = 3 cm H_2O using a modified Servo 300 Ventilator (Siemens, Solna, Sweden) with computerized NO delivery system. Gas mixture per group was either 0/25 or 20/25 [NO (ppm) / FiO_2]. After six hours of ventilation in these 2 groups and immediately after anesthesia in group 3 (control), ^{99m}Tc-DTPA was nebulized into the inspiratory line of the breathing circuit and administered as a fine aerosol. Gamma counting was measured for 20 minutes, monoexponential curves were fitted to the data and the clearance half-time (T½) was calculated.
Results: The T½ mean ± SD of the different groups were:

Group [NO (ppm) / FiO_2]	T½ (Mean ± SD)
0/25	75.0 ± 22.0 min
20/25	38.7 ± 13.8 min
Control	85.0 ± 29.7 min

20 ppm NO resulted in a significant decrease in T½ (ANOVA with Mann-Whitney post-test, $p<0.05$).
Conclusion: Exogenously administered NO in combination with mechanical ventilation in a healthy rabbit lung increases clearance of ^{99m}Tc-DTPA from the lung and this may indicate an effect of NO on the function of the alveolar-capillary barrier.

Sepsis and septic shock, what is the future?

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The term systemic inflammatory response syndrome (SIRS) was adopted by the Consensus Conference to denote a type of systemic response to severe infection or otherinsults in critically ill patients. When SIRS occurs from infection it is called sepsis. Sepsis occurs more frequently in persons with pre-existing illness or severe trauma. There has been tremendous advances in prophylaxis, diagnosis, and treatment of sepsis. A comprehensive model of the disease progression from SIRS to MODS should be developed giving priority to severity of illness scoring system and other predictive methods. Some recommendations for future clinical trials include: Trials should not start with humans. Before proceeding to human trials, animal studies should indicate an acceptable risk/benefit ratio. Appropriate patient populations must be defined and treatment protocols should be standardized. Full and rapid reporting of all results should be mandatory and a central repository of published and unpublished study results could be helpful. Accrual at each center should be of sufficient size, and should include the number of patients accrued, mortality rates, and patient characteristics. Pivotal trial should be preceded by sufficient pilot or phase II studies. Correct drug dosage and usage should be delineated in pilot studies. Large, multicenter, trials should be used to enhance the unversality of trial results. Analyses should be planned a priori. Definitions for the target population should be explicit, reproducible, and include illness severity scores. Outcomes should be relevant reproducible and include both measures of benefit and harm. MODS and its reversal should be considered as an endpoint. Quality of life should also be considered as an endpoint. The estimators of overall treatment effects should be controlled for base-line prognostic factors and subgroup analysis should only be used for hypothesis generation and not to modify the conclusoin of the trial. Economic analysis should be included as part of clinical design. Evaluatin of source control should be a critical component of any study. Standardized clinical mediator assays should be pursued. Placebo patients in clinical trials should be studied for a better understanding of the pathogenesis and epidemiology of SIRS. Evidence based medicine should be used to evaluate the validity of clinical.

RESPIRATORY THERAPY IN CHILDREN WITH ARF OF DIFFERENT KINDS.

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Objectives: Analisis of respiratory support in 52 children with ARF of different kinds, aged from 2 monthes to 14 years old (body weight from 4,5 to 45 kg), is presented (1.acute obstructive disease-14; 2.ARDS-8; 3.ARF of central genesis-30, including meningoencephlitis-3, Reye's syndrome-4, brain postreanimation disease-5). Intinal parameters and regymes of CMV, CPPV were determined by baseline disease and concomitant pathology characteristics and were divedent into 3 groups: 1. PIP=24-38 mbar, PEEP=3-7 mbar, f=25-45, I:E ratio=1:1,5-1:3, FiO2<0,5; 2. PIP=20-32 mbar, PEEP=2-4-8 mbar, f=28-45, I:E ratio=1,5:1-1:1,5, FiO2>0,6; 3. PIP=18-24 mbar, PEEP=1-2 mbar, I:E ratio=1:2-1:3, FiO2<0,45. When PEEP was about 4 mbar, dopamin titration was performed. CMV, CPPV duration ranged from 1 to 25 dayns: <6-in 35, 6-12-in 10, and>12 days-in 6 patients Transition of patients to IMV, SIMV modes was performed, when PIP decreased to 16-17 mbar, FiO2 decreased to 0,4 and less with SaO2=90%.
Results: In patients of group 1, who were treated with CPPV, teophillin(18-24mg/kg/day), glucocorticosteroids(2-3mg/kg/day), when R exceeded in 2,2-3,4 times normal values these ages(from 25,1 to 133,8 mmHg), it was possible to decrease AaDO2 from 120,2-261,8 to 35,8-106,1 mmHg in 8-18 hours and to normalize characteristics of lung mechanics in 2-3 days. In patients of group 2, when moderate hemodilution, hypocoagulation and pulmonary circuit spasmolytic therapy were combined with A/C ventilation, AaDO2 decrease by 210,9-346,1 mmHg and Qs/Qt decrease to 3,6-7,9% were noted in 5 children. In 3 patients AaDO2 increased to 570,1-618,3; RDS severity was increased to degrees III-IV. In 2 patients with RDS on CMV complication (rightside pneumothorax: barotrauma-1 and destructive pneumony-1) occured. All patients of group 3 at the time of transition to CMV were in coma of I-II degrees (Glasgo-Pittsburg scale) during from 15 hours to 4 days. In 9 children (meningoencephalitis-5, Reye's syndrome-2, postreanimation disease-2) brain edema was progressed, in spite of therapy aimed at it's supression (e.g. moderate hyperventilation regimen, 190-200% MV); and coma developed to III-IV degrees. Total lethality was 25% and depending on ARF kinds: obstructive disease- 7,1%, ARDS-37,5%, ARF of central genesis-30%.

The psychology of the paediatric surgical patient

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Objectives : This chapter will describe what is known of the psychlogical responses of infant and children to hospitalisation and attendant procedures. The factors which may moclify these responses will be discussed and important considerations will be outlined for optimal anaesthetic management and postoperative period of infants and children which will minimised the risc of emotional upset.

Methods : In this paper the autors will discussed the problem of:
1. health children (ASA I, II) facing single uncomplicated surgical elective procedures
2. various abnormal situations including neurotic children, children facing repeted operations, chronically ill, burnes and traumatically impired ones
3. unfortunate young patient facing and often expecting fatal outcome from leukaemia, tumors, cystic fibroses or other disease.

Concludions : Management of each child must vary greatly, in general the phases of emotional condicioning include home and preadmission preparation, admition preoperated and operative care and postoperative period.
The authors would be happy if the child passes all stages without any trauma which could be prolonged in the future life.

Inhaled Nitric Oxide (iNO) in Postoperative Congenital Heart Disease - Special Implications

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Introduction iNO is used to selectively reduce pulmonary vascular resistance. We applied iNO in the postoperative intensive care of patients with pulmonary hypertension and the risk of right ventricular failure after surgical correction of a congenital cardiac defect.
Methods 2-50 ppm NO were added to the ventilatory gas mixture using a specially designed equipment (Messer-Griesheim, Germany/Austria). Indications for application included pulmonary artery pressure >50% systemic pressure, critically depressed right ventricular function or an oxygenation index >10. Assessment of NO-efficiacy consisted of on-off-on measurements according to the clinical stability of the patient including hemodynamic parameters, pulmonary gas exchange, continuous monitoring of ventilatory function and transesophageal echocardiography of the right heart.
Results In 29 situations (19 patients, age 3 days-71,1 years), iNO was applied 0-628 h postoperatively. Oxygenation was improved in 13 situations from 114±51 to 171±53 mmHg pO_2; pulmonary pressure was reduced in 17 situations from 70±22% to 34±17% of systemic pressure. In 7 situations, no reduction of pulmonary pressure was present, but measurement of cardiac output or echocardiographic analysis indicated an improvement of right ventricular function (right ventricular stroke volume +39±12%, cardiac output +20±11%). In 8 situations (immediately postoperativ with suprasystemic pulmonary artery pressures [n=4], multi-organ-failure [n=4]), no response to iNO could be determined.
Conclusions For a special group of patients, the selective reduction of pulmonary vascular resistance by iNO has become an important part of postoperative therapy. Using this selective afterload reduction, postoperatively depressed right ventricular function can be improved . This effect of iNO seems to be the most important one in the postoperative period. Thus, iNO appears justified to be applied when impaired right ventricular function could be improved even when pulmonary artery pressure is not raised or remains unchanged.

Do respiratory disorders due to anaesthesia during the first year of life corelate with prematurity

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Objectives : Premature infant are exposed to danger of apnea due to anaesthesia during their first months of life. It is yet unknown whether prematurity is corelated to any other kind of respiratory disorder due to anaesthesia within the first year of life.

Methods : We therefore researched retrospectively for respiratory disorders in all infants under 12 months of life belonging to ASA group I. They all had been anaesthetised in 1985.95 in our clinic for the following surgical reasons: ingvinal haernia, umbilical haernia, hydrocelae testis and phymosis.

Results : In 2350 cases we found: laringospasm during induction in anaesthesia (0,5%), bronchospasm during induction in anaesthesia (0,22%), impaired intubation (0,1%), postanaesthetic laringospasm (0,1%), supposed aspiration (0,04%),postanaesthetic inspiratory stridor (0,05%), postinductional lungoedema (0,03%), death after 4 months in consequative of infection pneumonie (0,12%), none of these disorders was correlated the prematurity; 3 infants suffered of post anaesthetic apnea, 2 of them had premature medical history.

Concludions : Prematurity does not enhance the risk of respiratory disorders due to anaesthesia within the first year of life, except the danger of postanaesthetic apnea needs spetial cosideration.

Aerolized Prostacyclin (aePGI2) for pulmonary hypertension (PHT)

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Introduction: Intravenous PGI_2 can cause severe systemic vasodilation with hypotension when used for treatment of PHT. The increasing clinical application of inhaled nitric oxide (iNO) has illustrated the physiology and benefits of selective pulmonary vasodilation, however, it is potentially toxic and requires complex administration equipment. We examined the effects of $aePGI_2$ in patients with PHT as an alternate to iNO.
Patients and Methods: During routine catheterization for evaluation of pulmonary vasoreactivity, $aePGI_2$ versus iNO was compaired. 9 were cyanotic patients with congenital intracardiac shunting lesions, 3 had primary PHT (patient group A). $AePGI_2$ was used postoperatively in 3 patients in whom interruption of ongoing iNO-Therapy for PHT or right ventricular dysfunction had to be anticipated for technical or medical reasons (patient group B). $AePGI_2$ was applied using a pneumatic drug nebulizer delivering an aerosol particle size of 2-5 μm. The aerosol was inhaled for 10 min spontaneously (group A) or applied close to the Y-piece of the inspiratory limb in the ventilated patients (group B) after an NO-off-test had proven persisting PHT. No acute side effects occurred in either group.
Results: Group A: 5/12 patients showed no vasoreactivity. In 2/3 patients with primary PHT, a significant drop in pulmonary artery resistance occured (-33±12%) as verfied by repeated cardiac output measurements. In 5/9 patients with shunting defects, the relative pulmonary vascular resistance (Rp:Rs) decreased with iNO from 96±32% to 62±33% systemic resistance, and to 52±41% systemic resistance with $aePGI_2$ (p vs iNO > 2). Thus, $aePGI_2$ showed a marked effect in 7/12 patients and in all patients where iNO was effective. Group B: Cardiac index (+21±17%), systemic oxygenation and left atrial pressure improved; central venous pressure and pulmonary artery pressure (-45±19%) decreased 2 min after application of $aePGI_2$ and remained so 20-30 min after application was stopped.
Conclusion: It could be demonstrated that $aePGI_2$ lowers pulmonary vascular resistance and indirectly improves cardiac function. This effect seemed to be selective, and was comparable to iNO in the doses we have examined. Therefore, $aePGI_2$ could represent a clinically useful alternate to iNO. However, further research is necessary to work up the benefits of either therapeutic strategy.

HEAT AND MOISTURE EXCHANGE FILTERS FOR BACTERIAL RETENTION IN INTUBATED PIGS DURING INTENSIVE CARE

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Objectives: Heat and moisture exchange filters (HME) are used as artificial noses for intubated patients to prevent tracheo-bronchial or pulmonary damage resulting from dry and cold inspired gases. Furthermore they are used for the prevention of bacterial contamination of the anesthetic apparatus by the patient's exspired air. So they are considered as a time- and money-saving device in anesthesia. Filters are mounted directly on the tracheal tube, where they collect a large fraction of the heat and moisture of the exspired air, adding this to the subsequent inspired breath. The effective performance depends on the water- and bacteria- retention capacity of the filter. This study evaluates the efficiency of four different filters under clinical conditions.
Methods: Four different types of filters (DAR Hygrobac, Gibeck Humidvent, Medisize Hygrovent and PALL BB 100) were investigated during mechanical ventilation over a period of 24 hours. 20 minipigs with hemorrhagic shock were intubated and ventilated for 5 days in an animal intensive care unit (ICU). After 24 hours of mechanical ventilation the filter was randomly replaced maintaining the individual ventilatory conditions. The weight of the filter was determined before use and after removal after 24 hours. The airway pressure was monitored online to record changes during use. Tracheal secretions and both sides of the filter were microbiolologically tested to see whether bacteria of the animal's respiratory system could be found on the patient's side of the filter or if they even would have penetrated the barrier.
Results and discussion: Over a period of 24 hours 3 of 4 types of filters showed an increase in weight of 10 ± 6% and airway pressure. Bacterial colonisation occured in nearly all filters (93 of 100) on the patient's side, whereas only three of four types of filters showed identical bacterial colonisation on both sides. The only filter that did not show bacterial penetration, increase in weight or airway pressure was the PALL-HME, a condensation humidifier without hygroscopic salts for moisture retention. With respect to our data one should use a condensation humidifier if airway conditions should remain stable during mechanical ventilation and desinfection of the anesthetic apparatus should be avoided after each patient.

C-REACTIVE PROTEIN AND WHITE BLOOD COUNT IN SITUATIONS OF ORGANIC STRESS OTHER THAN INFECTION

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Objectives: Determine the fluctuation of C-reactive protein (CRP) and white blood count (WBC) for 4 days after organic stress in children not having bacterial infection.
Methods: We studied 81 children, aged 15 days to 14 years, admitted in our PICU during a 18 month period with diseases entailing organic stress. Patients admitted with bacterial infection or malignancy,as well as those whose blood, urine, bronchial swab cultures were positive for pathogenic organisms, were excluded from the study. Twenty four children were admitted after severe injury or surgery to thorax or abdomen, 24 with head trauma, 8 with convulsions and 23 with respiratory distress. CRP measurment, WBC and differential leucocyte count was performed for each patient on admission and daily until the 4th day.
Results: CRP values were increased in surgical patients and those with head trauma. In these cases the CRP was negative on the 1st day, then increased reaching peak values by the 2nd day, when it started decreasing. CRP was negative in patients with convulsions and respiratory distress. All the patients (except for one with laryngitis) had high WBC. Higher WBCs were observed on the 1st day, decreasing during the next days. Conclutions: In many conditions, other than infections,CRP increases up to the 2nd day and thereafter decreases,whereas WBC is high and gradually decreases with the improvement of the disease.

FLUCTUATION OF INTERLEUKIN-6 AND C-REACTIVE PROTEIN IN CHILDREN WITH HEAD INJURY.

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Objective: (i)The fluctuation of Interleukin-6 (IL-6) and C-reactive protein (CRP)in children with head injury (HI) for 4 days after the accident.(ii)The correlation of these values with the severity of the HI.Methods:We studied 20 children with HI,treated in our PICU,aged 15 months to 14 yrs (mean 8.6 yrs).They were followed for 4 days after the HI and the IL-6 and CRP levels were recorded over time. The Glasgow Coma Scale ranged from 3 to 15 (mean: 8.7) and APACHE II from 2 to 15 (mean:7.4). Statistical analysis was conducted with the use of regression techique for repeated measures Results: IL-6 levels were high in the first 12 hrs (mean:103pg/ml) decreasing over time, but they were still elevated by the 4th day of the injury (mean:18pg/ml).(IL-6 in healhy controls <1pg/ml). IL-6 decreased on the logarithm of the values by 0.27 pg/ml per 12 hrs ($p<0.001$).CRP was negative on admission (mean:4.3mgr/L), then increased reaching peak levels on the 2nd day (mean: 87.7mgr/L), decreasing thereafter;its value increased, on average,by 33.08 mg/L per 12 hrs ($p<0.001$) up to the 2nd day. Mean IL-6 and CRP levels were higher in more severely injured patients, (result not statisticaly significant).
Conclution: In children with severe HI, IL-6 increases early, within the first 12 hrs, and gradually decreases over time, whilst CRP increases later reachig peak values the 2nd day. The correlation of IL-6 and CRP with the severity of the HI remains questionable.

ACUTE AND CHRONIC NUTRITIONAL STATUS IN THE CRITICALLY ILL CHILD

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Objectives: The effect of Protein Energy Malnutrition(PEM) in critically ill children may be important. The purpose of this study was to assess the incidence of malnutrition according to age and its impact to prolonging the stay in the intensive care unit.
Methods: Between March to November 1994,Weight Length,Triceps Skinfold (TSF) and Mid-Arm Muscle Circumferance (MAMC) were collected prospectively in 29 girs and 44 boys (mean age 2,8y) within 48 hours of admission. Exclusion criteria were malignancies,chronic organ failure,syndroms and fluid disturbances.
The Waterlow stages were used for assesment of their acute and chronic nutritional status and the fat and protein stores.At the time of assesment calories intake was negligible.
Results: At risk to develop or in acute and chronic PEM were classified 48% and 28% of all children respectively. At risk or deficient in fat and protein stores were classified 32% and 38% respectively. Children under 6 months of age were more susceptible in protein stores deficiency (x^2 test $p<0.005$). MAMC had a good correlation with acute PEM ($r=0.46, p<0.001$). This study failed to prove any significant difference in the length of stay in the Unit between the depleted and the non-depleted patients.
Conclusions: On admission in Intensive Care Unit, critically ill children of all ages may present with signs of PEM. The overall impact of this situation needs further investigation.

NUTRITIONAL ASSESSMENT AND RELATED BIOCHEMICAL CHANGES IN THE CRITICALLY ILL CHILD

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Nutrition is especially important to the critically ill patient whose diet can frequently be replaced by artifical feeding. Patients at risk must be identified before they become debilitated.
The aim of the study was to assess prospectively the nutritional status of 27 critically ill patients within 48 hours of their admission to the Intensive Care Unit. We measured 4 anthropometric parameters (weight, length, midarm muscle circumferance and triceps skinfold thickness) and 3 visceral proteins [albumine (alb), prealbumine (pre), retinol-binding protein (RBP)] as biochemical markers. The Waterlow classification was used for the evaluation of the anthropometry.
Results: Anthropometry: Acutely undernourished were 15% of our patients, chronically undernourished were 18%. Fat storage deficiency showed 36% and protein storage deficiency only 4%. Biochemisty: All three biochemical markers showed lower mean values compared to the matched for age group of controls. Statistically significant was the difference for albumine and RBP.
Conclusion: Biochemical measurements may represent a more sensitive predictor for nutritional depletion.

OUTCOME OF SEVERE PEDIATRIC RESPIRATORY DISEASES SUPPORTED BY DIFFERENT METHODS OF MECHANICAL VENTILATION

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Objectives: To retrospectively evaluate the influence of modifications of basic mechanical ventilation (MV) modalities on the morbidity and mortality of critically ill children, receiving MV for severe respiratory diseases.
Methods: We used "low volume - pressure limited" MV strategies during the years (1990-93), compared to the conventional ventilatory support used during the years (1986-89).New modes of MV included inverse ratio ventilation, CO_2 elimination by intratracheal catheter,mechanically controlled hypoventilation and permissive hypercapnia. Our 80 patients had received either MV alone (VA) or with medical treatment (MT) were diveded into two subgroups with regard to presence or absence of documented air-leaks (AL). Results: Our data showed that the mortality rates decreased in the high risk groups, both the AL (73% V_s 45%, $p<0.04$) and the VA group (80% V_s 30%, $p<0.001$).Our overall survival rate has been increased from 56% to 78%($p<0.03$) along with a reduction of the ARDS survival rate from 7% to 50%($p<0.02$). Simultaneously, the AL inci-dence in the VA group has also been declined longitudinally (45% V_s35%). Those changes were preceded by a reduction of the means of tidal volumes (V_t 12.1 V_s 8.97 ml/Kg, $p<0.0005$),cor-responding to higher pCO_2 values Conclusions: modifications of basic MV modalities might improve the outcome of children with severe lung diseases, compared with traditional methods of MV.

AIR-LEAKS AMONG MECHANICALLY VENTILATED CHILDREN FOR SEVERE RESPIRATORY DISEASES

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Objectives: Mechanical ventilation (MV) in cases of acute respiratory failure can exacerbate an underlying lung injury and produce various air-leaks (AL). The aim of this study was to evaluate the incidence of AL in critically ill children receiving MV for severe respiratory diseases and to examine whether AL could be correlated with some specific clinical events or ventilatory settings. Methods: The 80 patients included in the study (mean age 2.9±0.6 years, 49 males and 31 females), were initially admitted to the PICU for ARDS (27%), asthma (15%), pneumonia (21%), pulmonary congenital diseases (9%) or bronchiolitis (10%). The patients were divided into two groups; those with AL or without AL (NAL). Results: AL developed 22 out of 80 patients (27.5%) with greater incidence among patients with congenital abnormalities (43%) or ARDS (41%) compared to those with foreign bodies (29%), asthma (25%), pneumonia (18%) or bronchiolitis (0/8). Survival was lower in the AL group, compared to the NAL group (41% vs 76%, $p<0.01$). There was correlation between the incidence of AL with not only high ventilatory pressures (barotrauma), but also the indipendent variable of large tidal volumes (V_T 12.2 VS 9ml/Kg, $p<0.0001$), indicating a direct injury by the large volumes on pulmonary epithelium. Conclusions: MV is an aggravating factor in producing AL, when high peak airway pressures or large tidal volumes, are delivered by the ventilator.

HYPERBARIC OXYGEN THERAPY IN PERSISTENT INFECTION DISEASE.

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Hyperbaric oxygen (HBO) therapy is a therapeutic modality which increases tissue oxygenation inhibiting the growth of certain bacteria.Clinical studies in patients with local infections have demonstrated significant improvemet with restoration of perfusion and oxygenation of the infected tissues. We present a 4 year old girl who has a very large heamangioma on her right leg (Klipper Trenaunay syndrome). The last four months she experienced recurrent episodes of thrombophlebitis and local infections of the leg. Beside the andibiotic therapy she underwent 4 Laser sessions at the haemagioma site. She was transferred to our PICU with severe sepsis and multiple organ failure due to infection of her right leg. On admission her leg was oedematous with bad perfusion. U/S was performed to the leg which revealed numerous abscesses (E. coli). Surgical drainage of the abscesses and antibiotics were administered IV and via her right femoral artery. She continued to be febrile. She was planned to undergo amputation of the right leg. At that time she had nine sessions on the hyperbaric oxygen chamber. A few days later the infection was controlled, so amputation was excluded. HBO according to the literature, can be used successfully in patients with persistent local infections, burns, air empolism, carbon monoxide poisoning and wound healing.

A REVISED THERAPEUTIC INTERVENTION SCORING SYSTEM FOR PAEDIATRIC INTENSIVE CARE UNITS.

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Introduction: The Therapeutic Intervention Scoring System (TISS) was last revised in 1983. Since many more interventions are now widely used, this TISS underscores the more ill patients and consequently the resource use in toady's intensive care units.

Aims: 1. To develop a revised TISS incorporating the additional interventions, 4 Point: Exchange blood transfusion, 3 Point: CSR drains, Cuirass ventilation, Small Particle Aerosol Generator, ETCO2., Special bed/mattress, 2 Point: $TCPO_2/TCPCO_2$, Intra-osseous/intra-peritoneal fluids, Continuous infusion of sedative drugs in the non-ventilated patient, 1 Point: Scheduled Nebulised drug therapy, Cervical collar, Pulse oximetry, Continuous drug infusions

2. To use the TISS to validate Intensive Care Levels. **Level I :** the non intubated patient, **Level 2 :** the unstable or ventilated patient and **Level 3** the ventilated and unstable patient (eg. MOSF).

Patients and Methods: 171 consecutive patients admitted to the PICU were scored using a new proforma developed to include the additional interventions and to improve accuracy of collection of data by nurses. Maximum values for New and Old TISS (NTISS, OTISS) and maximum intensive care level was computed for each patient admission.

Results: NTISS correlated well with OTISS (R=0.983, y=0.056+1.154). There was no significant difference between mean values for OTISS and NTISS)in Level 1 patients (P=0.338 unpaired t- test).For level 2 and 3 patients mean value of NTISS was greater than OTISS (P<0.0001 and P=0.0015), respectively. There was a significant correlation between levels using either NTISS or OTISS (mean difference Level 1 and 2, Level 2 and 3, P<0.0001).

Conclusion: A new TISS has been developed and used in a PICU. Nurses were able to accurately score the interventions on their shift. The assignment of patients to intensive care levels correlates with TISS values allowing a quantitative measure of severity.

EXTERNAL OSCILLATORY VENTILATION-NEGATIVE BASELINE AND CONTINUOUS NEGATIVE PRESSURE VENTILATION. EXPERIENCES AND INDICATIONS

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Aim: To assess the clinical uses of, and experiences with, the Hayek oscillator. This is a non-invasive device capable of delivering not only continuous negative pressure (CNP) but also external oscillatory ventilation around a negative baseline (EOV-NB) using an external cuirass. This type of ventilation avoids the need for intubation and intermittent positive pressure ventilation (IPPV) and facilitates weaning in ventilator dependent patients.

Patients and Methods: 21 patients in respiratory failure, age range 3 weeks to 15 years in a total of 29 patient episodes were treated using either CNP or EOV-NB mode. Duration of treatment varied from 4 hours to 8 days. Indications for use of the device were:

1) to facilitate weaning from IPPV
2) prevent reintubation of patients following unsuccessful extubation, and
3) avoid intubation and IPPV altogether using the Hayek oscillator as the only means of respiratory support.

Results: There was an increase in PaO_2:FiO_2 ratio after CNP and EOV-NB (P <0.0001, and p=0.01 respectively, Wilcoxon Signed Rank test). Patients who were in respiratory failure with hypercapnia showed a statistically significant reduction in $PaCO_2$ both with EOV-NB and CNP (P=0.02 and P=0.01 respectively) but the magnitude of change was individually greater in the patients who were treated with EOV-NB. All patients, however, showed a fall in respiratory rate (P<0.0001) after the application of the Cuirass in CNP mode. There was no physiological deterioration related to the application of external extrathoracic negative pressure in either CNP or EOV-NB modes.

Conclusion: The improvement in PaO_2:FiO_2, the fall in $PaCO_2$ and respiratory rate were indicators of an improvement in ventilation. The proposed mechanisms include improvement in FRC, recruitment of additional alveolar units, and improvement in secretion clearance resulting in reduction in the work of breathing.

ARTERIAL HYPERTENSION IN CHILDREN AFTER OPERATIVE CORRECTION OF CONGENITAL HEART DISEASE AND MANAGEMENT

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Introduction. As it is known, arterial hypertension (AH) after the successful repair of congenital heart diseases (CHD) relating to coarctation of aortae and patent ductus arteriosus frequently occurs requiring treatment. We have studied hemodynamic status in children with AH following operative correction of CHD for differentiation of pharmacological management.

Methods. The investigation was carried out in 47 children with AH from 3 to 14 years of age, who underwent various surgical procedures. 39 children had coarctation of aortae and 8 children patent ductus arteriosus. Impedance reography methodwas used to measure cardiac output (CO) and systemic vascular resistance (SVR) was calculated. Heart rate (HR), central venous pressure (CVP) mean arterial pressure (MAP) systolic pressure (SP), and diastolic pressure (DP) were monitored. The hemodynamic data was compared with skin-rectum difference for the temperature (ΔT), urine output (UO) and arterial-venous difference (Δ) in PO_2, PCO_2, pH acid-base balance (ABB). The results were subjected to t-tests and p 0,05 was considered significant.

Results. The children had increased CO of 110-230% from control data and inadequate decrease SVR of 70-155% from control.45% children achieved increased CO by means of the increased HR.There were not significant differences of CVP, ΔT, UO, ABB,ΔPO_2,ΔPCO_2,ΔpH. Children were divided into 2 groups. The first group with 24 children (21 with CA and 3- PDA) CO=110-130%, SVR=130-150%,MAP=91,3±18,2 mmHg,SP=122,3±15,7 mmHg, DP=75,8±18,7 mmHg. Positive correlation was appeared between DP and SVR (r=0,72, p 0,05) and the 2nd group with 23 children CO=130-230%, SVR=70-130%, MAP=82,7±15 mmHg, SP=142,3±18,9 mmHg,DP=52,7±12,9 mmHg. Our attention was caught by increased tachycardia in the children of the 2nd group.

Discussion. Different hemodynamic status AH of children in the early period after operative correction of CHD can be detected by non-invasive impedance reography technique. This aids us in choosing the course of pharmacological management. In the first group, increased MAP did not lower SVR. A positive correlation appeared between DP-SVR (r 0,72). For the children of this group we used vasodilatators. In the second group increased MAP was produced by means of CO and for control in one we used cardyoselective β-blokers and opiate. This analysis of hemodynamic status can be a guideline for the therapy and control of AH in children during postoperative management.

HEMODYNAMIC STATUS, SYMPATHOADRENAL ACTION AND HEMOSTASIS IN INFANTS WITH SEPSIS.

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Introduction. The purpose of this investigation was the study of the interaction between hemodynamic status and sympathoadrenal action during disseminated intravascular coagulation (DIC) in the infants with sepsis.

Methods. The investigation was carried out 137 children from 1 week to 3 month of the life.The hemodynamic facts were defined with the help of tetropolar reography methods. The excretion of the catecholamines (CA) with the urine was determend by Taylor K.N.,Laversy R (mcg/day).

Results. In the hypercoagulation stage of DIC we determened the activation of the thrombin and plasmin systems with the increase of the inhibitors. In this case we registered in full value clot. This process combined with the dayly excretion with the urine epinephrine (E), norepinephrine (NE) and dophamine (D), that showed the intensification of the synthesis processes and the release of CA in blood from tissue deport. The activation of the sympathadrenal system (SAS) assisted to form the hyperdynamical regims of the circulation and increase the microcirculation. The klinical sings of the insufissiently of the circulation have not defined,that has been associated the compensatory character of the changes of SAS and hemodynamic status. The consumption coagulopathy has been demonstrated in the hypocoagulation stage, that was manifested by the exhaust of the coagulation and vessel-platel hemostasis. The consumption of components thrombin ,plasmin, kallekrein-kinin systems and the formiration not in full value clot was accompaned by decrease of A,NA,D, the products of the metabolism of CA and the activation of monoaminoxydasa. The decrease of the excretion A and the exhaust deport CA indicated about the low functional reserve of SAS. It was one of the main reason of the hemodynamic distroed (heat insufissiently) and the microcirculation (intestinal eodeme with the low effectife periferal flow) and multiplay organ failure.The distroed deport of SAS with thrombocytopenia may be one of the mechanism the distroed of vessel-platel hemostasis.
The correlation between changes of hemostasis, CA and circulation are required administration medicins, that restore the levels of CA in the blood, prevent multiplay organ failure and hemorrage in children with sepsis.

THE USE OF PITUITRINUM DURING CONSERVATIVE THERAPY OF GASTROESOPHAGEAL HAEMORRHAGES IN CHILDREN WITH THE PORTAL HYPERTENSION

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Objective: Evaluate the influence of Pituitrinum on central and portal hemodynamic in children with portal hypertension.
Methods: Intraoperative examination of 15 children with extrahepatic portal hypertension carried out to elucidate the effect of Pituitrinum infusion (1 un/kg) on central hemodynamic (bioelectrical impedance measurement by the method of Kubichec with computer program) portal pressure (measured manometricaly) portal blood ,flow (measured by using an electromagnetic flow Probe placed around the upper mesenteric vein). Moreover the analysis of clinical results of treatment the gastroesofageal haemorrhages with pituitrinum infusion (1 un/kg/day) in 17 children with hortal hypertension.
Results: During operation the infusions of Pituitrinum not find significant change of cardiac output, heart rate and arterial pressure. From the start of the infusion of Pituitrinum the portal pressure reduced on 22% and portal blood flow was lower than before infusion on 57%. After the end of infusion of Pituitrinum occurred the restoration of the portal pressure to the initial pressure but the portal blood flow remained lower.
During gastroeosofageal haemorrhages the infusion of Pituitrinum against the background of infusion crystalloid and glucose solutions and the exception of the colloid allowed to stop the haemorrhages in the course of 2.9±0.6 day without urgent surgery.
Conclusions: Pituitrinum exerted the minimal effect on central hemodynamics and appreciably improved the portal pressure and blood flow.

3. Respiratory Failure

INTERPRETATION OF CLUSTER ANALYSIS IN EVALUATION OF THE CARDIORESPIRATORY SYSTEM FUNCTION IN PREGNANT PATIENTS WITH EPH-GESTOSIS

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Objectives: Multi-measured correlative analysis of the most number of non-invasive indices of the cardio-respiratory system function was made to determine the structure of their interrelation and the ways of their adequate and effective correction.
Methods: Spirometry, capnography, oxygenography, indirect Fick method at recurrent respiration, plethysmography, integral rheography - in all 52 indices were used. The received data were processed on a computer by a standard package of statistical BMDP programs.
Results: 70 women with EPH-gestosis (I group) and 48 somatically healthy pregnant women (II group) were studied. Cluster analysis has shown that the rate of the mean correlation connection between ventilation indices was 94% in the Ist group and 90% in the IInd group; gaseous metabolism - 91% and 86%, respectively; central hemodynamics was 87% in both groups.
Conclusion: Cluster interpretation allowed to suggest that an increase of the rate of the mean correlation connection between the indices was characteristic of effective adaptation as the system was multi-component and well-regulated. On the contrary, the increase of the rate of strong correlation connection between the indices reveals the rigidity of the system and the tensity of adaptation mechanisms, i.e. the proximity to decompensation. It follows from this that in cases of EPH-gestosis, the reliability of regulating ventilation and gaseous metabolism decreases.

THE PREVENTION OF THE RESPIRATORY DISTRESS-SYNDROME IN PATIENTS WITH SIGNIFICANT BURNS.

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Objectives:Respiratory distress-syndrome is the most frequent and almost constant complication of all critical conditions. We can judge about the degree of the syndrome by the breathlessness, tachycardia, harsh breathing and appearance of moist rale.
Methods: Side by side with other methods of urgent intensive therapy we have used the drainage of the thoracic lymphatic duct as a means for reducing of the interstitial edema in patients with burns during toxemia.
12 patients with severe burn trauma, from 30% to 70% of the total surface area of the body involved,were treated. Daily volume of the lymph drainage was from 400 till 4000 ml.In case of sufficient volume the lymphosorption with the return into the venous bed was done.
Results: By the end of the 2 nd day from the beginning of the lymph drainage the patients condition became better: normalization of hemodynamics, decrease of dyspnea and hypoxemia.
Conclusion: The usage of the lymphodrainage in complex treatment of developing respiratory distress-syndrome has enabled to improve the results significantly and to prevent the further development of the distress-syndrome in 8 patients.

PRESSURE SUPPORT VENTILATION ADMINISTERED WITH FACIAL MASK ALLOWS BRONCHOALVEOLAR LAVAGE IN SEVERELY HYPOXEMIC PATIENTS

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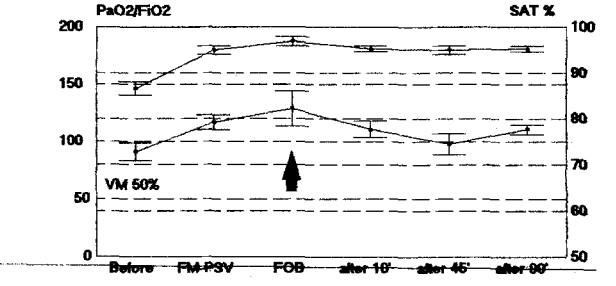
Severe hypoxemia in non intubated patients represents a major contraindication to fiberoptic bronchoscopy (FOB) and bronchoalveolar lavage (BAL), but these procedures are often required for a correct diagnosis of the causative agent of pneumonia. Aim of this investigation was to verify the safety and efficacy of bronchoscopic procedures during pressure support ventilation administered through facial mask (FM-PSV).
Five intensive care patients, all immunocompromised, (3 males and 2 females; mean age 41.6±17.5) were enrolled in the study. All patients presented criteria for pneumonia with PaO2/FiO2 ratio ≤ 100 and were responders to FM-PSV. FOB and BAL were performed after topical anesthesia with FM-PSV (PS = 16 cm H2O; PEEP = 5 cmH2O; Trigger = - 1cmH2O) continuously administered (10' before FOB FiO2= .7; during FOB , FiO2 =1 and for 90' after FOB, FiO2 = 0.7).
PaO2/FiO2 ratio as well as O2 saturation (SAT) did not show significative changes during the procedure (Fig.1). No complication was observed and hemodynamic conditions were stable for all patients.
CMV, Pneumocystiis (2), Legionella and Mycobacterium Tuberculosis were identified from BAL allowing a prompt and targeted therapy.
We concluded that Mask PSV can represent an excellent technique to perform FOB and BAL in severely hypoxemic patients without deterioration of gas exchanges and avoiding endotracheal intubation.



TOTAL PARENTERAL NUTRITION IN MECHANICALLY VENTILATED PATIENTS: CURRENT EPIDEMIOLOGICAL PROFILE.

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Objective: To analyze the current incidence and epidemiology of total parenteral nutrition (TPN) among critically ill patients placed on mechanical ventilation. **Design:** Prospective observational study. **Setting:** Medical Intensive Care Unit in a Tertiary Hospital. **Patients:** A total of 113 consecutive critically ill patients with non-coronary related disease needing mechanical ventilation admitted in our ICU during a 12 months period. **Measurements:** Data of sex, age, diagnosis, and outcome were recorded. Severity of illness and therapeutic effort in the first 24 hours were measured using Acute Physiology Score and Chronic Health Evaluation (APACHE II) and Therapeutic Intervention Scoring System (TISS). **Results:** 113 mechanically ventilated patients, 76 male and 37 female, were studied. Only ten patients needed TPN and their main diagnoses were: five cases of multiple organ failure secondary to pneumonia (2), ARDS (2) and septic shock (1); two cases of acute pancreatitis; and one mesenteric thrombosis, one status epilepticus, and one prolonged cholinergic crisis by suicidal organophosphate insecticide subcutaneous injection. No statistically significant differences between both TPN and non-TPN groups were found:

Values:	TPN Group	Non-TPN Group
Number of Patients	10	103
Age (mean±SD)	52.0±15	52.7±18
Sex (M/F ratio)	2.33	2.02
APACHE II	18±9.5	20±8.2
TISS	33±10	32±9.7
% Mortality	20	29.1

Conclusions: The current incidence of TPN among mechanically ventilated critically ill patients is low (8.85% of mechanically ventilated patients), because the enteral feeding is increasingly used. TPN support in mechanically ventilated patients is only related to specific diagnoses, but not to greater severity of illness nor greater therapeutic effort. It is also not related to greater mortality rate with respect to the patients receiving mechanical ventilation without TPN.

Balloon-expandable endovascular stent implantation in the treatment of tracheomalacia in pediatric age.

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Background: Tracheomalacia is a major problem after surgery for complex congenital heart diseases in patients of pediatric age. To date, no treatment for this infrequent but life-threatening complication is widely agreed, mainly in neonates and infants.

Patients: Three infants showed tracheomalacic degeneration after surgery for Scymitar syndrome, double aortic arch and pulmonary artery sling, respectively. After 51+7 days of assisted ventilation, they were considered inextubable because of failure to wean from mechanical ventilation by Synchronized Intermittent Mandatory Ventilation (SIMV), SIMV plus Pressure Support plus Continous Positive Airway Pressure. Thus, they underwent balloon-expandable endovascular stent (Johnson&Johnson) implantation at the site of the malacic degeneration. Under fluoroscopic guide, the stent was mounted on a Low-Bow balloon guide-wire (0.035") and expanded to 6 mm of withd.

Results: After the stent implantation, the mean diameter of the tracheomalacic segment increased from 4.8+0.2 to 6.0+0.3 mm (+32.4%, $p<0.05$), peak respiratory pressure decreased from 41+3.6 to 13.7+9.3 cm H2O (-66.6%, $p<0.01$) and pulmonary compliance increased from 7+1 to 12.3+2.5 ml/cm H2O (+44.1%, $p<0.05$). Early after the stent implantation, all patients were easily weaned from the assisted ventilation.

Conclusions: endovascular balloon-expandable metallic stent implantation at airway level of critically ill infants could be considered as a simple, quick and effective treatment of tracheomalacia in pediatric age.

EFFECT OF MILD HYPOTHERMIA FOR ADULT RESPIRATORY DISTRESS SYNDROME ON OXYGEN SUPPLY - DEMAND BALANCE

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Objectives: To investigate the effect of controlled hypothermia for severe acute respiratory failure on the oxygen supply - demand balance.

Methods: All fifteen patiens with severe hypoxemia associated with adult respiratory distress syndrome (ARDS) were machanically ventilated. When severe respiratory failure was not improved sufficiently in spite of conventional therapy, controlled hypothermia was managed. Patients were divided into two groups by the value of cadiac index (CI) before hypothemia management (Group 1: n=9, CI $\geq$ 3 L/min/m^2; Group 2: n=6, CI < 3 L/min/m^2). The core temperature was progressively reduced from 37°C to 32°C by surface cooling. Oxygen delivery ($\dot{D}o_2$) divided by oxygen consumption ($\dot{V}o_2$) was defined as the coefficient of oxygen delivery ($\dot{D}o_2/\dot{V}o_2$). In each group, the value of $\dot{D}o_2$, $\dot{V}o_2$ and $\dot{D}o_2/\dot{V}o_2$ was calculated by 1°C core temperature alteration.

Results: CI (group 1 vs group 2; 3.8±0.85 l/min/m^2 vs 2.1±0.83 l/min/m^2, mean±SD, $p<0.01$) before surface cooling were significantly different between two groups. In group 1 patients, the maximam value of the coefficient of oxygen delivery were significantly increased compared to that of group 2 (4.5±1.23 vs 2.8±0.62, $p<0.01$).

Conclusions: We concluded that mild hypothermia improved the coefficient of oxygen delivery in ARDS patient that had maintained cardiac function sufficiently before cooling.

CONTAMINATION OF HOSPITAL GAS SOURCE WITH NITRIC OXIDE: UNWITTING REPLACEMENT THERAPY?

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Objective: Evaluate the level of nitric oxide in the hospital compressed gas source over different days.

Methods: A Servo 900C (Siemens) ventilator was connected to the standard hospital gas supplies and set at a respiratory rate of 20 breaths/min, and a tidal volume of 200 ml for a test lung. FiO2 was set at 21% and nitric oxide (NO) levels were sampled from the expiratory port with a NO chemiluminescence analyzer (Sievers 270B). This was repeated with an FiO2 of 100%. Ambient NO levels were also determined. Measurements were performed on seven different days.

Results:

FiO2	Mean NO level (ppb)	SD
Ambient air	91	37
21%	94*	39
100%	56	37

ppb - parts per billion, SD - standard deviation, *NO levels were significantly higher at 21% compared to 100%, $p < 0.005$, paired t-test.

Conclusion: Inhaled NO levels were significantly higher at a lower FiO2. This represents contamination from the hospital gas source.

Speculations: NO may be found in hospital gas source and serve to confound measurements of exhaled NO if this is not appreciated. Furthermore, the resultant loss of auto-inhalation of NO from intubation, may unwittingly be replaced from this contamination thus maintaining V/Q matching. The lower levels of NO at higher FiO2 may partially contribute to oxygen toxicity.

THE SIGNIFICANCE OF PRONE POSITION IN THE THERAPEUTIC MANAGEMENT OF POSTOPERATIVE ARDS

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Objectives: Evaluate the efficacy of prone position in ARDS and determine its importance in the therapeutic algorithm.

Methods: 43 consecutive patients with severe ARDS (Murray-Score > 2,5; p_aO_2/f_iO_2 < 160 mmHg; 29 male, 14 female, mean age 62 years) were conventionally ventilated (PCV, PEEP 6-16 mbar, I:E=1:1, p_{peak} < 30 mbar). If after 24 hours pulmonary function did not improve patients were placed in prone position. Change from prone to supine position was done every 12 hours. Beside ultimate survival, parameters investigated were $AaDO_2$, p_aO_2/f_iO_2, and venous admixture (Q_S/Q_T).

Results: During the first 12 hours in prone position 39 of 43 patients showed a significant decrease in Q_S/Q_T (25.3% vs. 17.8%) and $AaDO_2$ (235 vs. 187 mmHg), and an increase in p_aO_2/f_iO_2 (151 vs. 201 mmHg). Changes were most pronounced in patients with high Q_S/Q_T, and in patients with an onset of ARDS less than 48 hours before first application of prone position. After an average of 6 position changes (2 to 16) 28 of 43 patients could be weaned from the ventilator. 22 patient could leave the hospital. In the later course letality was primarily determined by additional organ failures and by the severity of the underlying disease. Negative side effects were minor, including slight cardio-vascular depression and increase in p_aCO_2, and never posed a limitation to continuation of prone position. Especially in patients with septic shock skin lesions in exposed areas could not always be prevented. Prone position could easily be combined with all ventilation modes and with all intensive care interventions. Also immediately after major surgery and in patients with open packing prone position was possible.

Conclusions: In this investigation prone position proved to be an efficient and safe method in the treatment of severe ARDS. Patients with a pronounced ventilation/perfusion mismatch and patients in the early stages of ARDS appear to profit most from prone position. Though the immediate effect on oxygenation is striking, still more the 40% of all patients die from multi organ failure and underlying diseases. A proposed therapeutic algorithm for ARDS is as follows: If under conservative ventilation (PCV, PEEP < 20 mbar, p_{peak} < 30 mbar) pulmonary function does not improve within 12 - 24 hours prone position should be applied. When after 2 - 3 position changes no lasting effect can be achieved further ventilation modes (e.g. PC-IRV, APRV, NO, etc.) should be used in addition to prone position. Standard intensive care principles, such as fluid restriction and optimization of circulation, apply also to patients in prone position.

QUANTITATION OF NITROTYROSINE LEVELS IN LUNG SECTIONS OF PATIENTS AND ANIMALS WITH ACUTE LUNG INJURY.

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Objectives: Nitric oxide reacts with superoxide to form peroxynitrite, an extremely reactive and toxic species. We quantified the presence nitrotyrosine, the stable product of the interaction of peroxynitrite with tyrosine residues in the lungs of pediatric patients that died with respiratory distress syndrome (RDS).
Methods: Paraffin embedded lung sections, obtained at autopsy, were incubated with a polyclonal antibody raised against nitrotyrosine, followed by a secondary fluorescent antibody. Alveolar structure-associated fluorescence was quantified using existing methods.
Results: Tissue sections from patients who died with RDS exhibited significant specific immunostaining which was uniformly distributed across the blood-gas barrier. In contrast only background levels of fluorescence were seen in the lungs of patients who died from non-pulmonary causes. Intense staining was also seen in the lungs of rats that breathed 100% O_2 for 60 h, a condition known to result in RDS-type illness; no immunostaining was observed in air-breathing rats.
Conclusions: Significant levels of peroxynitrite may be formed in the lungs of patients with acute lung injury. Peroxynitrite may be contributing to the pathology of RDS by damaging key components of the alveolar epithelium including the pulmonary surfactant system.

ACUTE RESPIRATORY DISTRESS SYNDROME IN LIVER TRANSPLANTATION.

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INTRODUCTION: Acute respiratory distress syndrome (ARDS) is frequent in postoperative patient undergoing high risk abdominal surgery. The aim of this study was to analyze the incidence of ARDS in liver transplant recipient and the relationship with graft disfunction.
MATERIAL AND METHODS: We have analyzed 267 patients who underwent a liver transplantation. The definition of ARDS included consensus criteria (impaired oxigenation PaO2/FiO2 ≤ 150, detection of bilateral pulmonary infiltrates in chest RX and a pulmonary-artery oclussion pressure ≤ 18). Graft disfunction (acute rejection -AR- or primary graft non function -PGN-) was suggested by a deterioration in liver function or the appearance of clinical signs and was confirmed by histologic finding on liver biopsy. We analyzed predisposing factors to develop ARDS and their influence in outcome. Statistical analysis was performed using Chi square and student's t test.
RESULTS: In our serie, ARDS ocurred in 11,2%. There were no significant differences in demographic and clinical characteristics between groups. The supportive donors methods were similar.
INTRAOPERATIVE FACTORS: The warm isquemia time was 87 ± 15 minutes in patients with ARDS vs 50 ± 12 in patients without ARDS (control group; $p < 0,05$). The ARDS group received more red blood packet than the control (25,5 ± 16 vs 19,2 ± 9; $p < 0,05$).
POSTOPERATIVE FACTORS: We found lower incidence of ARDS in normal evoluted graft (5,4%) than patients with PGN (23%) or AR (25%).
Mechanical ventilation time was prolonged 16,9 ± 10 days in patients with ARDS vs 1,7 ± 1,4 days in control. Mean stay ICU was 19 ± 10,9 days in the ARDS group vs 4,9 ± 2,7 days in control group.
Postoperative mortality rate was 53% in ARDS patients vs 5,7% in those without respiratory failure.
CONCLUSIONS:
1- ARDS incidence in liver transplantation is low (11,2% in our serie) but it causes high mortality (53%).
2.- ARDS in liver transplantation was significative related, in our serie, with intraoperative (isquemia graft time and transfusions) and postoperative factors (AR or PGN)
3.- ARDS increases mechanical ventilation time, mean stay ICU and mortality in patients undergoing a liver transplantation in our serie.

PERFLUOROCARBON-ASSOCIATED GAS EXCHANGE (PAGE) IN NORMAL AND ACID-INJURED LARGE SHEEP.

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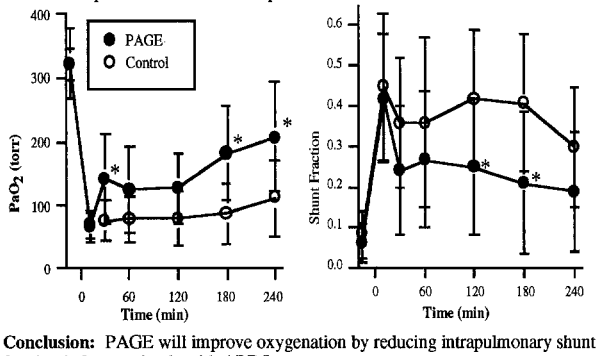
PAGE, gas ventilation of the perfluorocarbon-filled lung, supports gas exchange and circulation in small animals (<15kg) with lung disease. We hypothesized that large animals could be supported by PAGE without adverse effects on hemodynamics. We first elucidated the determinants of gas exchange in normal sheep, and applied them to a model of adult respiratory distress syndrome (ARDS).
Methods: Using the ventilator settings determined to be optimal in our pilot study (FiO_2 of 0.6, PEEP of 5 cm H_2O, IMV of 6 bpm, IT of 50%, and TV of 16 ml/kg), sheep weighing 58.9 (± 8.3) kg had lung injury induced by instilling 2 ml/kg of 0.05N HCl into the trachea. Ten minutes after injury, sheep with PaO_2<100 torr were randomized to continue gas ventilation (control, n=9) or to institute PAGE (n=9). PAGE was instituted by instilling 1.6 L of unoxygenated perflubron into the trachea and resuming gas ventilation at the previous settings. ABG's were drawn at baseline, 10 minutes after injury, 30 minutes after injury, and then every 30 minutes for 4 hours.
Results: Reported as mean ± std. *p< 0.03 PAGE versus Control



Conclusion: PAGE will improve oxygenation by reducing intrapulmonary shunt fraction in large animals with ARDS.

CPAP effects on pulmonary function tests after CABG

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Pulmonary function tests were realized on 140 patients after CABG surgery with the use of mammary arteries. Vital Capacity and Force Expiratory Volume 1sec. were obtained before operation (VC pré, FEV1pré) and on the 2d post-operative day, 4 hours after removal of the thoracic drains (VC post, FEV1 post).
These 140 patients are divided in 3 groups:
group 1 treated prophylactically after extubation with CPAP (1 hour 3x / day)
group 2 treated after extubation with incentive spirometry (20x / 2 hours)
group 3 treated therapeutically (atelectasy, pulmonary oedema, PaO2/FiO2<230) with CPAP (3x 1h/day)

RESULTS

	group 1	*group 2*	*group3*	*P*
n	*65*	*48*	*27*	
age	*62±9*	*61±9*	*60±8*	*NS*
VCpré (ml)	*3570±764*	*3809±942*	*3750±771*	*NS*
FEV1pré (ml)	*2567±704*	*2727±780*	*2586±602*	*NS*
VCpost (ml)	*1998±609*	*1383±326*	*1626±510*	*0.0001*
FEV1post(ml)	*1113±377*	*869±197*	*969±309*	*0.0003*
VCpost/VCpré	*56%*	*36%*	*43%*	
FEV1post/FEV1pré	*43%*	*32%*	*37%*	

CONCLUSION

48 hours after the operation, we observed a important decrease in the pulmonary function tests. But patients treated prophylactally by CPAP have significantly better tests than patients treated with incentive spirometry.
After myocardial revascularization with mammary artery grafts, the systematic use of mask-CPAP after extubation can thus be recommended to improve pulmonary function.

HEMODYNAMIC AND GAS EXCHANGE RESPONSES TO INHALATION OF NITRIC OXIDE IN SEVERE HYPOXEMIC ARDS AND COPD PATIENTS.

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Objectives: Inhaled nitric oxide (NO) can improve oxygenation and decrease mean pulmonary artery pressure (PAPm) in hypoxemic patients with ARDS. In severe hypoxemic COPD patients, it is not known whether inhaled NO can exert a similar effect on hemodynamics and gas exchange. Therefore, we investigated the response of inhaled NO in hypoxemic COPD patients and the results compared with those obtained in a group of ARDS patients. **Methods:** Ten COPD patients (age 71±2y;FEV_1 0.98±0.12L) and 11 ARDS patients (age 57±5; LIS 2.8±0.1) mechanically ventilated were studied. Hemodynamic parameters were measured using a Swan Ganz catheter. Arterial and mixed venous blood gas determinations, SaO_2, SvO_2, Hb and MetHb were measured (ABL 500,Osm3). Mean intratracheal concentrations of NO and NO_2 were continuously monitored using a chemiluminescence analyzer (NOX 2000). During the study the ventilatory pattern and FiO_2 were kept constant. The protocol was for ARDS group: *basal$_1$, NO 10 ppm, basal$_2$*; COPD group: *basal$_1$, NO 10 ppm, NO 20 ppm, NO 30 ppm and basal$_2$*. After a steady state of 20 min hemodynamic and gas exchange measurements were performed. A positive NO-response was defined as a 20% increment in PaO_2. **Results:** PAPm was similar in both groups and decreased significantly after NO (ARDS, basal 33.6±9.7 mmHg, NO 29.7±6.7 mmHg, $p<0.01$) (COPD, basal 27.8±6.3 mmHg, NO-10 24.4±5.3 mmHg, $p<0.01$). All other hemodynamic variables remained unchanged after NO. Basal oxygenation was higher in COPD group (PaO_2/FiO_2 189±53 mmHg) vs ARDS group (PaO_2/FiO_2 100±40 mmHg)($p<0.01$). After NO-10, PaO_2 increased (69±20 mmHg to 97±40 mmHg, $p<0.01$) and Qs/Qt decreased (37±11% to 31±10%, $p<0.01$) only in ARDS group. In both groups, significant correlations between basal PAPm and inhaled NO-induced decrease in PAPm were found. Inhaled NO-induced increase in PaO_2/FiO_2 was not correlated with basal PaO_2/FiO_2. NO responders were 8/11 (73%) in ARDS group and 2/10 (20%) in COPD group ($p<0.05$). **Conclusions.** In hypoxemic ARDS and COPD patients, inhaled NO decreased mean pulmonary artery pressure. However, oxygenation only ameliorated in ARDS group because the number of responders to inhaled NO were higher in ARDS group and this effect seems not to be related to the basal hypoxemia. These results might be explained by the V/Q abnormalities present in COPD patients. *Grant FIS 95/1390.*

PHYSIOLOGIC DETERMINANTS OF CO_2 ELIMINATION IN MECHANICALLY VENTILATED PATIENTS.

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Objectives: It has been recently reported that expired CO_2 slope as a function of time is modulated by total respiratory system resistance (Rrs) in critically ill patients (Chest 1994;105:219-223). In this study, we analyze the relative contribution of disease (Dis), endotracheal tube resistance (Rtube), airway resistance (Rmin), additional resistance (△Rrs), autoPEEP (PEEPi) and dynamic/static elastance (Ed/Es) to the CO_2 elimination in different clinical conditions. **Methods:** We have studied 37 adult patients (8 controls, 11 acute respiratory failure, 9 severe ARDS and 9 COPD) mechanically ventilated (Servo 300 and 900C, Siemens) without PEEP. We recorded tracheal pressure, airflow and capnograms. Signals were analogic to digital converted for posterior data analysis. Respiratory system mechanics was assessed by constant end-inspiratory and end-expiratory occlusions technique. At equal tidal volume (0.5L) and 0 cmH_2O of PEEP, we calculated Rtube, Rmin, △Rrs, PEEPi and Ed/Es. Capnographic indexes were alveolar ejection volume (V_{AE})/Vt ratio and expired CO2 slope beyond V_{AE} ($SlpCO_2$). V_{AE} was determined as the crosspoint between VCO_2 vs Vt curve and the straight line $VCO_2 = VCO_2max-(F_ACO_2 \cdot 0.95) \cdot Vt$. $SlpCO_2$ was calculated by linear regression. Stepwise multiple regression analysis was performed for capnographic indexes. **Results:** $SlpCO_2$ and V_{AE}/Vt correlated well with all the mechanical variables studied with the exception of Rtube. Partial r^2 from multiple regression analysis could be observed in the Table.

	△Rrs	Dis	Ed/Es	Rtube	PEEPi	Rmin
$SlpCO_2$	0.29 $	NS	NS	NS	NS	NS
V_{AE}/Vt	0.33 #	0.49 #	NS	0.22 $	NS	NS

$ $p<0.01$; #$p<0.001$

For $SlpCO_2$, total variance explained by the model (△Rrs) was $r^2 = 0.54$ ($p<0.001$). For V_{AE}/Vt, total variance explained by the model (△Rrs, Dis, Rtube) was $r^2 = 0.80$ ($p<0.001$) . **Conclusions:** Lung heterogeneity is the major determinant of CO_2 elimination in mechanically ventilated patients.
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ALVEOLAR EJECTION RATIO ELUCIDATED FROM VCO_2 VERSUS Vt CURVES

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Objectives: Alveolar ejection volume (V_{AE}) can be defined as the fraction of tidal volume (Vt) with minimal dead space (Vd) contamination. According to the classical paradigm: $\lim_{Vd \to 0} [VCO_2/Vt] = F_ACO_2$, VCO_2 vs Vt relationship tends asyntotically to a constant slope when approaches end-tidal volume. We have defined V_{AE} as the volume that defines this relationship until a limit of 5% variation. **Methods:** Six subjects with normal respiratory mechanics were studied during anesthesia for minor surgery. Two subjects, otherwise normals but having high values of total resistance and dynamic compliance, were also studied. Capnograms were recorded in steady-state at 3 levels of Vt (0.3, 0.5 and 0.8 L) and four levels of PEEP (0, 5, 10 and 15 cmH_2O). F_ACO_2 was determined as VCO_2 vs Vt slope during the last 5% of tidal volume. V_{AE} was determined as the crosspoint between the VCO_2 vs Vt curve and the straight line $VCO_2 = VCO_2max-(F_ACO_2 \cdot 0.95) \cdot Vt$. Expired CO_2 slopes of phase III at 50% and 75% of expired Vt were also measured by linear regression. Two consecutive cycles were measured to determine intraindividual variability (Vi). Interindividual variability (VI) was assessed from the coefficient of variation. **Results:** The following table shows the results at Vt=0.5 L and PEEP 0 cmH_2O in normals:

	Mean±SD	Vi	VI
V_{AE}/Vt	0.64 ± 0.03	2.044	5.45
$Slope_{50\%}$ (mmHg/L)	6.35 ± 1.34	13.99	25.15
$Slope_{75\%}$ (mmHg/L)	6.40 ± 2.64	50.10	63.11

PEEP did not influence V_{AE} neither slopes. V_{AE}/Vt normally increased with tidal volume, except in two subjects with abnormal respiratory mechanics where V_{AE}/Vt decreased instead. $Slope_{50\%}$ or $Slope_{75\%}$ could not discriminate those subjects. **Conclusions:** V_{AE}/Vt is an useful capnographic parameter to estimate ventilatory troubles in a most objective, reproducible and physiological way than classical geometrically-based parameters.
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CAPNOGRAPHIC INDEXES AND LUNG MECHANICS IN PATIENTS WITH ACUTE LUNG INJURY RECEIVING MECHANICAL VENTILATION. EFFECT OF PEEP.

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Objectives: Patients with ARDS presented lung abnormalities which originate an increase in airway resistance (Rmin), in additional resistance (△Rrs) and in static elastance (Ers). Application of PEEP further increases △Rrs. Capnographic indexes reflect lung ventilation/perfusion inhomogeneities. In these conditions, the effects of PEEP on lung mechanics could be better understood by simultaneous measurement of capnographic indexes. **Methods:** We studied 3 groups of subjects. N: 8 normal subjects scheduled for minor surgery; ARF: 9 critically ill patients with mild acute respiratory failure; ARDS: 8 patients with early ARDS (< 72 h). We recorded tracheal pressure, airflow and capnograms. Signals were analogic to digital converted for posterior data analysis. Respiratory system mechanics was assessed by constant end-inspiratory and end-expiratory occlusions technique. At equal tidal volume (0.5L) a PEEP level of 0,5,10 and 15 cmH_2O was applied in all patients. We calculated Ers (cmH_2O/L), Rmin, △Rrs (cmH_2O/L/s) and autoPEEP. Capnographic indexes were alveolar ejection volume (V_{AE})/Vt ratio and expired CO2 slope beyond V_{AE} ($SlpCO_2$). V_{AE} was determined as the crosspoint between VCO_2 vs Vt curve and the straight line $VCO_2 = VCO_2max-(F_ACO_2 \cdot 0.95) \cdot Vt$. $SlpCO_2$ was calculated by linear regression. Values were compared using ANOVA and Scheffe F-test. **Results:** Data at PEEP 0 could be observed in the table (mean±SD; *$p<0.05$ respect N):

Group	Ers	Rmin	△Rrs	$SlpCO_2$	V_{AE}/Vt
N	19±2	1.8±0.9	2.1±0.6	8±3	0.60±0.07
ARF	23±7	4.9±2.2*	4.5±1.3*	14±7	0.43±0.1*
ARDS	27±6*	6.2±1.9*	4.8±1.4*	25±13*	0.31±0.09*

At PEEP 15, only △Rrs in ARDS group increased significantly (4.8±1.4 at PEEP 0 vs 8.5±3.9 at PEEP 15, $p<0.05$) whereas capnographic indexes remained unaltered. **Conclusions:** 1) Low V_{AE}/Vt ratio and increased $SlpCO_2$ indicate lung heterogeneity; 2) PEEP did not modify capnographic indexes sugesting that high PEEP increases stress relaxation in ARDS patients.
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EFFECT OF DIFFERENT SURFACTANT PREPARATIONS ON L-SELECTIN EXPRESSION OF ACTIVATED NEUTROPHILS

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Introduction: The potential role of polymorphonuclear neutrophil (PMN) in the pathogenesis of acute lung injury, including the adult respiratory distress syndrome (ARDS), is well described. The aim of this study was to investigate wether different surfactant preparations have an influence on L-Selectin expression of activated neutrophils in vitro. **Material and methods:** 5 ml heparinized whole blood (30U/ml) from 5 healthy adult volunteers were incubated for 1 hour with 10^{-6} mol/ml N- formyl-methionyl-leucyl-phenylalanine ((FMLP) Fa. Sigma) together with natural (Alveofact®, Curosurf®) and synthetic (Exosurf®) surfactant preparations (1,2mg/ml). Elastase-proteinase inhibitor complex (E-PI) as a result of PMN-activation were determined by chemoluminescence immunoassay. Analysis of granulocyte populations and measurement of L-Selectin expression were performed on a FACScan flow cytometer (Becton Dickinson). L-Selectin were expressed as percentage of positive stained cells. **Results:** After incubation with natural surfactant (Alveofact®) and FMLP we found decreased E-PI levels from 30% resp. 20% with Curosurf® compared with E-PI levels after incubation with FMLP alone. E-PI levels were significantly increased (90%) after incubation with synthetic surfactant (Exosurf®) preparation and FMLP. The results of L-Selectin positive stained cells after stimulation are given below:

	median (%)	range
FMLP nativ	85,2	(65,8-92,1)
FMLP	22,9	(9,2-29,1)
FMLP+Alveofact	21,7	(15,1-27,4)
FMLP+Curosurf	3,7	(1,3-10,7)
FMLP+Exosurf	1,7	(0,6-4,5)

Conclusion: In contrast to synthetic surfactant natural surfactants (Alveofact®,Exosurf®) are able to inhibit PMN-activation. After incubation of activated neutrophils with surfactant, L-Selectin expression is decreased. These effects depends on which preparation is used. We conclude, that natural surfactant (Aveofact®) can perhaps influence early recruitment („rolling") of PMN in patients with respiratory failure like ARDS.

MECHANISM OF ALVEOLAR RECRUITMENT DURING LATERAL POSITIONING IN PATIENTS WITH ARDS

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Objectives: In thoracic CT scans of patients with severe ARDS atelectasis and pleural effusion can be found in the dependent lung regions. By rotating these patients from left lateral position to right lateral position a redistribution of the CT densities, a recruitment of atelectasis and therefore an improvement of gasexchange is possible within a few days (1, 2). The objective of this study was to find out the mechanism of alveolar recruitment during lateral positioning by CT scanning in left and right lateral position.

Methodes: After approvel by the local institutional reviewboard we investigated 7 ventilated patients with severe ARDS (Entry criterias: Murray Score > 2,5) in the CT scann of the university hospital. After a stabilisation period of 30 minutes in supine position a thoracic CT scan slice 1 cm above diaphragm was taken. Then two different positions of the patients were studied in a randomized order: a) 60 degree of left lateral position, b) 60 degree of right lateral position. Each lateral position was held for 20 minutes. At the end of each of these periods a thoracic CT scan slice 1 cm above diaphragm was taken. Quantitative analysis of CT scan data was based on the frequency distribution of the CT numbers. To quantify the alveolar recruitment during lateral positioning by means of CT scan we defined 3 compartments within the lungs: a) normaly inflated lung, b) poorly inflated lung, c) noninflated lung (= atelectases) (3).

Results: Independant of the side of lateral positioning (L) in the non-dependent upper lung a significant increase of the normaly inflated compartment (S: 45%; L: 65%) as well as a significant decrease of the noninflated compartment (S: 34%, L: 12%) was observed in comparison to supine position (S). In the dependant lower lung the normaly inflated compartment decreased significantly (S: 45%, L: 26%) whereas the noninflated compartment increased significantly (S: 34%, L: 51%). Throughout the whole studyperiode we did not observe any significant change regarding gasexchange and hemodynamic parameters.

Conclusions: In lateral position the non-dependent upper lung is decompressed. Therefore a significant recruitment of atelectases is observed in the upper lung within 20 minutes. On the other hand the dependent lung is compressed by the weight of the upper lung and the mediastinum. A great amount of the alveoli of the dependant lung collapse in this short time intervall. Therefore the net effect of recruitment of one positioning maneuver is very small. When positioning patients one should be aware, that the patient is kept in each lateral position long enough to clean up the atelectases in the non-dependant lung and short enough to compress less lung tissue in the dependant lung.

References: 1.) Hörmann et al. Kinetic Therapy in severe ARDS - CT findings. J Europ Resp Society 1993; 6/17: 369 s. 2.) Hörmann et al. Effect of kinetic therapy in patients with severe adult respiratory distress syndrome. Crit Care Med 1994; 22: A87. 3.) Rosenblum et al. Radiology 1980; 137: 409.

PULMONARY METABOLIC FUNCTION IN PATIENTS IN CRITICAL STATES

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Objective: A serious complication of critical states of various ethiology in which not only lungs'gas-exchange, but the metabolic function suffers is ARDS. To evaluate the extent of the pulmonary metabolic function disturbance, lactate concentration (L mMol/l) in mixed venous and arterial blood was examined as well as the index of body filling by toxic substances (T) and the effective albumin concentration (EC gr/l), reflecting albumin transport ability.

Methods: 12 patients with multiple severe spinal trauma and massive hemorrhagy were examined in dynamics during the first 10 days of treatment, 7 of them survived, 5 - died. ARDS was discovered in 8 patients. T and EC were determined with the help of the fluorescend probe K-35.

Results: During the first 3 days with a high L of blood (La=3,86±1,47, Lv=6,70±1,08) lungs utilize it from the incoming blood (a-v=2,84); when the concentration is within normal values, this phenomenon is not observed. Within the same period ECa=25,0±2,45; ECv=23,0±2,46 (norm=47±2), while Ta=0,34±0,07, Tv=0,72±0,09 (norm=0), which testifies to the fact that lungs absorb toxic substances of various nature. After 3 days if there are no pathological changes in lungs and in case of positive illness course, L is also within normal values, in case of unfavourable course and ARDS development L increases and La considerably excedes Lv (La=4,99±0,96, Lv=3,16±0,66; a-v=1,83), which means that lungs cease to utilize L but, probably, produce it. Toxic substances continue to accumulate (Ta=0,75±0,08, Tv=0,74±0,07); lungs cease to work as a detoxication organ (Ta=Tv). At the same time albumin transport functions decreases (ECa=17,0±1,40, ECv=16,0±1,18) which makes intoxication worse.

Conclusions: ARDS developing in critical states is accompanied by lungs'metabolic function disturbance. Lungs cease to utilize toxic substances and L, and even produce the latter.

PROLONGED NITRIC OXIDE (NO) INHALATION IN PATIENTS WITH SEVERE ARDS.

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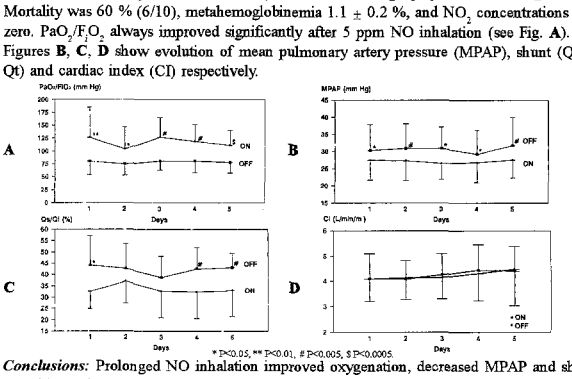
Objective: To analyze effects of low-dose NO inhalation in patients with severe acute respiratory distress syndrome (ARDS) over five days.

Methods: We prospectively studied 10 patients (9 men, 1 woman) with severe ARDS admitted to our ICU between May 1994 and May 1995 who required NO inhalation with a dose of 5 ppm for at least 5 days. Entry criteria for NO inhalation were Murray score ≥ 2.5 and $PaO_2/F_IO_2 < 125$ mm Hg with PEEP ≥ 8 cm H_2O for at least 24 hours. All patients were sedated, intubated and mechanically ventilated with volume assist-control ventilation, and had indwelling arterial catheters (pulmonary artery, and radial or femoral artery) to measure cardiac output (by thermodilution) and relevant intravascular pressures, and to calculate derived parameters. NO was administered between Y piece of the ventilator and endotracheal tube and flow was adjusted to obtain 5 ppm NO in the inhaled gas. The NO, NO_2 and NO_X concentrations were continuously measured at the distal end of the endotracheal tube by the chemiluminiscence method (NOX 4000, SEO-Seres, France). Metahemoglobinemia levels were mesured daily. NO inhalation was mantained if PaO_2/F_IO_2 improved at least 20 % and was stopped when the change in PaO_2/F_IO_2 was below 20% or when the patient presented a $PaO_2/F_IO_2 > 150$ mm Hg after 30 minutes without NO inhalation. Every day we made an ON-OFF test to determine if NO inhalation improved PaO_2/F_IO_2. Statistics: Analysis of variance. Data: mean ± standard deviation.

Results: The mean age was 60.1 ± 10.2 years and mean lung injury score was 3.3 ± 0.2. Mortality was 60 % (6/10), metahemoglobinemia 1.1 ± 0.2 %, and NO_2 concentrations zero. PaO_2/F_IO_2 always improved significantly after 5 ppm NO inhalation (see Fig. **A**). Figures **B**, **C**, **D** show evolution of mean pulmonary artery pressure (MPAP), shunt (Qs/Qt) and cardiac index (CI) respectively.



Conclusions: Prolonged NO inhalation improved oxygenation, decreased MPAP and shunt, and did not change CI. Low-dose NO inhalation does not cause tolerance over time. We did not observe a rebound effect after NO withdrawal.

A PROSPECTIVE TWO-YEAR STUDY OF ENDOTRACHEAL SELF-EXTUBATION.

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Objective: To evaluate incidence, associated factors and consequences of endotracheal self-extubation.

Methods: We prospectively studied all patients who required endotracheal intubation and mechanical ventilation for more than 48 hours admitted to our ICU between May 1993 and May 1995. Endotracheal self-extubations (ESE) were divided into deliberate (DSE) and accidental (ASE). We analyzed age, sex, SAPS at admission, type of ESE, need for reintubation, type of ventilatory support (weaning or no weaning), diameter of the tube, number of days under mechanical ventilation prior to ESE, mortality, reason for reintubation, time between ESE and reintubation and sedation level. Statistics: Chi square and Fisher's tests were used for comparing percentages. A discriminant analysis was performed to study the variables (collected during the first year) which were related with the need for reintubation. The model obtained in this discriminant analysis was applied to patients who presented an ESE during the second year of study.

Results: In the first year of study 241 patients required endotracheal intubation for more than 48 hours. Their mean age was 57.8 ± 16.5 years, mean SAPS at admission was 13.9 ± 4.1 and the overall mortality was 33.5% (80/241). In this period we observed 24 episodes of ESE in 22 patients (incidence 8.3%) who had mean age 64 ± 12.7 years, SAPS at admission 12.5 ± 3.1, and mortality 31.8%. The 24 episodes of ESE were divided in 17 DSE and 7 ASE. Nine of the 17 DSE required reintubation (52.9%) and 5 of the 7 ASE (71.4%) (P NS). Three of the 10 patients who were being weaned needed reintubation (30%) while 11 of the 14 (78%) who were not being weaned needed reintubation (P<0.05). Discriminant analysis selected first weaning and second SAPS at admission as the most powerful variables to predict the need for reintubation after an ESE: These variables correctly clasified the need for reintubation in 79.2 % of patients. We applied this model to self-extubated patients during the second year of study. In the second year we observed 16 episodes of ESE in 15 of 276 intubated patients for more than 48 hours (incidence 5.8%). The efficiency of this model on the prospective second-year study was 87.5 %.

Conclusions: Reintubation in self-extubated patients strongly depends on the type of mechanical ventilatory support: the probability of needing a reintubation if ESE occurs during full ventilatory support is higher than if ESE occurs during weaning. These data suggest that some patients may remain under weaning from mechanical ventilation for unnecessarily prolonged periods of time.

ACUTE EFFECTS OF CHANGING FROM SUPINE TO PRONE POSITION IN PATIENTS WITH SEVERE ARDS.

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Objective: The aim of this study was to evaluate the acute effects on gas exchange and hemodynamics due to positional changes from supine (SP) to prone (PP) in patients with severe acute respiratory distress syndrome (ARDS).

Methods: Nine intubated, sedated, paralyzed and mechanically ventilated patients with severe ARDS were prospectively studied. All had a Murray score > 2.5, and a PaO_2/F_iO_2 < 100 with PEEP ⩾ 8 cm H_2O for at least 24 h. All patients had indwelling arterial catheters in the pulmonary artery as well as in the radial or femoral artery in order to measure cardiac output (by thermodilution) and relevant pressures, and to withdraw blood samples. Arterial blood gases and hemodynamic parameters were measured first in SP, and then in PP after 60 minutes of stabilization. Ventilatory parameters remaing unchanged during all the study. Statistical analysis was done by the non parametric Wilcoxon test. Data are expressed as mean ± SD.

Results: There were 6 men and 3 women with a mean age of 54.2 years (21-71) and mortality was 55 % (5/9). Main results are shown below:

	PaO2/FiO2 (mm Hg)	PaCO2 (mm Hg)	Shunt (%)	MPAP (mm Hg)	PVRI (dyn·sec·cm^{-5}/m^2)	SVRI (dyn·sec·cm^{-5}/m^2)	CO (L/min)
SP	87 ± 20.6	84 ± 24.6	44.6 ± 9.1	29.0 ± 7.1	290 ± 114	1219 ± 448	8.0 ± 2.1
PP	90 ± 30.5	88.8 ± 28.2	43.6 ± 2.0	32.3 ± 7.2	333 ± 101	1192 ± 296	7.1 ± 2.6
P	0,008	NS	0,07	NS	NS	NS	NS

Conclusions: Positional changes from supine to prone may be a therapeutic alternative to improve gas exchange in patients with severe ARDS.

DESCRIPTION OF A NEW METHOD TO PERFORM PRESSURE-VOLUME (P-V) CURVES DURING MECHANICAL VENTILATION.

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Objective: To describe and compare a new method for obtaining P-V loops (P-Vcv) by using a two-way Collins valve (TWV) with those obtained by the supersyringe method (P-Vss).

Methodology: We prospectively studied 14 patients who had an acute lung injury and were intubated, sedated and paralyzed, and mechanically ventilated. We performed the P-Vcv loops and P-Vss loops in random order, and the static inflation pressure was limited to 35 cmH_2O with both methods. Pressure (P) was measured at the airway opening by means of a differential P transducer, and volume was obtained from flow (measured with a pneumotacograph) integration. The P-Vss method has already been described (Harf A,et al.BEPR 1975;11:709-28). The P-Vcv method consists in the following: the inlet of a TWV is connected to the ventilator's Y-piece, and both outlets are connected to the endotracheal tube by means of an additional Y-piece; one of this outlets has a one-way Rudolph valve in order to allow inspiration but not expiration during the inflation maneuver. Changing the TWV tap position allows basal ventilation or progressive inflation of the respiratory system. This maneuver is as follows: during an end-expiratory occlusion, the ventilatory settings are adjusted to deliver a 100 mL V_T with a respiratory rate of 20/min and I/E ratio 1:4; at the same time the TWV tap is changed in order to divert flow through the one-way valve. Inflation then begins after releasing the expiratory occlusion. Pressure and flow signals were digitized and acquired by a computer for subsequent data analysis. We analyzed the following parameters: inflation compliance (ICcv and ICss, [mL/cmH_2O]) and lower inflection pressure (IPcv and IPss, [cmH_2O]) in terms of regression and correlation coefficients.

Results: The regression equation for the inflation compliance was: *ICcv=0.97*ICss+5.2.* The 95% confidence intervals (95% CI) for the slope were from 0.78 to 1.16 and for the intercept from -3.0 to 16.0. The correlation coefficient was 0.95 (P < 0.001).

The regression equation for the inflection pressure was: *IPcv=0.98*IPss-0.3.* The 95% CI for the slope were from 0.78 to 1.19 and for the intercept from -1.6 to 1.1. The correlation coefficient was 0.95 (P < 0.001).

Conclusion: With the new P-Vcv method, P-V loops can be performed without disconnecting patients from ventilator, and using the ventilator as an automatic volume generator. The information obtained with the P-Vss and the P-Vcv is equivalent from a clinical point of view.

LOW-DOSE NITRIC OXIDE (NO) INHALATION IN ARDS PATIENTS: RESPONDERS vs NON-RESPONDERS.

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Objective: To analyze the variables which eventually may differentiate ARDS patients who do and do not respond to low doses of inhaled NO.

Methods: We prospectively studied 10 patients (9 men, 1 woman) with severe ARDS admitted to our ICU between May 1994 and May 1995 who were treated with NO (5 ppm). The entry criteria for NO inhalation were Murray score ⩾ 2.5 and PaO_2/F_iO_2 < 125 mm Hg and PEEP ⩾ 8 cm H_2O for at least 24 hours. All patients were sedated, intubated and mechanically ventilated with volume assist-control ventilation. Tidal volume was between 6 and 10 mL/kg, with constant inspiratory flow, respiratory rate was 15-25/min, and I/E ratio between 1:2 to 1:3. All patients had indwelling arterial catheters (pulmonary artery, and radial or femoral artery) in order to measure cardiac output (by thermodilution) and relevant intravascular pressures, and to calculate derived parameters. NO was administered between Y piece of the ventilator and endotracheal tube, and flow was adjusted to obtain 5 ppm NO in the inhaled gas. The NO, NO_2 and NO_x concentrations were continuously measured at the distal end of the endotracheal tube by the chemiluminiscence method (NOX 4000, SEO-Seres, France). Metahemoglobinemia levels were measured daily. We considered a response to NO inhalation when an improvement in PaO_2/F_iO_2 above 20 % was observed after the inhalation of 5 ppm NO (Group R). When the change in PaO_2/F_iO_2 was below 20 % it was considered a lack of response (Group non-R). Statistis: analysis of variance. Data are mean ± standard deviation.

Results: The mean age was 60.1 ± 10.2 years and mean lung injury score 3.3 ± 0.2. Mortality was 60 % (6/10). Metahemoglobinemia was 1.1 ± 0.2 %. NO_2 concentrations were zero.

	Delta % PaO2/FiO2	PaO2/FiO2 (mm Hg)	SVRI (dyn·s·cm^{-5}/m^2)	MPAP (mm Hg)	PVRI (dyn·s·cm^{-5}/m^2)	CI (L/min/m^2)	Qs/Qt (%)	Delta MPAP (mm Hg)
Group non-R (n=13)	3,9 ± 10,1	88 ± 16	1169 ± 271	25,3 ± 4,2	241± 106	4,9 ± 0,8	42,7 ± 6,6	1,6 ± 2,8
Group R (n=37)	37,8 ± 10,5	76 ± 27	1494 ± 399	32,4 ± 7	421 ± 199	3,9 ± 0,8	41,9 ± 10,9	4,1 ± 3,3
P	<0,001	0,003	0,005	0,001	0,003	<0,001	NS	0,02

Abbreviations: systemic vascular resistance index (SVRI), mean pulmonary artery pressure (MPAP), pulmonary vascular resistance index (PVRI), cardiac index (CI), shunt (Qs/Qt) and absolute change in MPAP (Delta MPAP). n = number of determinations.

Conclusions: Patients who exhibit a hyperdynamic state (septic patients) are less prone to improve with low doses of inhaled NO.

THE COMPARISON OF TOTAL AIRWAYS RESISTANCE (Raw) AND SMALL AIRWAYS CONDUCTANCE IN PATIENTS FOLLOWING CARDIAC SURGERY.

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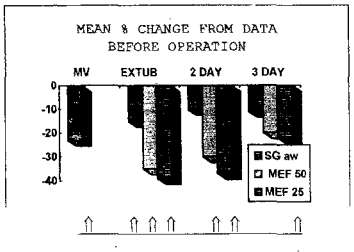
Small airways functional abnormalities have been recognized as a common feature of lung pathology. However peripheral airways contribute relatively little (≈10%) resistance to flow and there disturbances can not be adequately estimated by conventional measurements of respiratory mechanics. The purpose of the study was to evaluate the relationship between Raw and small airways conductance following weaning from ventilator.
Methods. 37 patients (age:24-62 years; 22 males) with no serious complications after mitral or multiple valves replacements and with more than 15 hrs on mechanical ventilation have been enrolled in this study. The modified flow interrupter technique (PTG "Gould" with Fleish head #2; differential pressure transducer PM-131-TC "Statham" w. amplifier "Kistler 7251") and flow-volume recording of forced expiration (Fleish head #4) have been applied before surgery and following operation on mechanical ventilation (**MV**), after extubation (**EXTUB**), on 2 (**2 DAY**) and 3 (**3 DAY**) days. Airways specific conductance (**SG aw**) has been calculated as a mean of 7-10 consequent measurements in each patient at each stage. The SAC was estimated by max expiratory flow at 50 and 25% of VC on 3-4 F-V curves (**MEF 50, MEF 25**). All the data were statistically analyzed with t-test.

Results. Before surgery SGaw was 0,98±0.18 $s \cdot kP^{-1}$, MEF_{50} was 3.30±0.36 and MEF_{25} - 1.83 $l \cdot s^{-1}$. Mean % changes from these data are presented on chart (⇑ - p<0.05 vs preoperative data). MEF_{50} and MEF_{25} are omitted at MV stage because the forced expiration test is not applicable on ventilator. Total airways conductance as well as SAC have been decreased on the day of extubation



On the next two days total Gaw improved, but MEF_{25} was still decreased.
Conclusion. The obtained results demonstrated serious functional disturbances of small airways after open heart surgery. They are in parallel with increased respiratory resistance on the day of extubation, but are more prominent and last longer. Obviously disturbances of small airways, the "quiet area" of the lungs, contribute to creation of intrinsic PEEP and should attract physician attention during weaning some patients with ALI from ventilator.

NONINVASIVE VENTILATION IN ACUTE EXACERBATION OF COPD : WHICH PATIENTS OF HIGH PROBABILITY OF FAILURE?

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Introduction : Noninvasive ventilation (NIV) reduces the need for endotracheal intubation, the length of stay in ICU and the mortality rate in acute exacerbation of COPD. However, some patients failed to be ventilated with NIV.
Objectives : To further delineate patients who failed to be ventilated with NIV and to obtain predicted factors of failure.
Patients : A cohort of 51 patients (72 ± 10 years) presenting with acute exacerbation of COPD (FEV1: 610 ± 396 ml, PaCO2: 62 ± 17, pH: 7.33 ± 0.08) and noninvasively ventilated (pressure support through a full-face mask) between April 1990 and May 1994. Twenty-seven (53%) were successfully ventilated with NIV (discharged alive without the need for endotracheal intubation) while 24 (47%) failed, requiring endotracheal intubation.
Methods : Patients successfully ventilated and those who failed were compared according to 35 respiratory and nonrespiratory variables. Univariate analysis (Wilcoxon rank-sum test and Fisher-exact test) was performed to select variables included in a multivariate analysis by stepwise logistic regression.
Results : Underlying disease assessed by the Simplified Acute Physiologic Score (15 ± 3 vs 11 ± 3, p = 0.0003), creatinine serum concentration (122 ± 45 vs 86 ± 25 µM/L, p = 0.005), blood urea nitrogen (BUN : 12 ± 6 vs 8 ± 3 mM/L, p = 0.009), age (75 ± 9 vs 69 ± 10, p = 0.01) were higher and encephalopathy (71 vs 30%, p = 0.005) more frequent in patients who failed. Multivariate analysis showed that encephalopathic patients (OR (Odd Ratio) = 4, p = 0.001) older than 65 years (OR = 4, p = 0.04) and presenting with BUN ≥ 10 mM/L (OR = 3, p = 0.01) failed to be ventilated with NIV. Variables related to the respiratory status (i.e. PaCO2, PaO2, FEV1) were unable to predict the failure of NIV.
Conclusion : COPD Patients older than 65 years, presenting with acute exacerbation, encephalopathy and BUN ≥ 10 mM/L, should be carefully monitored because of high probability of failure with NIV.

FR/VT IN WEANING OF COPD.

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Objectives:To evaluate if respiratory Fr/Vt index can be used in weaning of COPD from ventilatory support.
Methods:From February to December 1994 we studied 30 patients,25 males and 5 females(mean age 68+/-5);18 of These had emphysema,10 chronic bronchitis,2 dilatative cardiomyopatia,with tracheostomy and emphysema.Mean paCO2 at admission in ICU was 95+/-8mmHg,while when weaningbegan, 60+/-5.Mean autopeep was 8 cmH20(4-12).All patients were ventilated in CPPV as long as four hours to calculate static and dynamic cmpliance and autopeep.Then the ventilation was continued with PSV+Cpap(Peep 7cmH20).When the patients had haemodinamic and respiratory assessment,we had carried out spyrometry,and evaluated Fr/Vt index,particularly,with regard to NIP,at 10,20 and 30 minutes.If Fr/Vt/NIP was 5 weaning was successful.After 30',if values of Fr/Vt 103,the patients continued as for as 2 hours,with T-tube and then they were extubated.
Results:23 patients(76.6%)were extubated with success,while 7(23.4%)failed:one at basal time,2 at 20'and 4 at 30', in agreement to clinical and mechanical expectation.
Conclusions:The Authors think that Fr/Vt is an index of weaning more accurate,because,it takes into account rapid shallow breathing,and it is readly measurable,indipendent from patient's respiratory effort.
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THE EFFECTS OF EXOGENOUS SURFACTANT THERAPY ON SURVIVAL AND MORBIDITY AMONG EXTREMELY PREMATURE INFANTS .

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Objectives: Evaluate the effects of surfactant replacement therapy on survival and morbidity of extremely premature infants (EPI).
Methods: Over a five years period (from 1990-94) 47 infants with gestational age (GA) < 26 weeks and birth weight (BW) <750 gm treated at Rikshospitalet, Oslo were included in the study.
Results: 22 infants were treated with exogenous surfactant (S) while 25 infants were not (NS). BW and GA for this two groups were: S-BW 638±79 gms GA 25±1 wks, NS- BW 654±90 gms, GA 25±1 wks. No differences in antenatal steroids, the incidence of vaginal delivery, aiquired sepsis or bronchopulmonary dysplasia (BPD) were found. Survival data were as follows:

Survival	Surfactant n(%)	No surfactant n(%)
> 24 hours	16(73)	22 (88)
>28 days	10(45)	13(52)
> 6 month	9(41)	10(42)
> 1 year	9(41)	8(32)

Surfactant treated infants required mechanical ventilation for 27± 22 days vs 36±25 in no surfactant group.
Conclusion: Surfactant therapy improved the survival of EPI (41% vs 32%), decreased the duration of mechanical ventilation and need for supplemental oxygen while this therapy did not alter the incidence of BPD.

ACUTE RESPIRATORY FAILURE IN HEADTRAUMA PATIENTS.

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Objectives: Analysis of the incidence of neurogenic pulmonary edema (NPE) in a population of headtrauma patients with acute respiratory failure (ARF). NPE can occur after a central nervous system insult. Differential diagnosis: cardiogenic pulmonary edema and other forms of non cardiogenic pulmonary edema. True incidence and pathophysiology remain poorly defined, however the role of catecholamines seems undeniable. Early onset NPE (within 12 h after trauma) is characterised by hypoxemia, transient pulmonary hypertension and bilateral central fluffy infiltrates on chestX-ray. Characteristics of cardiogenic edema or pneumonia are absent. Late onset NPE, (beyond 12 hours after trauma), is more insidious. The clinical and radiographic picture has to clear within 24 to 48 hours. (1)
Methods: All headtrauma patients admitted from January 1 to December 31, 1993 in a neurotrauma ICU setting were retrospectively analyzed for ARF with as sole criterium a PaO2-FiO2 ratio < 250.
Results: 151 Neurotrauma patients were admitted during 1993. 94 Patients (63%) presented with severe head injury (GCS<8), 42 patients (27.8%) with moderate (GCS 8-12) and 15 patients (9.9%) with minor head injury (GCS 12-15). Overall mortality was 19.2%.
Early (within 12 h. after trauma) and delayed onset respiratory incidents were distinguished, counting for 29 (19.2%), respectively 27 patients (17.8%), 7 patients (4.6%) had early and late respiratory complications.
Early respiratory insufficiency was caused in 9 patients (25.0%) by aspiration, in 11 patients (30.1%) by lung contusion, in 1 patient (2.7%) by fat embolism and in 15 patients (41%) by NPE. In the late onset group 31 patients (91.2%) presented with pneumonia, 1 (3.0%) with fat embolism and 2 (5.8%) with NPE.
The NPE group, 17 patients, presented as follows: 15 patients (88.2%) developed early NPE, and 2 (11.8%) delayed onset NPE. 9 patients (53%) died within the first days after admission, showing high mortality. GCS was less than 8 in 16 patients (94.1%), indicating severity of head injuries.
Conclusions: High incidence of ARF with various etiology (41,7%) was found in this population. In about 10% of all admitted headtrauma patients (26,9% of ARF) NPE was causing arterial hypoxemia. Occurrence of NPE seems to be related to the severity of the brain injury and thus to outcome. These data call for extreme vigilance in respect of the insidious occurrence of NPE.

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IS GASTRIC MUCOSAL pHi A BETTER OUTCOME PREDICTOR OF WEANING AND EXTUBATION THAN CONVENTONAL WEANING INDICIES?: A PILOT STUDY*

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Objectives: 1. To compare the ability of gastric mucosal pH (pHi), airway occlusion pressure ($P_{0.1}$), integrative index [($P_{0.1}$ x f/Vt)/pHi], and the rapid shallow breathing index (f/Vt) to predict the outcome of a weaning and extubation trial.
Methods: Patients in the intensive care unit of St. Paul's Hospital, Vancouver B. C. were included if recovering from respiratory failure and if in the opinion of the primary physician were ready for extubation. Patients were excluded if undergoing compassionate withdrawal of support or had tracheostomies. The attending physicians were blinded to the measurements. Included patients were placed on pressure support (PS) of 0 cm H_2O with demand-flow continuous positive airway pressure (CPAP) 5 cm H_2O. After a minimum of 30 minutes on the above settings: gastric intramucosal pCO_2, ABG, and a $P_{0.1}$ were measured. The patients were then disconnected from the ventilator for a period of one minute and the patients' respiratory rate and minute ventilation were measured using a Wrights respirometer to calculate the frequency to tidal volume ratio (f/Vt). Patients were then extubated. Extubation failure was defined as the inability to maintain spontaneous ventilation for 24 hours for any reason.
Results: Twenty patients met criteria and were studied over one month period in October 1994. Six of the twenty patients (30%) failed weaning. The mean and standard deviation is outlined in table #1.
Table #1

	pHi	P0.1 (cmH2O)	f/Vt (b/min/L)	Integrative Index
Success	7.34+/-0.16	2.8+/-0.71	53.4+/-10.2	21.3+/-3.4
Failure	7.01+/-0.10	6.8+/-3.9	74.3+/-43.3	87.5+/-43.6

Comparison between ROC areas shows pHi and $P_{0.1}$ to each show a statistically significant difference from an area of 0.5 ($p<0.05$), the area at which the test has no discriminative value. This is not the case for either the integrative index or the f/Vt ratio. The differences between areas for each curve is not statistically significant. The area's for each ROC curve is shown in table #2.
Table #2

Index	Area+/-SE
pHi	.95+/-0.078
P0.1	.93+/-0.10
[(P0.1xf/Vt)/pHi]	.76+/-0.21
f/Vt	.66+/-0.27

Conclusions: The trends demonstrated from this preliminary data suggest that the pHi, $P_{0.1}$, and the integrative index may all perform better than the frequency to tidal volume ratio. Power calculations indicate that an N of 200 would be required to possess the power (β=0.1)to compare all of the above except pHi Vs P0.1.
*Supported by the BC Lung Association and the St. Paul's Hospital Foundation.

LUNG INJURY DUE TO MECHANICAL VENTILATION - AN INDICATION FOR ECMO?

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Introduction: Before the entry criteria for ECMO are fulfilled, newborns may require aggressive mechanical ventilation which may result in lung injury. Alveolar damage and pneumothorax complicate the primary pulmonary disease which then worsens the prognosis. The question arises therefore how long conventional ventilation should be continued and when should ECMO be commenced even if the classical entry criteria for initiation of ECMO have not been fulfilled.

Results. 9 of the 21 newborns referred to us for ECMO-therapy developed barotrauma, 6 of the 9 required ECMO and one of the three other patients who did not recieve ECMO-therapy died. To determine the correlation between the risk factor barotrauma and the severity of the pulmonary situation, we determined the oxygenation index of each patient referred to us for ECMO-therapy . The Table demonstrates the OI of patients following standardized conventional therapy. Infants with an OI < 25 required no ECMO and the prognosis was good. With an OI > 40 the classical entry criteria for ECMO were fullfilled, ECMO was commenced and the prognosis was also good. 3 infants had an oxygenation index between 25 and 40 after 48 hours of conventional therapy and all 3 developed barotrauma as a complication of conventional ventilation. In these infants was the prognosis poor, whether ECMO was commenced or the conventional therapy was continued.

Oxygenation index after conventional therapy			
OI > 25	11 patients	11 x no ECMO	10 patients survived 1 patient died
25 < OI <40	3 patients	2 x ECMO	1 patient survived 1 patient died
		1 x no ECMO	1 patient died
OI > 40	7 patients	6 x ECMO	5 patients survived 1 patient died
		1 x no ECMO	1 patient died

Conclusion. So as a cautious conclusion, limited by the low number of patients presented here, a prolonged conventional therapy with an oxygenation index between 25 and 40 and the additional existence of barotrauma could be an indicator of a poorer prognosis. In the situation where an adequate oxygenation cannot be attained with acceptable mechanical ventilation and a more aggressive ventilation could cause severe lung injury, ECMO should be considered even if the OI is below 40.

DIRECT COMPARISON OF INHALED NITRIC OXIDE AND AEROSOLIZED PROSTACYCLIN IN ARDS

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Inhalation of nitric oxide (NO) and aerosolization of prostaglandin (PG) I_2 have been suggested to achieve selective pulmonary vasodilation and improvement of arterial oxygenation in patients with acute respiratory distress syndrome (ARDS). We directly compared these two modes of transbronchial vasodilator therapy in 16 ARDS patients mechanically ventilated for 24 - 96 h (mean Murray lung injury score [1] 2.75 ± 0.05). Patients were randomized to receive either first NO and then PGI_2 (n=8), or vice versa (n=8), with an intermediate baseline period. Each drug was titrated individually to find the lowest effective dose for maximum improvement of arterial oxygenation. Gas exchange variables, including data from the multiple inert gas elimination technique (MIGET), and hemodynamics under application of NO/PGI_2 were compared to pre- and post-challenge values. NO (mean dose 17.8 ± 2.7 ppm) increased the mean oxygenation index (paO_2/FiO_2) from 115 ± 12 to 144 ± 15 mmHg ($p < 0.01$) and reduced the shunt-flow from 33.1 ± 3.6 to 26.6 ± 4.5 % ($p < 0.05$). Aerosolized PGI_2 (mean dose 7.5 ± 2.5 ng/kg min) augmented paO_2/FiO_2 from 114 ± 12 to 135 ± 12 mmHg ($p < 0.01$), and decreased shunt from 33.5 ± 3.8 to 26.0 ± 3.9 % ($p < 0.05$). The MIGET analysis showed predominant redistribution of blood-flow from shunt areas to regions with normal ventilation-perfusion ratios in response to both agents. In 10 patients, both NO and PGI_2 caused an increase in paO_2/FiO_2 by at least 10 mmHg. Two further patients displayed a corresponding improvement of arterial oxygenation in response to either NO or PGI_2. The mean pulmonary artery pressure decreased from 34.8 ± 2.2 to 33.0 ± 1.8 mmHg in response to NO, and from 35.0 ± 2.2 to 31.9 ± 1.7 mmHg ($p < 0.05$) in response to PGI_2. Cardiac output, systemic arterial pressure, and right and left heart filling pressures were not affected by either agent. We conclude that individually titrated doses of inhaled NO and aerosolized PGI_2 effect selective pulmonary vasodilation and redistribute blood-flow from shunt-areas to well-ventilated regions with nearly identical efficacy profiles.

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TIME COURSE OF D-DIMER IN BRONCHOALVEOLAR FLUID OF PATIENTS AT RISK FOR OR WITH ARDS

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Background: Intraalveolar fibrin deposition is a typical finding in acute lung injury and not necessarily harmful, however persistence of intraalveolar fibrin deposit may lead to hyaline-membrane formation and alveolar fibrosis. Thus timing of intraalveolar clotting disorder seems to be critical.
Methods: To explore the time course of factors contributing to fibrin deposition and resolution, we sequentially analysed fibrin degradation (by D-dimer) in bronchoalveolar lavage (BAL) fluid of patients developing ARDS and those at risk for, but finally not developing, the syndrome. 36 BAL were performed in 11 patients with ARDS, and 15 BAL in 10 patients at risk for, but not developing the syndrome. All patients were admitted to the intensive care unit (ICU) for treatment of sepsis, trauma or shock.
Results: In early ARDS we observed higher levels of D-dimer in BAL than in patients at risk: 1841 ± 827 ng/ml vs 293 ± 134 ng/ml, $p < 0.05$. Similarly, values of D-dimer in the subacute phase were 2776 ± 836 ng/ml vs 237 ± 125 ng/ml, $p < 0.05$. In ARDS as well as in the at risk group, D-dimer in BAL fluid showed good correlation with the polymorphonuclear leucocyte count and with the protein content of BAL. No correlation was found between plasma and BAL levels of D-dimer.
Conclusions: In ARDS fibrin turnover is markedly activated when compared to patients at risk but finally not developing this syndrome. These findings expand our understanding of intraalveolar coagulation abnormalities by providing evidence of increased fibrin breakdown in this syndrome.

THE ROTATING INTENSIVE CARE BED AND QUADRIPLEGIA : A MEDICAL, PARAMEDICAL AND PATIENT EXPERIENCE.

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Introduction : A 27 year old patient who recently develloped quadriplegia after a polio-like syndrome remained ventilator-dependent and suffered from recurrent pulmonary atelectasis and infection although receiving optimal standard therapy including respiratory physiotherapy, aerosols, bronchial aspiration, regular body position changes and antibiotics. He was changed to the Rotorest[R] oscillating bed rotating the patient over 124 ° every 4 minutes for a period of 20 days.
Aim : We describe the medical and paramedical aspects of this novel technique , most frequently used in coma patients. The fully conscient patient reported his experiences during kinetic treatment.
Medical : Very soon an important improvement of the pulmonary status was observed. Antibiotic treatment could be discontinued and no pneumonic infiltrates reappeared during treatment. Some improvement in intestinal transit was noted.
Nursing: This new device initially increased the workload . After a short learning period nursing the patient could be more easily handled by a sole nurse. No scars were noted, only some bruises resulting from friction.
Patient: Physically the treatment was well tolerated. Psychologically the feeling of isolation, due to important hindrance of communication required extra attention and patient motivation.
Conclusion : The use of the rotating ICU bed improved the physical condition. Nursing workload decreased except for the psychological support. Advantages and disadvantages of this kinetic treatment must therefore be considered carefully in conscious patients.

CHANGES OF COAGULATION PARAMETERS IN ARDS PATIENTS DURING EXRACORPOREAL LUNG ASSIST USING HEPARIN-COATED SYSTEMS

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Objectives: The use of extracorporeal bypass systems for oxygenation and CO2-removal is performed in patients with acute respiratory distress syndrome (ARDS) to reduce mortality and to improve restitution of pulmonary functions. High-dose heparin - commonly used in such patients to prevent thrombotic complications - might cause incurable bleedings as a major risk. This lead to the development of heparinized bypass systems; results of animal and first clinical studies proposed that such systems might run with low-dose heparin or even without any systemic anticoagulation.
Methods: Since 1989, 47 patients with severe ARDS were treated with extracorporeal lung assist (ELA) using heparin-coated systems (Type Maxima, Medtronic, Carmeda coating) in our ICU. They received a moderate systemic heparinization. Standard clotting assays (ACT, APTT, TT, PTT, AT-III, Fbg, FSP) as well as special tests (TAT, ß-TG, PF4, PAI-1, D-dimers, protein C, C1-inhibitor) were performed.
Results: Covalent heparin-coating of the ELA-systems combined with low-dose heparinization could not prevent major changes in coagulation: 1) In mean, platelets dropped from 305/nl to 76/nl within 60 h after onset of ELA. 2) TAT levels were already elevated before ELA start (55 ug/l) and demonstrated an additional peak 2 h after onset of ELA (up to 240 ug/l). 3) In parallel, there was a transient peak of PAI-1 levels (from 5 to 75 AU/ml) 2 h after onset of ELA. 4) In mean, fibrinogen levels dropped from 470 to 310 mg/100ml within 24 h after onset of ELA. 5) In mean, C1-inhibitor levels dropped significantly from 132% to 115% after onset of ELA and reached the initial levels within 48 h. 6) After membrane change, there were significant changes for C1-inhibitor, fibrin-D-dimers and TT. 7) Global clotting tests such as APTT, PTT and TT were within normal range.
Conclusions: Patients with severe ARDS develop a prethrombotic state already before they get connected to the ELA bypass system. After onset of ELA, they experience additional involvement of procoagulant, anticoagulant, fibrinolytic, and complement systems. In parallel to laboratory findings, clinical data suggest that the use of heparin-coated systems with accompanying systemic low-dose heparinization does not avoid thrombembolic and hemorrhagic complications in long-term ELA patients. Thus, at the present, higher dosed individually adjusted heparin treatment has to be recommended. Thereby, standard clotting monitoring is not sufficient.

INSPIRATORY AND PERIPHERAL MUSCLE STRENGTH DURING PROLONGED INTENSIVE CARE.

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Objective: Poor muscle performance contributes to prolonged dependence on mechanical ventilation. Longitudinal data on muscle function in icu patients is scarce. We evaluated changes in inspiratory and peripheral muscle performance during prolonged intensive care in patients with acute respiratory failure.
Methods: 22 patients requiring intensive care for more than one week were studied. Maximum inspiratory pressure (PiMax) was measured twice a week for a maximum of three weeks. Handgrip power (dynamometer) and subjective fatigue (Kehlet score) were obtained in survivors only. One measurement was done on the date of extubation. PiMax pressure was obtained by occluding the airway for 20 seconds or at least five inspiratory breath attempts.
Results:

PiMax mean±SD	2nd week cmH2O	Minimum cmH2O	Last cmH2O
Survivors	33±15.3	29.4±14.4	37.7±12.4 (at extubation)
Non survivors	25.1±10.2	19.5±9.6	28.1±17.2 (before death)

Difference between groups: NS. Change during ICU stay: NS.

Mean±SD	grip icu Kg	grip last Kg	Kehlet score icu	Kehlet score last
All	15.5±7.7	19.5±6.3	6.6±2.3	5.7±1.7

There was no correlation between grip strength, PiMax and Kehlet score.
Duration of mechanical ventilation was 10±5vs.30±32 days, Intensive care and hospitalization 26±15vs.30±32 and 15±7vs.30±32 days in survivors and non survivors respectively.

Conclusions: We conclude that there is no distinct pattern of changes in PiMax during prolonged intensive care. Impaired respiratory muscle and hand grip strength as well as subjective fatigue persist throughout the recovery from acute respiratory failure.

EVALUATION OF A NEW RESPIRATORY INDUCTIVE PLETYSMOGRAPH IN THE MEASUREMENT OF PEEP INDUCED CHANGES IN LUNG VOLUME

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Objectives - Measurement of PEEP-induced changes in lung volume helps to assess respiratory mechanics in acute lung injury (ALI). We evaluated the accuracy and stability of a new respiratory inductive plethysmograph (RIP), in the measurement of PEEP induced changes in end-expiratory lung volume (EELV) and tidal volume (Vt) against volume reference, pneumotachograph (PNT).

Methods - Two hours periods of basal ventilation and stepwise increases and reductions of PEEP (5-10-15-10-5 cm H2O) were recorded in patients with ALI. In addition, the new RIP device (Respitrace Plus™) was compared to an older RIP (Respigraph™, NIMS, FL, USA) to determine its thermal stability using cold and warm devices and a ventilated lung model.

Results - The difference between the new RIP and PNT in the measurement of Vt was -30 ± 3 ml (x ± SE) or a -5.2 ± 0.6 % error. Increasing PEEP from 5 to 15 cm H2O induced a 511 ± 93 ml change in EELV. A difference of 18 ± 12 ml (3.5 % of max. EELV change) (NS) was found between RIP and PNT EELV readings. During controlled ventilation with constant settings the mean change in EELV was 187 ± 69 ml/120 min (Fig.1). Validation of calibration showed a mean error of 1 ± 1.78 % after 120 min. The new RIP had a higher drift when cold (cold 28 ± 10 ml/30 min vs warm 3 ± 1 ml/30 min), whereas the old RIP was thermally stable (cold -3 ± 3 ml/30 min vs warm 1 ± 1 ml/30 min).

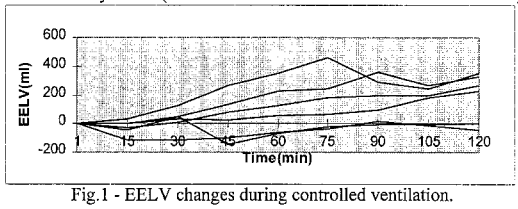

Fig.1 - EELV changes during controlled ventilation.

Conclusions - The new RIP was accurate in the measurement of Vt and acute changes in EELV. In contrast the measurement of EELV is not sufficiently stable for longterm monitoring. Due to thermal instability, the new RIP should be kept on for several hours to minimise the drift.

SALBUTAMOL BLOCKS PULMONARY NEUTROPHIL RETENTION INDUCED BY INHALED PLATELED-ACTIVATING FACTOR IN NORMAL MAN.

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Platelet-activating factor (PAF) is an inflamatory mediator implicated in the pathogenesis of bronchial asthma and acute respiratory distress syndrome (ARDS). Its inhalation in healthy subjects produces transient bronchoconstriction and mild ventilation-perfusion mismatch, together with peripheral leukopenia as a result of intrapulmonary neutrophil (PMN) sequestration. Likewise our group has shown in healthy subjects and asthmatic patients that salbutamol (S) inhibits both pulmonary and systemic effects of PAF, suggesting that S may inhibit PAF-induced venoconstriction in pulmonary microcirculation.

The aim of the present study was to investigate if S inhalation decreases PMN by lung sequestration induced by PAF. We studied 8 healthy, non-atopic, nonsmoking subjects (6M/2F, 24 ± 4 yr), which were pre-treated with S (300 μg) or placebo, with a randomized, double-blind, crossover, design, before PAF (24 μg) inhalation. We measured the respiratory system resistance (Rrs) by forced oscillation, arterial blood gases and both total white cell and PMN count every 4 min over a 30 min. period. Simultaneously, we recorded continuously the lung dynamics of In^{111}-neutrophil and Tc^{99m}-erythrocytes activity, with a gammacamara.

After placebo, PAF inhalation decreased white cells (from 5410 ± 1125 to 3302 ± 934 x10^9/L), and PMN (from 2975 ± 693 to 1222 ± 767 x10^9/L), and increased $AaPO_2$ (from 2.1 ± 9.5 to 14.7 ± 12.2 mmHg, $p<0.05$) and Rrs (from 3.0 ± 0.6 to 3.7 ± 0.7 $cmH_2O.s.l^{-1}$) ($p<0.05$ each). The fall in total white cell count correlated with the intrapulmonary PMN retention ($r=0.83$, $p<0.05$). By contrast, after S, PAF did not induce any change in white cell count (from 5963 ± 1766 to 6147 ± 1721 x10^9/l), PMN count (from 3543 ± 1628 to 2953 ± 1793 x10^9/l), $AaPO_2$ (from 7.3 ± 10 to 5.6 ± 8.6 mmHg), and Rrs (from 2.9 ± 0.5 to 2.9 ± 0.7 $cmH_2O.s.l^{-1}$). Compared with placebo, after S there was a lower ^{111}In-PMN lung activity (2.0 ± 0.4 vs 1.3 ± 0.7 cts/mCi/pixel, $p<0.01$), lower intrapulmonary PMN retention (15.6 ± 7.7 vs 11.1 ± 4.8 %, $p=0,09$), and a faster washout (0.14 ± 0.08 vs 0.17 ± 0.007 s^{-1}, $p=0,4$).

Our results indicate that S inhibits PAF-induced intrapulmonary PMN sequestration, being consistent with the hypothesis that S may offset the venoconstriction of pulmonary microcirculation caused by this mediator.

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DIFFERENCES IN BILATERAL JUGULAR BULB OXYGEN SATURATION VALUES IN SEVERE HEAD INJURED PATIENTS.

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Recent data suggest that the proportion of patients with relevant discrepancies between two Jugular bulb (JB) oxygen saturation (SJO_2) values is higher than suspected.

Objectives: determine the incidence, the significance and the prognosis value of those differences, if they exist, in severe head injured-patients.

Material and Methods: 35 severe head-injured patients, Coma Glasgow Scale (GCS) < 8, with diffuse brain injury according to Marshall criteria in the first CT scan, ICP recorded, with an interval from accident-double JB monitoring < than 12 hours, were studied. Data from bilateral SJO_2 were obtained simultaneously, every 6 hours. Discrepancies were considered significant, when differences in SJO_2 were > 10%. No changes in treatment protocol (Hyperventilation, Manitol, etc) were carried out due to this study.

Results: 30 men and 5 women were studied, aged 32±15.1 yrs. At arrival at hospital, GCS were < 5 in 20 and > 5 in 10. The incidence of high ICP(> 20 mmHg) were 75% at the entry. The mean Therapy Index Level required to control ICP was 4±2. All patients required vasopressor therapy to maintain CPP over 65 mmHg. In 20 patients a 5.5 F Swan-Ganz fiberoptic catheter was used to obtain a continuous recording of SJO_2. In the others 15, SJO2 were intermittently controlled. The mean time of monitoring were 6.8±3.5 days. Ten patients died within this period. A total of 1.240 blood samples were analized. At arrival, SJO_2 discrepancies were found in 22 patients, 62%. At 48 hours, the incidence were lower, 18/35, 51.4%. At 4th day, were 11/29, 38% and at day 7, when the catheters were retired, 11/25, 44% showed discrepancies. The CT showed new injuries in 94% of patients with differences > 10% in SJO2 values throughout treatment period. None of those were considered for neurosurgical treatment. No correlation was found between ICP and SJO_2 values and SJO_2 differences.

Conclusions: The incidence of discrepancies between SJO_2 was higher than expected in severe head-injured patients. These situation could reflect disturbances between O_2 demands. When differences are known, and those tend to change, the CT scan, nearly always, will show new injuries.

DOES ACUTE HYPERCAPNIC RESPIRATORY FAILURE IMPLY INSPIRATORY MUSCLE FATIGUE?

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Inpiratory muscle fatigue with failure of force generation as defined by a tension-time index (TTi)>0.15-0.20 has been shown to occur in normal volunteers and in stable COPD patients with a specific imposed breathing pattern. Its role, however, in hypercapnic respiratory failure is less certain. We studied 10 failed weaning trials in 5 COPD patients in which breathing pattern, tension-time index (TTi) of inspiratory muscles, dynamic PEEPi, dynamic lung elastance, lung resistance, and arterial $PaCO_2$ and pH were measured at the beginning and end of a T-piece weaning trial. In addition, the change in esophageal pressure during a Mueller maneuver (ΔPes max) was measured. A weaning trail has been prospectively defined to have failed if one of the following criteria was met: a rise in PCO_2 >20mmHg from baseline accompanied by a fall in pH<7.35; a respiratory frequency (f) >30/min; excessive accessory inspiratory muscle recruitment; and a marked increase in dyspnea. Values are expressed as mean ± SE.

Weaning failure was characterized by a more rapid, shallow breathing pattern, worsened mechanics, hypercapnia and respiratory acidemia despite an unchanged TTi and Pes max. We conclude that in this setting hypercapnic respiratory failure is not a consequence of inspiratory muscle fatigue. Rather the adopted breathing strategy and resultant hypercapnia may represent an adaptation to forestall the onset of muscle fatigue.

	START	END	P
Vt (L)	0.277 ± 0.03	0.233 ± 0.02	0.01
f (min^{-1})	24 ± 2.1	28 ± 2.7	0.01
V_E (L/min)	6.6 8 ± 1	6.59 ± 1	NS
Elastance (cmH_2O/L)	15.5 ± 3	24.1 ± 4	0.01
Resistance (cmH_2O*L*s)	16.6 ± 3	22.2 ± 3	0.01
PEEPi (cmH_2O)	3.4 ± 0.6	4.9 ± 0.7	0.005
TTi	0.07 ± 0.01	0.056 ± 0.01	NS
PaCO2 (mmHg)	55.3 ± 4.5	70.1 ± 6.7	0.01
pH	7.40 ± 0.01	7.31 ± 0.02	0.002
Pes max (cmH_2O)	49 ± 3.5	52 ± 4.4	NS

MEASUREMENT OF EXTRAVASCULAR LUNG WATER (EVLW) IN ADULT RESPIRATORY DISTRESS SYNDROME (ARDS): THERAPEUTIC IMPLICATIONS.

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Acute pulmonary hypertension observed in ARDS is associated with increased capillary permeability and results in marked increase of lung lymph flow and pulmonary oedema formation, despite normal vascular hydrostatic pressure.

Objectives: to assess EVLW and to compare the effects of different treatments on intrapulmonary fluid motions.

Methods : In sedated, paralysed and ventilated patients with moderate or severe ARDS (Murray score > or = 2), we measured routine hemodynamic parameters (Swan Ganz catheter 93A434H Baxter lab.), EVLW by thermal green dye indicator dilution method (fiberoptic thermistor catheter 2024, COLD Z021 computer, Pulsion Medizitechnik Lab., Germany) and blood gases. All parameters were recorded at baseline state. The effects of fluid support (FS: Elohes*: 500 ml), PEEP+10cmH_2O, inhaled nitric oxide (NO 10ppm) alone or associated with PEEP and/or Almitrine (Al) during 30 minutes, were studied in a non randomized order. Baseline state was obtained between each stage of the protocol.

Statistical analysis : Friedman and Wilcoxon test for paired values.

Results : Seven patients (age 37±24, SAPS II 43±11, Murray score 2,5±0,32) were prospectively investigated. Main results (mean ± se) are shown in the table below :

	Baseline	FS	PEEP	NO	NO+PEEP	NO+PEEP +Al
PaO2/FIO2 *	112±57	113±44	191±114	144±96	219±138	299±203
Qs/Qt %	46±12	50±12	40±12	43±4	36±8	34±9
EVLW ml.kg^{-1}	17,6±8,8	17,5±8,7	17,4±7,8	15,5±7,1	18,1±7,8	18±8,2
ITTVml.m^{-2}	1490±547	1584±467	1506±442	1502±417	1572±508	1518±516
PBVml.m^{-2}	169±70	189±46	196±37	204±63	170±34	158±43
MPAPmmHg*	24±4	29±6	30±7	22±5	24±4	28±6

ITTV = intrathoracic thermal volume ; PBV = pulmonary blood volume; MPAP : mean pulmonary arterial pressure ; * p<0,05.

Conclusions : All intrapulmonary volumes were markedly increased (normal EVLW=7-10ml.kg^{-1}). Compared with baseline values, inhaled NO alone did not significantly decrease MPAP and Qs/Qt. Both NO+PEEP and NO+PEEP+Al significantly reduced Qs/Qt and improved systemic arterial oxygenation (PaO_2/FIO_2). These results suggest that inhaled NO combined with PEEP and Al may provide a useful therapy to reduce Qs/Qt in ARDS. The immediate improvement of PaO_2/ FIO_2 is not associated with any change of intrapulmonary fluid volumes.

EIGHT HOURS' INHALATION OF PROSTACYCLIN (PGI_2) AEROSOL IN HEALTHY LAMBS CAUSES NO SIGNS OF RESPIRATORY-TRACT TISSUE DAMAGE.

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Introduction: inhaled prostacyclin (PGI_2) has been shown to reduce pulmonary hypertension selectively without decrease of systemic vascular resistance as known for intravenous application of this substance[1,2]. Potential toxic effects of inhaled PGI_2 on respiratory tract tissues, have not been investigated yet.

Methods: in 14 pentobarbital anesthetized, mechanically ventilated healthy lambs (mean body weight 33,8 kg) randomly either PGI_2 (28 ng/kg/min, Flolan®, Wellcome, UK) or normal saline was nebulized for eight hours. Biochemical and cellular composition of the epithelial lining fluid (ELF) was examined before and after 8h inhalation. ELF was obtained by bronchoalveolar lavage. After sacrifying the animals, trachea and bronchoalveolar tissue were fixed and stained for light- and electron-microscopic examination.

Results:

Parameter	NaCl baseline	PGI_2 baseline	NaCl 8h	PGI_2 8h
ELF-Protein (mg/dl)	4.8 (3.3/9.7)	9.3 (2.9/21.7)	4.9 (4.4/13.7)	9.3 (3.4/12.7)
ELF-LDH (U/l)	2185(1505/30009)	917(764/2034)	725(379/2669)	794(447/2785)
ELF-AP (U/l)	46(37/352)	172(153/480)	132(67/138)	164(88/213)
ELF-PMNL (%)	2(1/12)	2(1/8)	4(2/8)	13(5/20)

Values are median (1./3.quartile). PMNL: polymorphonuclear leukocytes. LDH: lactate dehydrogenase. AP: alkaline phosphatase. p<0.05, rANOVA for between group analysis.

Concerning the investigated ELF-parameters, no statistically significant differences were detected between the PGI_2 and the control group.

Histopathological changes occured in both groups and consisted in rare focal flattening of tracheal epithelium with loss of cilia and slight inflammatory cell infiltration, as well as slight swelling of alveolar type-I pneumocytes. Sections of generation 5, 10 and 15 from bronchial tree were free of pathological changes.

Conclusion: After 8h inhalation of PGI_2 no signs of respiratory-tract tissue damage caused by the aerosol could be detected. The minor pathological findings in the trachea are most likely due to mechanical irritation by bronchoscopy, changes of the alveolar epithelium are known for long-term mechanical ventilation[3].

References: 1. Eur Surg Res 25:329-340, 1993; 2. Lancet 342:961-962, 1993. 3. Br J exp path 63: 401-407, 1982.

The use of the ganglion stellate blockade in treatment of respiratory insufficiency in ICU patients

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Objectives: The aim of this study was to evaluate of efficiacy of ganglion stellate blockade in patients with respiratory failure.

Methods: Two groups of patients were investigated: group I (n = 15) trauma patients with acute lung injury (ALI), group II (n = 15) patients with asthmatic status. In all cases continuous mandatory ventilation (CMV) was used with Bennett 7200 AE. In both groups bilateral ganglion stellate blockade with antero-lateral approach was performed, using 0.375 % Marcain. The following parameters were analysed: PaO_2, SaO_2, $PaCO_2$, PIP and C_{stat}.

Results: In trauma patients with ALI after bilateral ganglion stellate blockade short – lived and slight improvement of PaO_2 and SaO_2, decrease of $PaCO_2$ and PIP, and increase of static compliance of respiratory system were found. In second group bilateral ganglion stellate blockade interrupted the asthmatic status and significant statistical improvement of parameters of oxygenation, ventilation and respiratory system mechanics were observed.

Conclusions: We suggest that the bilateral ganglion stellate blockade is a very useful method in treatment of patients with obstructive respiratory insufficiency.

ELECTROLYTE DISORDERS IN ACUTE RESPIRATORY FAILURE

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The aim of the study was to analyse whether there exists serum and urine electrolyte disorder in patients(pts.) with acute respiratory insufficiency(ARI). The study included 18 pts. with ARI (PaO2:8,24±1,49 kPa, PaCO2: 5,01±0,77kPa, pH:7 42±0,59, HCO3: 26,3±8,10 mmol/l, SaO2 : 90,4±7,42%) who were hospitally treated due to pneumonia(9 pts.),emboly of the pulmonary artery(3 pts.) and severe attack of bronchial asthma (6 pts). Among tham there were 12(66,7%) males and 6(33,3%) females, average age 51,5±16,1 years, otherwise previously healthy. Electrolyte concentracions were measured at the onset of the disease in serum and urine collected during 24 hours (sodium-Na,potassium-K, chlorine-Cl, calcium-Ca,magnesium-Mgand phosphorus-P). The measured serum and urine electrolyte concentrations were compared with respective referent values (RV). By serum electrolyte analysis, the following average velues were obtained: Na:140,94±4,00 (RV:135-148)mmol/l, K:4,42±0,59(3,5-5,1)mmol/l, Cl:94,83±5,97(98-106)mmol/l, Ca:2,24±0,22(2,25-2,75)mmol/l, Mg:0,82±0,28(0,70-1,15)mmol/l, P:1,27±0,29(0,80-1,6)mmol/l. Average electrolyte levels of urine collected during 24 hours were: Na:64,44±49,10(40 - 220)mmol/days(d),K:24,92±13,36(25-125)mmol/d, Cl :57,22±37,28 (110-250)mmol/d, Ca:1,71±0,67(2,5-7,5)mmol/d, Mg:0,66±0,65 (3-5)mmol/d and P:13,91±8,11(12,9-42)mmol/d. By comparison of the results obtained in patients with ARI at the onset of the disease with referent values,average serum Cl and Ca levelse observed to be decreased.Also,there is urine electrolyte disbalance,since average K,Cl,Ca,Mg levels were decreased and only urine P concentration was increased.It means that in ARI patients serum and urine electrolyte disbalance may be expected.

RESPIRATORY INSUFFICIENCY IN MASSIVE PNEUMONIAS

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The object of our investigation was a group of 21 pts with massive pneumonias, 14 males (66.6%), 7 females (33.3%),mean age 55 yrs.Thirteen (62%) of them were smokers,8(38%) nonsmokers. Only 1 pt (4.7%) had pre-existing chronic respiratory disease,and 20 (95.2%) were admitted for the first time,with no previous respiratory anamnesis. Diagnose was based on anamnestic data of productive cough in 15 pts(71.4%),physicaly bronchial breathing in 19 pts (90.4%),white cell count under 10 x 10^9 /L in 18 pts(85.7%). Radiographicly, bilateral massive homogeneous shadows were found in 7 pts (33.3%), unilateral in 12 pts(57.1%),pleural effusion in 2 pts (9.52%). Abnormal renal function was found in 14 pts (66.6%). Sputum culture was positive in 8 pts (38%): Str.pneumoniae, Str.pyogenes,Pseudomonas aerug. in 4, 2, 2 cases respectively. All patients had remarcable hypoxemia (PaO2 range from 4,75 to 8,1 kPa) without hypercapnea. All patients needed oxygenotherapy together with antibiotics and other symptomatic therapy. Nineteen pts had amelioration of general condition and normalization of blood gas analyses, while 2 pts with the lowest hypoxemia died.In conclusion,massive pneumonias are frequently followed by respiratory insufficiency which is one of the markers of pneumonia severity. As existing hypoxemia complicates the course of the disease,prolonges the recovery,makes therapy more complexe and may be cause of death , frequent blood gas measurement is recomanded.

A SIMPLE TECHNIQUE TO MEASURE EFFECTIVE ALVEOLAR PO_2 DURING SPONTANEOUS BREATHING.

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Objectives: The alveolar O_2 tension is measured by the application of the alveolar air equation in which the arterial PCO_2 is used or by the simplified form of this equation in which the respiratory exchange ratio is taken at the value of 0.8. The purpose of this study was to estimate the effective alveolar O_2 tension (PAO_2eff) during spontaneous breathing with a new bedside technique which is simple non-invasive in 14 normal subjects and 27 patients with chronic bronchitis-emphysema. We also compared these values with the ideal alveolar PO_2 (PAO_2(i)), measured from the alveolar air equation in which $PaCO_2$ was substituted by the effective alveolar PCO_2 ($PACO_2$eff) and with the alveolar PO_2 measured from the simplified alveolar air equation (PAO_2). This study is complemantary to previous work for the estimation of $PACO_2$eff.

Methods: The subjects breathed quietly through the equipment assembly (mouthpiece monitoring ring, Fleisch transducer head) connected to a pneumotachograph and a fast response O_2 and CO_2 analyzer. The method is a computerised calculation of the effective alveolar PO_2 quite similar to that of $PACO_2$eff, obtained from the simultaneously recorded at the mouth expiratory flow, O_2 and CO_2 concentration versus time curves.

Results: The results showed a mean difference (PAO_2eff-PAO_2(i)) of -0.061 kPa in normal subjects and -0.711 in patients. The mean of the difference (PAO_2eff-PAO_2) and (PAO_2(i)-PAO_2) was much greater than 0.281 in all subjects. The limits of agreement for the difference (PAO_2eff-PAO_2(i)) were -0.691 to 0.568 kPa in normal subjects and -2.040 to 0.596 in patients, while those for the differences (PAO_2eff-PAO_2) and (PAO_2(i)-PAO_2) were very large (>-1.5 to >1.7) in all subjects.

Conclusions: The effective alveolar PO_2 is very close to the ideal one in normal subjects. In patients PAO_2eff may excessively deviate from PAO_2(i) due to the observed significant difference between the alveolar/tidal volume ratio for O_2 and that for CO_2. The alveolar PO_2 measured from the simplified alveolar air equation (PAO_2) differed substantially from PAO_2eff and PAO_2(i) in all subjects.

EFFECTS OF ENDOTHELIN (ET) RECEPTOR ANTAGONISM IN DOGS WITH OLEIC ACID LUNG INJURY

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We studied the effects of bosentan (BOS), an ETa and ETb receptor antagonist, to examine if endogenous ET mediates pulmonary hypertension in anesthetized and ventilated dogs with acute lung injury due to oleic acid (OA). The gradient between pulmonary artery pressure (Ppa) and occluded Ppa (Ppao), and gas exchange (evaluated by arterial blood gases and SF6 intrapulmonary shunt) were measured at controlled flow. In 8 dogs (treatment), data were collected at baseline, during lung injury (obtained 90 min after intravenous administration of OA 0.06 ml/kg), and again after BOS (10 mg/kg intravenously). In 5 dogs (pretreatment), data were obtained at baseline, after BOS and then after OA. In treated dogs, OA increased (Ppa-Ppao, mmHg, table, means $\pm$ SEM, * $P <$ 0.05 vs base) and deteriorated gas exchange. After OA, BOS did not affect pulmonary vascular tone nor gas exchange. In pretreated dogs, BOS had no effect on baseline pulmonary vascular tone but prevented the increase in (Ppa-Ppao) after OA. The deterioration in gas exchange after OA was not influenced by BOS pretreatment.

Treatment			Pretreatment	
Base	8 $\pm$ 1		Base	8 $\pm$ 1
OA	12 $\pm$ 1	*	BOS	8 $\pm$ 1
OA + BOS	11 $\pm$ 1	*	BOS + OA	9 $\pm$ 1

In conclusion, these data suggest that ET could contribute to the increase in pulmonary vascular tone in the early stages of acute lung injury.

HYPEROXEMIA INHIBITS ERYTHROPOIETIN SECRETION IN ANEMIC PATIENTS

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The essential role of glucoprotein hormone erythropoietin is to control red cell production. Hypoxemia, reduced blood O_2-carrying capacity and increased affinity of hemoglobin for O_2 are the primary stimuli for erythropoietin production. Both anemia and hypoxemia induce rapidly erythropoietin secretion. Kidney erythropoietin RNA levels correlate inversely with Hematocrit and directly with plasma erythropoietin level. Similarly, hypoxemia increases kidney erythropoietin RNA and plasma erythropoietin. The effect of hyperoxemia (PaO_2>100 mmHg) on erythropoietin secretion isn't very well understood. The purpose of this study was first to evaluate the erythropoietin secretion in patients with acute respiratory failure and second to determine the effect of hyperoxemia on erythropoietin secretion in patients with and without anemia.

Sixteen patients with acute or acute on chronic respiratory failure needed mechanical ventilation were included in this study. These patient were divided in two groups. The patient who developed anemia were included in group I and the patients without anemia in group II. Erythropoietin was estimated in venous blood in three stages. The first sample was taken during hypoxemia, the second during hyperoxemia and third during normoxemia.

All the patients had high erythropoietin level during the hypoxemia period (mean value 98±41 mU/ml). During hyperoxemia etythropoietin levels were reduced in both groups (mean value 21.6±15.2 mU/ml in group I, 36.8±19 mU/ml in group II).

In normoxemia stage, erythropoietin increased again in anemic patients, and decreased more in the patients of group II.

We conclude that hyperroxemia inhibit erythropoietin secretion in spite of anemia and low arterial oxygen content. Hyperoxemia may be a factor of the insisted anemia in with oxygen treated ICU patients.

BIOCHEMICAL PARAMETERS IN BAL FROM MECHANICALLY VENTILLATED PATIENTS

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The purpose of this study was to determine the relationship between clinical features of acute lung injury (ALI) and parameters like total proteins, total and individual phospholipids, the presence of PAF, and acetylhydrolase activity in BAL of mechanically ventillated patients. Acetylhydrolase catalyses the cleavage of acetyl-group from the second position of the glycerylether backbone of PAF, leading to its inactivation.

Mechanically ventillated patients were divided to three groups. Group I includes patients without ALI; group II, comprises patients with moderate degree ALI, (1.0<G-II<2.5); and group III comprises 5 patients with severe ARDS (ALI score > 2.5). Broncoalveolar lavage (BAL) was obtained after infusion of normal saline at 37°C to intubated patients and cooled immediately. Cells were removed after mild centrifugation (350 x g, 30 min, 4°C). Aliquots from the supernatant were used for total protein, phospholipid and PAF analysis and determination. Acetylhydrolase activity was assessed after incubation of BAL with ^{3}H-PAF labelled on the acetyl group. Released label was measured by liquid scintillation counter in the supernatant after trichloroacetic acid precipitation of the non-reacted substrate. Kinetic characteristics of the enzymes were also studied.

Total phospholipids appear reduced in BAL of patients with ALI, while total proteins increase. These factors appear to correlate with the severity of ALI. PAF was not present in BAL samples pretreated with equal volume of 20% acetic acid to denaturate acetylhydrolase. Detection limit for PAF under our experimental conditions: 60 pg PAF/ ml BAL. Instead, acetylhydrolase activity was detected in amounts increasing with the total protein content.

THE FLOW PATTERN OF SPONTANEOUSLY BREATHING PATIENTS WITH ACUTE RESPIRATORY INSUFFICIENCY

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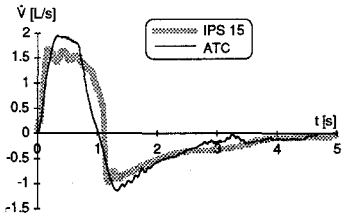
Background: Intubated patients without lung injury or impaired breathing control normally display an inspiratory peak flow of below 1L/s. The aim of our study was to investigate the inspiratory peak flow generated by patients with acute respiratory insufficiency (ARI). We had to take into account that both an inspiratory pressure support (IPS) and the resistance of the endotracheal tube considerably influence the flow pattern generated by the patient.

Patients and methods: To investigate the non-influenced flow pattern we developed a new ventilatory mode which automatically compensates for the flow-dependent resistance of the endotracheal tube (automatic tube compensation, ATC). Furthermore, the mode maintains a constant tracheal pressure in inspiration and expiration. Consequently, the measured flow pattern exactly corresponds to the flow pattern generated by the patient except that the ventilator modified for this mode (EVITA, Dräger Lübeck, Germany) was not able to deliver a gas flow of more than 2L/s. We have investigated 10 patients with ARI arising from different reasons.

Results: The inspiratory peak flow measured in the ATC-mode was 1.7L/s ±0.3L/s. The maximal deliverable flow of 2L/s was obtained in 3 of 10 patients. The figure shows the flow pattern under ATC and IPS in one of these patients.



Conclusions: Patients with ARI display a highly increased inspiratory peak flow. Ventilators used for spontaneous breathing should therefore be able to deliver a gas flow of more than 2L/s.

INTERACTIONS BETWEEN NO AND REACTIVE OXYGEN SPECIES: OPPOSITE EFFECTS IN *IN VITRO* AND *IN VIVO* MODELS.

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An overproduction of NO and reactive oxygen species (ROS) has been demonstratred in septic shock. ROS and nitric oxide (.NO) are free radicals which are known to react together leading to peroxynitrite anions that can decompose to form nitrogen dioxide (NO_2) and hydroxyl radical (OH°). Thus, NO has been reported to have a dual effect on lipid peroxidation (prooxydant via the peroxinitrite or antioxidant via the chelation of ROS). In the present study we have investigated in different models the *in vitro* and *in vivo* action of NO on lipid peroxidation.

Copper-induced LDL oxidation was used as an *in vitro* model of lipid peroxidation. LDL (100 µg ApoB/ml) was incubated with Cu^{2+} (2,5 µM) in presence or absence of NO donor (sodium nitroprussiate or Glutathione-NO) from 10 to 500 µM. Oxidation of LDL was monitored continuously with conjugated diene formation (234 nm) and 4 hydroxy nonenal accumulation (HNE). Exogenous NO prevents in a dose dependent maner the progress of Copper-induced oxidation. Ischaemia-reperfusion injury (I/R), characterized by an overproduction of ROS, is used as an *in vivo* model. Anaesthetized rats were submitted to 1 hour renal ischaemia following by 2 hours of reperfusion. Sham operated rats (SOP) were used as control. Lipid peroxidation was evaluated by measuring the HNE accumulated in rat kidneys in presence or absence of L-arginine or D-arginine infusion. L-arginine, but not D-arginine, enhances HNE accumulation in I/R but not in SOP (<0.05 nmol/g tissue in SOP versus 0.6 nmol/g tissue in I/R), showing that in this experimental conditions, NO produced from L-arginine, enhances the toxicity of ROS.

This study shows that the pro- or antioxydant effects of NO are different *in vivo* and *in vitro* and could be driven by environemental conditions such as pH, relative concentration of NO and ROS, ferryl species...These conditions are impaired in circulatory shock.

PREDICTING THE NEED FOR MECHANICAL VENTILATION IN PATIENTS WITH ACUTELY EXACERBATED CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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Objectives: Identify the factors associated with the need for mechanical ventilation (MV) in 590 patients (464 males, mean age 67.9 ± 10 years) hospitalized from 1981 to 1990 for an acute exacerbation of COPD.

Methods: The diagnostic and therapeutic approach was standardized so that data collected over a 10-year period were comparable. A progressive deterioration of clinical conditions and/or pulmonary gas exchanges was considered as indication for MV. Variables potentially predicting the need for MV were derived from clinical and arterial gas data, extrapulmonary diseases, use of drugs, chest x-ray and ECG abnormalities.

Results: MV, performed with external and/or internal ventilators, was necessary in 130 patients (22%). At the hospital admission, PaCO2 was higher and pH was lower in patients requiring MV (66 ± 18 mmHg vs 53 ± 15 mmHg, p<0.001; 7.32 ± 0.08 vs 7.36 ± 0.07, p<0.001). The dichotomic variables significantly associated with MV were: presence of chronic renal failure (Odds Ratio = 1.87; 95% Confidence Intervals = 0.92-3.77), pulmonary edema on chest x-ray (OR=1.74; 95%CI=1.11-2.72), use of diuretics (OR=2.91, 95%CI=1.63-5.26), use of digitalis (OR=1.78, 95%CI=1.16-2.73), and use of anti-arrhythmics (OR=1.66, 95%CI=1.08-2.55). Patients requiring MV had a higher in-hospital mortality than not ventilated patients (34.6% vs 8.7%, p < 0.001).

Conclusions: The factors predicting the need for MV in COPD patients were the severity of hypercapnia and respiratory acidosis at the time of hospital admission, and the presence of associated extrapulmonary conditions such as renal and cardiac failure.

COMPLICATIONS IN ACUTE ASTHMA EPISODES

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Pneumomediastinum, pneumothorax, atelectasis and myocardial infarction are rarely seen in bronchial asthma. These complications occur as a result of the severe asthma.The aim of our retrospective study was to analyse the complications seen in acute asthma attacks.
During the years 1990 through 1994, 244 patients were admitted to hospital in acute asthma episode. There were 11 (4,5%) pts with complications; mean age of 27 yrs; 6 females (54%). Clinical history, ECG and chest radiographs were analysed.
The mean duration of bronchial asthma was 14 yrs (range from 2 months to 17 yrs). All patients were atopics. There were four ex-smokers and one smoker. The worsening of asthma symptoms begun two days before the admission (range from 1 to 7 days). On ECG all patients had tachycardia. Rightward shift of the QRS axis and ST-T changes indicative of right ventricular strain were found in three pts. These were the transient findings that improved after curing the acute asthma attack. Non-Q myocardial infarction occured in one patient and resulted from the hypoxaemia of asthma. Hyperinflation was the usual finding on the chest radiograph. Pneumomediastinum and subcutaneous emphysema were apparent in five pts and required no additional treatment. Unilateral pneumothoraces were present in two pts and needed continious intrapleural drainage; one of these patienst died in cardiorespiratory insufficiency. Atelectasis of right upper lobe was present in one patient. It occured due to inspissated secretions and needed no additional treatment. All these patients, except one who died, improved on treatment with oxygen, steroids, beta-two agonists, theophylline and antibiotics.
In conclusion, complications occur in acute asthma episodes as a result of the severe asthma. Mediastinal emphysema and atelectasis are not serious complications. Pneumothorax and myocardial infarction are very serious life-treatening complications and always have to be considered in patients with severe asthma.

NON INVASIVE PRESSURE SUPPORT VENTILATION BY NASAL MASK IN PATIENTS WITH HEMATOLOGIC MALIGNANCIES COMPLICATED BY ACUTE RESPIRATORY FAILURE.

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Objective: Evaluate the treatment with Pressure Support Ventilation by nasal mask in a group of patients affected by hematologic malignancies complicated by acute respiratory failure.
Design: Prospective study
Setting: Hematologic and General I.C.U., University of Rome "La Sapienza".
Patients: 13 consecutive critical patients affected by hematologic malignancies, complicated by acute respiratory failure of parenchymal origin
Methods: Delivering PSV via nasal mask by means of a small ventilator (BiPAP, Respironics, USA) instead of conventional mechanical ventilation, we evaluated effects on blood gases, respiratory rate and hemodynamics along with tolerance and complications.
Main results: 11 out of 13 patients showed a significant improvement of blood gases and respiratory rate within the first 24 hours of treatment. In details PaO2, PaO2/FiO2 ratio and SatO2 significantly improved after 1 hour of non-invasive treatment (45±11 vs 90±39; 92±24 vs 176±74; 81±10 vs 95±4 respectively) and continued to improve in the following 24 hours ($p<0.01$).Five patients died in the I.C.U. following complications independent from respiratory failure.
Conclusion: Non invasive PSV by nasal mask may represent a valuable choice for the treatment of respiratory failure of parenchymal origin in hematologic patients.

ASSESMENT AND MANAGEMENT OF NEAR-FATAL ASTHMA

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Acute bronchial asthmatic episodes represent one of the most common respiratory emergencies. Its maximmum expression "status asthmaticus" is one entity of low incidence, still it is a risk to the physical integrity of the patient. During 1993 a total of 52 patients with diagnosis of status asthmaticus were hospitalized. Out of these patients six had a near-fatal asthma and they were subjected to a complex examination. Near-fatal asthma was defined as either respiratory arrest or acute asthma with PaCO2 greater than 6,7 kPa and/or an altered state of consciousness. Mean age was 56,2±16,2 yrs, four male and two female sex. At presentation two patients suffered from coma, others were confused. They exhibited severe dyspnoea, difficulty speaking, used accessory muscles of respiration, increased wheezing while two cases had silent chest on auscultation. Cyanosis indicated a very severe asthma attack in all six patients. Mean respiratory rate was 28±4/min and puls rate 118±12 bts/min. Arterial blood gases revealed a PaO2 of 6,95±1,33 kPa, PaCO2 of 7,87±1,85 kPa and pH of 7,274±0,132. After careful evaluation they received conventional therapy (immediately continuous oxygen, impelled nebulization with high doses of beta-two agonists and ipratropium bromide, intravenous steroids and theophylline). In two cases signs and symptoms of deteriorating airflow and respiratory muscle fatigue determined the need for mechanical ventilation. Out of six near-fatal attacks aggressive treatment was successfull in four patients and fatal in two cases. One patient admitted in coma died in severe hypoxaemia upon one hour and one mechanicaly ventilated died from cardiac arrhythmia. Life-threatening attacks in asthmatics in our group developed gradual worsening despite treatment which controls symptoms in most other patients. One patient had "brittle asthma", other long-standing acute episodes treated with systemic steroids. Conclusions: Identification of fatality prone subjects may lead to further reduction of severe episodes. Respiratory arrest and coma upon admission, severe dyspnoea with silent chest on auscultation, cyanosis and use of accessory muscles of respiration constitute the basic clinical picture. Hypoxaemia must be immediately corrected.The patients and physicians should be able to assess the severity of asthma, a major factor in near-fatal and fatal asthma attacks.

RELATIONSHIPS BETWEEN ADULT RESPIRATORY DISTRESS SYNDROME AND PULMONARY OR SYSTEMIC LESIONS

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Objectives :Our purpose was to asses if the evolution of patients with a adult respiratory distress syndrome (ARDS) ,shows any relation to the pulmonary or systemic origin of the disease and whether or not there were differences in the frequency of the syndrome in both groups.
Methods : Randomized prospective study in multidisciplinary ICU. One hundred and sixteen patients with a high risk developing ARDS were distributed into two groups. One was named systemic origin group(SO) and the other pulmonary origin group (PO).All patients only showed one cause (pulmonary or systemic) with potential risk of ARDS.The patient's hemodynamic and respiratory status was evaluated every 6 hours the first day and every 12 hours the second and third day. At the end of 72 hours the patients were diagnosed as ARDS or non-ARDS.
Measurements and Main Results : Of the total 116 patients, 57 were finally included in the SO group and 59 in the PO group.Patients in SO group and PO group had comparable ages ($p<.01$).PEEP in both groups was comparable (=.06) at the moment of admission to the study. There were no statistically significant differences for Cardiac Index and Systemic Vascular Resistances. The Pulmonary Vascular Resistances (PVR) showed significant differences at 48 h.($p<.05$) and 72 h. ($p<.03$).The oxygen comsumption (VO) in patients of the SO group showed statistically significant differences at 48 h. ($p<.05$) with respect to initial values.Fifteen cases of ARDS (26.3%) in the SO group and twenty five cases (42.3%) in the PO group were identified. The time of onset of ARDS was 35± 14 hours in the SO group and 11 ± 4 h hours in the PO group.The final outcome was very similar in both groups : mortality of 36% in the SO group versus 37% in the PO group.
Conclusions : The pathogenesis of ARDS depends on whether the lesion is originated at or outside the lung.
The PO group showed a shorter time of onset of ARDS, a faster and more severe increase of pulmonary shunt and a higher percentage of patients developing ARDS compared with patients of the SO group.The SO group showed a higher and faster increase in pulmonary resitances that PO group and a decrease in oxygen comsumption earlier and more severe than in the PO group. These data thus seem to show that there could be two mechanisms involved in the genesis of ARDS depending on the cause. The fact that the ARDS genesis is shorter in the cases of pulmonary etiology with faster impairment of pulmonary shunt, and a slower increase in pulmonary resistances in this pulmonary group, would indicate that the underlying mechanisms responsible for the hypoxemia are different to those which initiate the increase in pulmonary resistances. Finally, the exclusive impairment of oxygen consumption, which appears earlier than the onset of ARDS in the systemic origin group, could show the generalized character of the process in this group.

ALVEOLAR RECRUITMENT AND PULMONARY VASODILATION INDUCED BY INHALED NITRIC OXIDE

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The aim of the study was to evaluate how the application of PEEP potentiates hemodynamic and gas exchanges variations induced by inhaled NO.
In 9 ARDS patients (Murray=3.1±0.4) under volume controlled ventilation we performed an inhaled NO test. 10 and 20 ppm were delivered through a nebulizer (Servo nebulizer 945, Siemens Elema) during the inspiratory time, at clinical level of PEEP. In 3 patients PaO2 didn't change significantly (<3%) after the inhalation trial (average PaO2 without NO= 62mmHg; average PaO2 with NO=60 mmHg). 6 patients showed a PaO2 increase of almost 30% and were enrolled in the study.
2 different levels of PEEP were chosen for each Patient: LowPEEP (5 cmH2O below clinical PEEP) and HighPEEP (2 cmH2O above clinical PEEP). 4 randomized steps were applied: 1)LowPEEP (5.0 ± 3.7 cmH2O) without NO inhalation (NOoff); 2)LowPEEP with NO inhalation (NOon) at the previously selected (10 or 20 ppm) concentration; 3) HighPEEP (11.3 ± 3.2 cmH2O) and NOoff; 4) HighPEEP and NOon.

RESULTS:	LowPEEP		HighPEEP	
	NOoff	NOon	NOoff	NOon
Va/Qt	49.7± 8.3	45.3± 8.3**	44.8± 6.4##	35.8± 7.0$
PaO2	87.2±49.2	120.2±86.3**	102.5±31.2#	175.8±79.2
HbO2a	91.1± 5.2	94.0± 2.8**	94.5± 2.3##	96.7± 0.8
PAP	33.0± 8.9	26.8± 5.4**	32.7± 9.1	27.5± 5.5

HbO2a = arterial saturation
2X2 factorial analysis: ** = p<0.01 NOon vs. NOoff; HighPEEP vs. LowPEEP # = p<0.05 and ## = p<0.01; Interaction NO-PEEP $ = p=0.05.
In conclusion, alveolar recruitment induced by HighPEEP levels seems to enhance Va/Qt improvement due to inhaled NO.

COST EFFECTIVENESS OF INTENSIVE CARE OF PATIENTS WITH SEVERE ARDS

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Objectives: To evaluate the cost effectiveness of intensive care of patients with severe ARDS.
Methods: We treated 67 ARDS-patients (age 41 yr (16-75) mean, range) during 1991-94. The lowest PaO2/FiO2-ratio was 74 (29-140), the worst Murray score 3.0 (2.3-4.0), ICU-stay 41 (1-121) days and hospital mortality 40%. The costs of intensive care were calculated according to intensivity of patient care as assessed by TISS-scoring (Therapeutic Intervention Scoring System). The more intensive the care, the higher are the costs. Costs per year of life saved ("life-year" in US $) were compaired by other medical treatments (1-4). It is assumed that the mean expected length of remaining life in ARDS-survivors after intensive care is 25 years.
Results:

Treatment	life-year ($)
Bone marrow transplantation (acute leukemia)	65 000
Lowering cholesterol using lovastatin	51 000
Treating hypertension using nifedipine	32 900
Heart transplantation	28 000
Intensive care of ARDS-patients	3300

Conclusions: Intensive care of patients with severe ARDS is highly more cost-effective as compared with many other routinely used medical treatment strategies. The usually good recovery and the reasonable quality of life in survivors justifies investments to care of these patients (5).
References: 1) Welch H et al. Cost effectiveness of bone marrow transplantation in acute nonlymphocytic leukemia. N Engl J Med 1989;321:807-12. 2) Goldman L et al. Cost and health implications of cholesterol lowering. Circulation 1992;85:1960-1968. 3) Evans RW. Cost-effectiveness analysis of transplantation. Surg Clin North Am 1986;66:603-16. 4) Edelson JT. Long-term cost-effectiveness of various initial monotherapies for mild to moderate hypertension. JAMA 1990;263:408-413. 5) Uusaro A et al. Quality of life after severe ARDS. Am J Resp Crit Care Med 1995;April (Supplement).

EFFECTS OF INHALED PROSTACYCLIN ON PULMONARY HAEMODYNAMICS AND GAS EXCHANGE

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Perfusion of prostacyclin (PGI_2) to treat pulmonary hypertension in adult respiratory distress syndrome (ARDS) worse pulmonary gas exchange due to a marked impairement of ventilation/perfusion mismatch. Recently has been shown that if prostacyclin is given by aerosol instead of intravenous the net effect is an improvement of arterial oxigenation due to a redistribution of blood flow to well ventilated areas.
Objectives: To asses the effects of inhaled prostacyclin on pulmonary haemodynamics and gas exchange in patients with severe ARDS.
Methods: Two patients with severe ARDS (Murray Score >3) recived inhaled PGI_2 at 15-20 $ng.kg.min^{-1}$ using an ultrasonic nebulizer. Haemodynamic measurements, arterial and mixed venous blood gas analysis were performed before and after 30 min of PGI_2 inhalation.
Results: Short-term PGI_2 inhalation improved pulmonary gas exchange in both patients. Arterial oxygen partial pressure (PaO2) increased from 101 to 166 mmHg in patient 1 and from 87 to 108 in patient 2, the ratio PaO_2 to the fraction of inspired oxygen increased from 126 to 207 (patient 1) and from 124 to 154 (patient 2). Venous admixture decreased from 36% to 29% and from 34% to 27% in patient 1 and 2 respectively. Mean pulmonary artery pressure decreased slightly from 25 to 23 mmHg in patient 1 and from 41 to 37 mmHg in patient 2. No effects on systemic haemodynamics were observed in any patient.
Conclusions: PGI_2 inhalation improves gas exchange and produces selective pulmonary vasodilation, thus can be an alternative therapy for the treatment of pulmonary hypertension and hypoxemia in patients with severe respiratory faillure.

CORRELATION BETWEEN TWO METHODS OF MEASURING EXTRAVASCULAR LUNG WATER (EVLW) IN PIGS.

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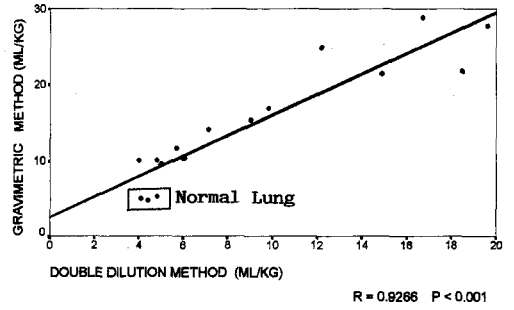
Objective: To compare two different methods to measure extravascular lung water (EVLW) in normal and pathologic lungs of pigs.
Material and Methods: We measure EVLW by two methods in fifteen adolescent pigs (weighing over 30 kg), three with normal lungs and twelve with pathologic lungs (pulmonary edema induced by intravenous injection of 0,1 ml/kg of oleic acid). The two methods were:- Method 1: Double Dilution (clod + indocyanin) (Pulsion Cold system) - Method 2: Gravimetric. (Hemoglobin content).
The comparison was made by linear regression analyses
Results:



R = 0.9266 P < 0.001

Discusion: There is a close correlation between these two methods of measuring EVLW. However there is an underestimation of 38.5 % in this kind of pulmonary edema (oleic acid induced) with the double dilution method. Although the size of the sample is small, in normal lungs there appear not to be this underestimation.

DECREASE OF EXTRAVASCULAR LUNG WATER (EVLW) and INCREASE OF LYMPHATIC DRAINAGE (LD) AFTER PEEP APPLICATION IN HYDROSTATIC PULMONARY EDEMA (HPE).

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The effect of PEEP on EVLW has been studied with contradictory results, probably as a consequence of: differences in methods of measuring EVLW, variations in the type and severity of lung injury, and different timings of PEEP application. Objective: 1) to analyze the effect of different levels of PEEP (0, 10 and 20cmH2O) on EVLW during HPE; 2) to establish whether increases in intrathoracic pressure due to high PEEP levels can obstruct lymphatic drainage.

Material and Methods: HPE was provoked in 3 groups of dogs by inflating a Foley catheter in left auricular to a pressure of 24-26 mmHg. PEEP levels of 0, 10 or 20 mmHg were applied.

Results:

TIME (min)	0	30	60	90	120
GROUP I (n = 6)					
PEEP (cmH2O)	0	0	0	0	20
EVLW (ml/kg)	8.5±2,5	15.2±4,3	18.3±5.4	21.1±5(1)	13.9±4.9
LD (ml/kg)	1.6±0.8	2.5±0.7	3.2±1.2	2.8±0.7	3.4±0.1
GROUP II (n = 7)					
PEEP (cmH2O)	0	0	10	10	0
EVLW(ml/kg)	8.1±10.9	15.3±3.7	13.6±2.5	12.7±2	17.6±5
LD (ml/kg)	1.9±1.1	3.6±1.7	5.9±2.3	6±2.5(2)	4.2±1.6
GROUP III (n = 5)					
PEEP (cmH2O)	0	0	20	20	0
EVLW (ml/kg)	8.6±2.5	16.6±5	14.4±5.9	14.7±4.7	23.4±6.7
LD (ml/kg)	1.5±0.8	2.6±0.8	4.7±1.7	4.2±2.1	3.8±1.9

(1): Statistically significant differences between group I and group II and III

(2): Statistically significant differences between group II and group I.

Conclusions: 1) The application of PEEP levels of between 10 and 20 cmH_2O limits the increase of extravascular lung water in cases of hydrostatic pulmonary edema. 2) PEEP of 10 cmH2O increase the lymphatic flow through the thoracic duct.

PHYSIOLOGIC EFFECTS OF POSITIVE END-EXPIRATORY PRESSURE (PEEP) IN POSTOPERATIVE SEDATED-PARALYZED MORBIDLY OBESE PATIENTS

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Objective: In the postoperative period, maintenance of adeguate arterial oxygen tension is a major problem in morbidly obese patients probably because of a large reduction in functional residual capacity (FRC). The aim of this study was to evaluate the effects of PEEP on respiratory mechanics and gas exchange in this kind of patients.

Methods: In nine postoperative mechanically ventilated morbidly obese patients (BMI>40 kg/m^2) we partitioned the total respiratory system mechanics into its lung (l) and chest wall (w) components using the airway occlusion technique associated with the esophageal balloon, during constant flow inflation (JAP 1989; 67: 2556). At three different levels of PEEP (0, 5, 10 cmH_2O) we measured: compliance (Cst), airway (Rint) and "additional" (DR) resistance, FRC and gas exchange. Tidal volume (0.66±0.03 l), inspiratory flow (0.46±0.1 l/s) and inspired oxygen fraction (100%) were maintained constant during the protocol.

Results: Data are presented as mean ± SD.

	PEEP 0	PEEP 5	PEEP 10	
Cst,l (ml/cmH_2O)	67.8±34.1	78.1±31.1	95.6±35.2	#
Cst,w (ml/cmH_2O)	120.8±57.5	114.8±43.9	146.0±46.1	*
Rint,l ($cmH_2O/l/s$)	8.2±4.0	6.0±2.4	4.6±2.4	#
DR,l ($cmH_2O/l/s$)	3.1±1.9	2.9±1.7	2.5±0.9	
DR,w ($cmH_2O/l/s$)	1.5±1.3	1.5±1.1	0.9±0.9	
PaO_2/PAO_2	0.36±0.1	0.39±0.1	0.42±0.1	#
$PaCO_2$ (mmHg)	41.8±7.1	41.3±6.0	40.9±5.0	
FRC (l)	0.6±0.2	0.8±0.2	1.0±0.2	#

ANOVA: # $p<0.01$; * $p<0.05$

Conclusion: In postoperative morbidly obese patients PEEP, increasing FRC, has benefical effects on lung and chest wall mechanics, as well as on arterial oxygenation.

EFFECT OF THREE DIFFERENT VENTILATORY STRATEGIES ON EXTRAVASCULAR LUNG WATER IN AN EXPERIMMAL MODEL OF PULMONARY EDEMA

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Objective: To assess the effect on extravascular lung water (EVLW) of the application of PEEP and the reduction of Vt in an oleic acid pulmonary edema model in pigs, using three ventilatory strategies.

Material and Methods: Twelve adolescent pigs (weighing over 30 kg) were randomly divided in three groups immediately after infusing via a central vein 0.1 ml/kg of oleic acid to produce a permeability pulmonary edema.

The ventilatory parameters for each group were as follows:

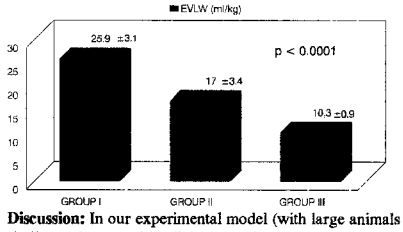
GROUP I (n=4) : Vt: 10-15 ml/kg; ZEEP.

GROUP 2:(n=4) : Vt: 10-15 ml/kg; PEEP: 10 cm H20.

GROUP 3:(n=4) : Vt: 5-10 ml/kg; PEEP: 10 cmH20. (Resulting in permissive hypercapnia)

After a four-hour period of ventilation the animals were killed and the lungs excised to calculate gravimetrically the extravascular lung water using a standardized procedure (hemoglobin content method).

Results:



Discussion: In our experimental model (with large animals and ventilatory parameters similar to those used in clinical practice) PEEP produces a reduction of EVLW that is even greater by diminishing tidal volumes in the range that produce hyperca pnia. If we consider EVLW as an indirect measure of ventilator induced lung injury, our results can have important clinical implications.

THE USE OF PRONE POSITION IN THE TREATMENT OF ACUTE RESPIRATORY FAILURE (ARF): A RETROSPECTIVE ANALYSIS

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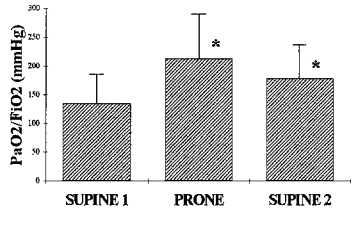
Objectives. To describe the use of prone position in our ICU we analyzed the clinical records of all patients admitted in 1993-94, selecting adult patients with ARF defined as: intubation and PaO_2/FiO_2<250 mmHg plus an FiO_2>0.5 or PEEP>5 cm H_2O.

Results. 146 patients met the ARF criteria: 40 of them (27.4%) underwent prone positioning (P+). Prone position use began in the early phase of ARF (3.5±5.6 days from the beginning, range 1- 32, median 2).25 out of 40 P+ pts were treated with controlled ventilation (CPPV or PCV), while 14 were on assisted ventilation (SIMV+PS) and 1 on spontaneous breathing (CPAP). Only 2 pts were awake when turned prone, while 11 pts required adjuncts of sedation to tolerate the change of position. The duration of prone positioning was variable (average lenght 4.7±3.3 h, range 0.5-12 h). Only minor side effects were observed (eyelids and facial edema, chest and facial pressure bruises).

We consider responders (R+) those patients presenting at least 12.5 mmHg increase in PaO_2/FiO_2: 35/40 patients (87.5 %) were responders when first proned. The PaO_2/FiO_2 changes induced by prone position are reported in the figure. PaO_2/FiO_2 increased when patients were proned (*$p<0.001$) and remained higher than baseline values when returning supine(*$p<0.001$). $PaCO_2$ remained unchanged. Prone positioning was used at least twice in 21/40 (52.5%) patients: 2 of the initial non responder (R-) became R+, while 4 R+ pts became R-. The patients in which prone position was not used (106) had less severe ARF than proned pts. (PaO_2/FiO_2= 165±59 vs 146±55, p=NS; PEEP 5±3 vs 7±3 cm H_2O $p<0.001$).



Conclusions. This retrospective analysis confirms that prone positioning improves oxygenation in the majority of ARF patients. Altough we have no available criteria to discriminate in advance R+ from R- pts, we now routinely consider the use of prone position in the treatment of severe ARF.

EFFECTS OF INHALED NITRIC OXIDE (NO) ON HEMODYNAMICS AND GAS EXCHANGE IN ARDS.

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Inhaled NO can improve arterial oxygenation and reduce pulmonary hypertension in ARDS patients; little information is, however, available about the dose-response curves. **Methods** Seven ARDS patients (LIS 2.7±.5) submitted to mechanical ventilation randomly received 8 inhaled NO doses in increasing or decreasing sequence: 0.5, 1, 5, 10, 20, 50 and 100 ppm. Reference measurements were obtained before and after the entire period of NO inhalation. Hemodynamic parameters and blood gases were measured after 25 min in each condition. CMV was administered under sedation and paralysis, with constant ventilation, PEEP (10±2 cmH2O) and FiO2 (.56±.14). The changes in Vt and FiO2 due to the NO (1000 ppm in N2) injection in the ventilator external circuit were compensated for. **Results and conclusions** (mean±sd, ANOVA) Q'va/Q': venous admixture; PAPm: mean pulmonary artery pressure; APm: mean systemic arterial pressure; CO: cardiac output.

ppm	PaO_2 mmHg	Q'va/Q' %	$PaCO_2$ mmHg	PAPm mmHg	CO l/min	APm mmHg
0 start	80±13	28±11	50±14	38±7	6±2	71±24
0.5	97±19	25±13	49±16	35±8	6±2	74±28
1	107±13	22±8	49±13	34±7	6±2	75±23
5	114±19	20±8	49±12	32±7	6±1	73±20
10	119±13	20±8	49±12	32±6	6±1	80±27
20	123±21	20±9	49±13	32±6	6±1	75±22
50	122±18	20±6	49±13	31±6	6±2	72±20
100	125±23	21±6	48±12	32±6	6±1	74±21
0 end	88±18	26±12	50±14	38±7	6±2	75±22
P	**.0001**	**.0001**	**.82**	**.0001**	**.68**	**.34**

The dose of 0.5 ppm, ineffective on PAPm, significantly improved oxygenation. The increase of PaO2 and the decrease of Q'va/Q' and PAPm were nearly maximal at 5-10 ppm. No deterioration of arterial oxygenation was observed at NO doses as high as 100 ppm. CO2 exchange was not influenced by NO inhalation. Systemic hemodynamic variables did not change throughout the study. These results suggest that a concentration around 10 ppm is adequate for obtaining maximum effects on hypoxemia and pulmonary hypertension in patients with ARDS.

IMMEDIATE EFFICACITY AND TOLERANCE OF 5 AND 10 mg NEBULIZED SALBUTAMOL IN ADULT PATIENTS WITH ACUTE SEVERE ASTHMA.

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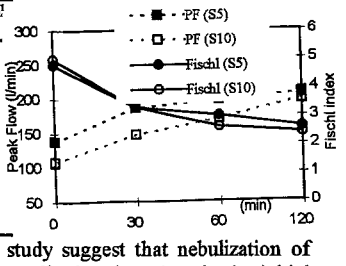
Objective: To compare efficacy and safety of two doses of salbutamol.

Methods: Sixteen adults who had severe acute asthma were randomly assigned to receive either 10mg (n=9) or 5mg (n=7) of nebulized salbutamol. Both groups were similar with respect to age, duration of asthma, duration of attack before arrival at the hospital and severity of asthma according to baseline measurements (table). Evaluation was performed 30, 60, and 120 min after the start of nebulization.

Results: Compared with 10mg regimen, 5mg regimen resulted in the same improvement in peak-flow and Fischl index (figure). The changes in heart rate, respiratory rate and paCO2 did not differ significantly between both groups. The incidence of side effects, which included tremor, palpitations, cardiac arrythmias and other symptoms, was not significantly different in the two populations.

	salbutamol 5mg	salbutamol 10mg
age (yrs)	46±21	40±17
sex (M/F)	2/5	2/7
peak-flow (l/mn)	138±65	108±46
heart rate (b/mn)	110±19	118±11
respiratory rate (c/mn)	30±3	33±4
Fischl index	4.8±1.6	5±0.7
PaCO2 (kPa)	5.8±1.5	5.8±0.8



Conclusion: The results of this study suggest that nebulization of 10mg of salbutamol is not more effective than 5mg in the initial treatment of acute severe asthma in adult patients.

NITRIC OXIDE (NO) IN THE AIRWAYS OF HEALTHY SMOKERS AND NON-SMOKERS

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(Chairman Prof.P.Pietropaoli)

Low-dose inhaled nitric oxide (NO) induces redistribution of pulmonary perfusion in patients with severe ARDS and causes improvement of oxygenation [1]. However, addition of exogenous low-dose NO in the inspiratory gas mixture might be only a replacement of missing atmospheric NO (2-130 ppb) in hospital central-supplied medical air. [2]

We have realised nitric oxide measurements in ten healthy volunteers, (4 smokers and 6 non-smokers) breathing with a mouthpiece and occluded nostrils through a ventilator circuit, with separation of inhaled and exhaled gases by a valve.

NO concentration was measured with a double-chamber chemiluminometer (Environnement SA, France) and with charcoal/silicate purified compressed air. There was no nitric oxide detectable in the inspiratory limb of the ventilator. Unfiltered central supply medical air contained 20 - 50 ppb of NO and 10 - 30 ppb of NO_2, whereas central supplied oxygen was NO/ NO_2 free.

Samples were taken after equilibration periods of 5 minutes, with increasing FiO2 levels of 0.21, 0.50 and 1.0 for subsequent 5 minutes periods; paired values were recorded every 30 s. The mean NO value was 4.57 ppb (SD 2.51) and no significant differences were found for different FiO2 levels both in smokers and non-smokers.

These data suggest that the NO concentration of pulmonary origin in the exhaled air of healthy volunteers is probably lower than that reported by other Authors [2] and that, previously reported, differences between smokers and non-smokers are not always striking [3]. We suggest the use of activated charcoal/silicate filters for clinical trials in order to achieve standard conditions.

[1] *Circulation 1991; 83: 2038-47;* [2] *The Lancet 1994; 343: 518-19*
[3] *The Lancet 1994; 343: 146-47*

PLASMAPHERESIS IN TREATMENT OF PATIENTS WITH BRONCHIAL ASTHMA

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Plasmapheresis has been conducted in 127 patients with severe duration of infectious allergic bronchial asthma on the background of initial secondary immunologic insufficiency, characterized by the decrease of the contents and functional activity of T-lymphocytes. T-supressors in particular in combination with B-Link immunity activation. The clinical affect has been reached in 85 patients (66,9% of cases) and been expressed in the decrease of the number of bronchospasmatic attacks and in 63% of hatients (49,6%of cases)-by their absense during 7-11 months. All this resulted in the decrease twice of the medical therapy volume including hormonal therapy. The growth of the starting supressive activity of T-lymphocytes in the reaction of blastic transformation the normalization of relationship between the immunoregulative cells can be used as the immune plasmapheresis efficiency criteria. The results of the research work allow to come to the conclusion that the use of the plasmapheresis in patients with bronchial asthma favourably influences the clinical state of the immunocorrective effect.

PROGNOSTIC FACTORS OF NEUTROPENIC PATIENTS AT THE ENTRY TO ICU. F.Blot, B.Escudier, *M.Guiguet, S.Antoun, B.Leclercq, G.Nitenberg. Service de réanimation, Institut Gustave Roussy, Villejuif; *INSERM U.263, C.H.U. Saint-Antoine, Paris.

The prognostic factors of neutropenic patients admitted to the ICU remain poorly known. The aim of this study was to determine the respective weight of underlying malignancy and organ system failures on the outcome of these patients.

Patients and methods: The charts of 107 neutropenic patients (WBC < 1000/mm^3 and/or PMN < 500/mm^3), admitted to the ICU between 1986 and 1990, were retrospectively reviewed. The characteristics of the neoplastic disease (hæmopathy or solid tumor, tumoral evolution, duration of cancer disease and of neutropenia), the Mac Cabe's score, the organ system (respiratory, hemodynamic, renal, neurologic, hepatic) failures and the severity scores (SAPS, SAPS II ,OSF) were registred within the 1st day in the ICU. When discharged from the ICU, the patients were classified as alive or dead.

Results: Fifty-seven patients (53.3%) had a hæmatologic malignancy, and 50 (46.7%) a solid tumor. Fifty-nine of the 107 patients died (55.1%); the mortality rate did not differ between both groups (61.4 and 48% respectively, p = 0.16). *With univariate analysis*, none of the tumoral features is linked to the prognosis; only the respiratory ($p < 10^{-4}$) and cardiovascular ($p < 10^{-3}$) failures, and the number of organ system failures ($p < 10^{-4}$) are associated to the risk of death. The SAPS ($p < 10^{-3}$) and SAPS II scores ($p < 10^{-4}$) were higher in patients who died. *With multivariate analysis* (logistic regression), only the respiratory failure is correlated to the risk of death ($p = 10^{-4}$); neither the features of the underlying malignancy (p > 0.8), nor the duration of neutropenia before admission in ICU (p = 0.83), nor the severity scores (IGS II: p = 0.068) are linked to the outcome.

Conclusions: The tumoral characteristics do not modify the prognosis after admission to the ICU. They should not influence the decision to admit or refuse a cancer patient in the ICU. Respiratory failure at ICU admission has the predominent weight on the risk of death in the ICU.

TREATMENT OF SEVERE ASTHMA WITH ECMO

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Patients with respiratory acidosis due to asthma occasionally require levels of mechanical ventilation that place them at risk for barotrauma. A few case reports have described the use of an extra-corporeal membrane oxygenator(ECMO) circuit as an alternative means of CO_2 removal. Generally, this has been used for short periods of time (<24h) without serious complications and with low blood flows through the extra-corporeal circuit. We report a case of refractory asthma who could not tolerate even small-volume breaths from a mechanical ventilator due to severe bilateral airleak. ECMO therapy was initiated at the referring hospital prior to helicoptor transport. High blood flows were used (70% of the patient's cardiac output), sufficient to achieve both CO_2 removal and oxygenation. Satisfactory gas-exchanged was accomplished (pCO2=50-60 mmHg) with nearly total lung rest for a prolonged period (60h). However, the long ECMO duration was associated with two severe complications:1) bilateral hemothoraces due to anticoagulation in the extra-corporeal circuit, and 2) prolonged weakness as a result of neuromuscular blockade for six days. The patient was discharged from the hospital in good condition. We present the respiratory and hemodynamic features of this case aw well as the potential complications of ECMO therapy in asthma.

DETECTION OF AIRWAYS OBSTRUCTION DURING TIDAL BREATHING.

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Objectives: Parameters derived from tidal expiratory flow ($\dot{V}e$) and volume (V_T) can be used to detect airflow obstruction in COPD patients who might be unable to perform forced spirometry (e.g., ICU). However, indices such as $\Delta Ve/V_T$ and $\Delta t/Te$ are highly variable (Thorax, 1981: 36; 135).

Methods: We investigated whether the standardized for V_T effective time ($teff_s$) of a tidal breath, which is derived by a simple mathematical procedure ($teff_s = \int Vdt/V_T^2$), is a more reproducible and sensitive detector of airways obstruction. We studied nine normal subjects (5 male, 31±5yr) and 13 COPD patients (4 male, 61±10yr) in the seated position, with a noseclip on. They breathed quietly, through a pneumotachograph to measure flow ($\dot{V}$). Volume was obtained by numerical integration of the flow signal. Each subject had an initial 10-15 min trial run, in order to become accustomed to the apparatus and procedure. When regular breathing had been achieved, all breaths over a 5 min time interval were recorded. The mean value of six consecutive breaths (ERS criteria) for each subject was used for analysis under the condition that within session variation of tidal volume (V_T) was <10%. Lung function tests were: in normals (mean±SD), FEV_1%pred=100±13%, FEV_1/FVC%=81±3%, and in COPD patients, FEV_1%pred=53±20 and FEV_1/FVC%=51±12%.

Results: Values are shown as mean±SD in the following table (unpaired t-test).

	$teff_s$, (sec/l)	$\Delta te/Te$ †	$\Delta Ve/V_T$ ‡
Normals(n=9)	1.96±0.68	0.32±0.15	0.38±0.11
COPD(n=13)	0.85±0.29	0.26±0.13	0.27±0.11
p<	0.001	NS	0.04

†expiratory time to tidal peak flow/tidal expiratory time, ‡volume expired at tidal peak flow/tidal volume

Mean within-day COV(%) was 6.6%, 19.1%, 22.7% for $teff_s$, $\Delta te/Te$ and $\Delta Ve/V_T$ respectively, studied in 3 normals, in 3 sessions/day. Mean day-to-day COV was 5.5%, 22.4%, 24.9% for $teff_s$, $\Delta te/Te$ and $\Delta Ve/V_T$ respectively, studied in 3 normals, in 3 separate days.

Conclusions: Standardized effective time ($teff_s$) obtained during tidal expiration may provide a simple, reproducible, and clinically useful index to detect airways obstruction in subjects who are unable to perform forced spirometry, e.g., in ICU.

COMMUNITY-ACQUIRED PNEUMONIA (CAP) WITH ACUTE RESPIRATORY FAILURE: COMPARISON OF LEGIONNAIRES' DISEASE (LD) AND PNEUMOCOCCAL PNEUMONIA (PP).

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Backgrounds: previous studies have suggested some differences in the clinical manifestations of LD and other pneumonia. However, it's not clear if those differences are due to the microorganism or to the severity of the disease.

Objective: to compare clinical and biological manifestations of LD and PP at the admission to the ICU for ARF.

Methods: retrospective inclusion of all cases of LD and PP admitted to our ICU between 1992.1 and 1993.12. The etiological diagnosis was based on serologic tests (LD, two blood specimens), blood cultures or protected specimen brush (PP). Data were compared using a Mann-Whitney test or a chi-square test with a Yates continuity correction when appropriated; p < 0.05 was considered as significant.

Results:

	LD (n=9)	PP (n=9)	
SAPS	13.9±7.4	15.1±6.6	NS
PaO2/FiO2	88±46	123±56	NS
Murray's LIS	2.9±0.6	2.2±1.1	NS
Temperature	39.8±0.9	37.8±1	p=0.00016
Duration of fever (d)	4.9±1.3	2±1.5	p=0.03
Diarrhea	4 / 9	1 / 9	NS
Neurologic changes	5 / 9	4 / 9	NS
WBC x 1000/mm^3	10.9±9.2	11.8±8	NS
Na (mmol/l)	130±6.2	135±5.7	NS
Creatinine (µmol/l)	144±75	122±55	NS
Creatine kinase (U/l)	443±295	70±44	p=0.03
Increase of CK level	8 / 9	1 / 9	p=0.02
SGPT (U/l)	63.9±84	19.6±15	p=0.04
Miller's criteria	9 / 9	1 / 9	p=0.0009
Mortality	2 / 9	4 / 9	NS

Conclusion: although comparable regarding at the severity of ARF, LD and PP differed significantly from each other with respect to duration of fever, temperature, creatine kinase and SGPT levels, and Miller's criteria (Ann Intern Med 1979;90:526). Those data could help towards the empiric antibiotic therapy.

EFFICACY OF BRONCNIAL ASTHMA TREATMENT BY SPELEOTHERAPY AND ARTIFICIAL SPRAY THERAPY

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A survey of literature sources proves that traditional, i.e. medicinal medication and physiotherapeutic methods of treatment often prove to be insufficiently effective both currently and in the remote future. The goal of this study was to investigate the efficacy of treatment of bronchial asthma patients by means of speleo- and artificial spray therapy. Speleotherapy treatment was conducted in the conditions of microclimate of salt mine in Solotvino hospital. Artificial spray therapy was conducted by means of a self-made device. Our method is based on the principle of using the major factor of speleotherapy - highly dispersed spray of sodium chloride. The obtained results were analyzed in five gradations.

At the end of the speleotherapy improvement and considerable improvement was observed in 75,0% of patients; inconsiderable improvement - in 15,9% of patients. Having evaluated the effectiveness of treatment using artificial spray therapy the indices are 68,7% and 20,5% respectively.

Remote results of treatment are an important index of treatment, the result of which were studied by means of a questionnaire-method. Patients who had been treated by speleotherapy more frequently reported a relapse in disease just after the course of treatment (29,3%). However, in a later phase the remission would last longer (from 6 months in 84,5% of patients, till one year in 69,9%).

In 12,5% of patients who passed the course of artificial spray therapy a relapse was registered immediately after the course of treatment. Then their condition stabilized while in 73,5% of patients a period of remission lasted for half a year. 42,9% of patients didn't report a relapse of the disease during one year.

THE LOAD OF THE INSPIRATORY MUSCLES IN PATIENTS DURING ACUTE RESPIRATORY FAILURE AND RECOVERY

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Methods: 19 mechanically ventilated patients (5 COPD, 6 ARDS, 8 other pulmonary diseases) were studied in two phases: 1) During the acute phase of respiratory failure; 2) During recovery 5-73 days later.
We measured MIP and monitored the pattern of breathing while the patients were breathing spontaneously through the respirator (pressure support mode with 3-8 cmH_2O) until either the point they were unable to sustain spontaneous breathing (SB) any longer (phase 1) or for two hours when they could sustain SB indefinitely (phase 2). Subsequently the patients were sedated, paralyzed and mechanically ventilated. Then we simulated the pattern of SB at the end of the SB trial by manipulating the variables of the ventilator and assessed respiratory mechanics by the end-inspiratory and end-expiratory occlusion technique.

Results: Compared with the acute phase during recovery the frequency of breathing was reduced from 37± 2 (x+SE) to 28±1 ($p<0.001$), T_I/T_T from 0.38±0.02 to 0.34±0.02 ($p<0.01$), PEEPi from 6.1±0.6 to 3.7±0.7 cmH_2O ($p<0.001$), dynamic hyperinflation from 0.32±0.04 lit to 0.20±0.04 ($p<0.01$), Ppeak from 27.3±1.3 to 22.4±1.4 cmH_2O ($p<0.05$). The ratio $P_I/P_{I,max}$ decreased from 0.45±0.03 to 0.32±0.03 ($p<0.001$). Pressure-time index (PTI) diminished from 0.16±0.01 to 0.11±0.01 ($p<0.001$). MIP increased from 44±4 to 53±4 cmH_2O ($p<0.01$). Static work due to $PEEP_I$ (W_{PEEPi},rs, $cmH_2O \cdot l$) decreased from 2.35±0.25 to 1.65±0.32 ($p<0.05$) and total Power (W_i,rs,$cmH_2O \cdot l \cdot min^{-1}$) from 317±39 to 209±22 ($p<0.05$). The other variables (V_T, V, T_I, Cst, Rrs) did not change significantly.

Conclusion:

1. During recovery, a combination of reduced inspiratory load and increased ventilatory capability makes a patient previously unable to sustain SB to breathe spontaneously.

2. Inspiratory load is reduced during recovery, mainly because both intrinsic PEEP and breathing frequency are diminished.

HIGH LEVELS OF LEUKEMIA INHIBITORY FACTOR IN ARDS.

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Objectives: Although elevated concentrations of a few cytokines have been shown to be present in the bronchoalveolar lavage (BAL) fluid (BALF) of patients with the adult (acute) respiratory distress syndrome (ARDS), the pathogenesis of ARDS is largely unknown. Leukemia inhibitory factor (LIF), a growth factor recently recognised as a polyfunctional cytokine integrated in cytokine networks was measured in unconcentrated BALF of patients from different patient groups.
Methods: LIF was measured in BALF by means of a specific and sensitive ELISA (detection limit 10 pg/ml)in BALF (lavage of 3 x 50 ml in the right middle lobe).
Results: LIF was not detected in the BALF of 13 healthy control patients and in only one (34 pg/ml) out of 26 patients at risk for ARDS (after cadiopulmonary bypass surgery) who underwent BAL 4 h after the end of the extracorporeal circulation. High and detectable levels were found in the unconcentrated BALF of 10 out of 12 patients with full-blown ARDS (196 + 80, mean + SEM, range 10-985 pg/ml). There was a good correlation between the level of LIF in the BALF and a number of markers of inflammation: neutrophils/ml (R:0.70, P= 0.01), albumin (R:0.75, P=0.008) and protein level (R:0.74, P=0.006).
Conclusions:The biological role of LIF in these BALFs is not readily explained by its currently known actions and it is unkwon whether LIF contributes to or is a response to local tissue damage. Our results indicate that this cytokine with Lots of Interesting Functions is a part of the inflammatory cytokine cascade in ARDS.

4. Nutrition and Metabolism

EFFECT OF CISAPRIDE ON GASTRIC EMPTYING IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

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Background and Objective : We recently demonstrated that cisapride - a new prokinetic drug - enhanced enteral feeding in a heterogenous group of ventilated ICU patients by significantly accelerating their gastric clearance (Crit Care Med, 1995 ; 23 : 481-485). It remains unknown, however, whether certain subgroups of patients might benefit more from adding cisapride to their enteral nutrition regimen than others. Patients with chronic obstructive pulmonary disease (COPD) might represent such a subgroup since their illness and its specific treatment put them at risk for gastric emptying disorders.
Design and setting : Prospective, consecutive sample study in an adult medical intensive care unit in a university hospital.
Patients : 10 mechanically ventilated and hemodynamically stable COPD patients.
Interventions : Gastric emptying was evaluated by bedside scintigraphy and expressed as the time at which 50% of a Tc^{99m}-labelled test meal was eliminated from the stomach (T 1/2). Baseline data (d0) were recorded after enteral nutrition reached 1500 to 2000 ml daily. Scintigraphic measurements were repeated 4 days after cisapride (10 ml orally, q.i.d) had been added to this regimen (d4). Patients were considered cisapride responders when gastric clearance improved by more than 50% from baseline.
Results : Normal values for the test meal and for scintigraphic acquisitions obtained in the supine position were found to be 31 ± 15 min. in healthy volunteers (Crit Care Med, 1995 ; 23 : 481-485). Five patients responded to cisapride (T 1/2 : 81 ± 31 min vs. 26 ± 10 min at d0 and d4, respectively) and five did not (T 1/2 : 36 ± 18 min vs. 33 ± 11 min at d0 and d4, respectively). In contrast with non-responders, all five responders had clinically significant maldigestion at baseline (excessive (> 150 ml) gastric residues, vomiting (> 3 times/day and abdominal distension) which disappeared in 4 of them after the administration of cisapride.
Conclusion : COPD patients who tolerate enteral nutrition well have basal gastric emptying times which are comparable with those of healthy volunteers and are not influenced by cisapride. However, cisapride treatment provides both scintigraphic and clinical improvement in those COPD patients who exhibit clinically obvious gastric emptying disorders.

EFFECT OF EARLY ENTERAL NUTRITION IN TRAUMA PATIENTS ON INCIDENCE OF MULTIPLE ORGAN FAILURE: PRELIMINARY RESULTS

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Objective: The aim of the study was to evaluate the effect of early enteral nutrition started within 24 hours of injury on the incidence of multiple organ failure (MOF) in trauma patients requiring ventilatory support.
Methods: After institutional approval 25 patients were enrolled in the study. Enteral feeding was begun within 24 hours of injury in 14 trauma patients (EN group) admitted to ICU. Nasoenteric tube was placed as soon as possible after admission into the distal duodenum under endoscopy. Additional parenteral nutrition was used to meet patients energy and protein requirements. The control group (PN) consisted of 11 patients fed during this period parenterally. Severity score Apache II, Trauma score, cumulative balance of nitrogen (g), incidence of MOF (three and more organs) and length of ventilatory support (days) were calculated. Values are expressed as mean ± SD.
Results:

Tab.1: Incidence of multiple organ failure

	EN group	PN group
MOF	1(7%)	5(45%)
Ventilatory support	8.1±1.2	14± 4

Tab.2: Cumulative balance of nitrogen (g)

Days	1.	2.	3.	4.	5.	7.	10.
EN group	0	-3	2	10	9	-3	-19
PN group	-9	-13	-20	-25	-36	-65	-99

Conclusion: Enteral nutrition begun within 24 hours of injury seems to be an important factor affecting incidence of MOF in critically ill trauma patients and may positively affect the lenght of ventilatory support.

MALNUTRITION: INCIDENCE AND RISK IN ICU.

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Hypothesis: Malnutrition in critically ill medical patients is related to socio-economic factors of age, race, and insurance status, in addition to diagnosis and severity of illness.
Methods: Nutritional status in 59 patients (men=31, women=28), was assessed retrospectively by serum ablumin and lymphocyte counts. These data were correlated to age, sex, insurance status, diagnosis, and admission Apache II scores.
Sample: Fifty-nine consecutive adult medical patients admitted to a 10 bed critical-care unit at a university teaching hospital over a 30 day period.
Statistics: Malnourshed subjects n(%)

Normal	Mild	Moderate	Severe
5 (8%)	6 (10%)	15 (25%)	34 (57%)

Correlations (1 tailed) to Nutrition Score

	Age	Sex	Race	Ins.	Dx	APII
r^2	.27	.14	-.11	.35	.57	.37
p	.017	.491	.210	.003	.001	.002

Ins. =Insurance Dx=Diagnosis APII=Apache II
Conclusions: Ninety-two % of the critically ill patient exhibited some degree of protein-calorie malnutrition on admission to the ICU. Nutrition status correlated with age, insurance status, diagnosis, and Apache II score.

EFFECTS OF THYMIC HORMONES AND HIGH CALORIES DIET ON NECROLYSIS TOXIC EPIDERMAL SYNDROME OUTCOME

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Objectives: Evaluate effects of high calories diet and treatment with immunostimulator Thymalinum on survival of patients with severe necrolysis toxic epidermal syndrome (NTES).
Methods: Two groups of patients were subjected to randomized follow up study. We compared two groups of patients with NTES. The first group (7 patients) received widespread treatment with corticosteroids (prednisolon 120-90 mg i/v per day), antibiotics and topical desinfectant solutions, the second group (6 patients) were treated additionally with high caloric diet 35-40 kcal/kg/24 h and Thymalinum 10 mg (Thymic hormones) daily.
Results: 3 patients died in the first group - mortality rate 42,9 %. Only 1 patient died in the second group - mortality rate 16,7 %.
Conclusions: Immunological status is very important in treatment of patient with NTES. However it's possible that thymic hormones may improve survival of such patients.

PARENTERAL NUTRITION WITH A NEW PROTEIN-LIPID NUTRITIVE MIXTURE. A BI-CENTER STUDY IN PATIENTS ON GASTROENTEROLOGY OR INTENSIVE CARE.

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Introduction : Parenteral nutrition (PN) is an important aspect in the optimal treatment of patients on gastroenterology or intensive care.

The aim of this bi-center study in 38 patients has been to assess tolerance and efficacy of a new protein-lipid mixture for PN from a simple preparation.

Patients and methods : Patients were selected in two hospitals (Tenon and Saint-Lazare, Paris) and were divided into two groups : group A (Gastroenterology, 11 short bowel syndrome) and group B (Intensive Care, 27 surgical patients). All patients likely to require PN for a period of 10 days (group A) or 7 days (group B) were studied. The PN regimens administered were the following : combination with 50 g of MCT/LCT fat emulsion and 9,6 g of nitrogen, in 1 liter and glucose requirements were met by infusion of 1 liter of glucose 20-30 % via a " Y " connection. Lipid thus provided 30-40 % of the non nitrogen calories. Total daily calorie intake was 1540 to 1940 kcal. This study monitored, before and at the end of infusions, the serum Albumin (Alb), preAlbumin (preAlb), triglycerides (TG), cholesterol (CS), and the serum aminotransferases (SGOT and SGPT) and alkaline phosphatase (ALP) activities. Statistical significances were calculated using the Wilcoxon-test.

Results (mean SD)		CENTRE A (n = 11)		CENTRE B (n = 27)	
		Day 0	Day 10	Day 0	Day 7
Alb	(g/l)	30,5 ± 10,2	33,1 ± 7	21,4 ± 5,6	22,3 ± 5,1
PréAlb	(mg/l)	213 ± 125	231 ± 92	97,9 ± 66,6	113,2 ± 57,5
TG	(mmol/l)	1,7 ± 0,9	1,9 ± 0,9	1,7 ± 1,1	1,8 ± 0,9
CS	(mmol/l)	3,9 ± 1,37	4,3 ± 1,4	2,7 ± 1,2	2,9 ± 1,1
SGOT	(UI/l)	33 ± 37	33 ± 23	55 ± 38	58 ± 49
SGPT	(UI/l)	32 ± 21	38 ± 20	56 ± 40	52 ± 40
ALP	(UI/l)	76 ± 32	106 ± 64	125 ± 133	180 ± 153

Both groups had serum Alb (+ 8,5 % gp A and + 4,2 % gp B) and preAlb gains (+ 8,5 % gp A and + 15,6 % gp B). These tend to be used as indices of nutritional status. ALP activities sligthly increased in group A (2/11) and in group B (6/27). On the other hand, mean concentrations of TG, CS and serum SGOT-SGPT activities showed no change during the trial.

Conclusions : We conclude that this new protein-lipid nutritive mixture, administered in conjunction with glucose (20 or 30 %) is well tolerated and safe for use in parenteral nutrition.

Validation of stress state of ICU patients by clinical assessment.

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Introduction: Many ICU patients present a catabolic illness in response to inflammation and infection, characterized by a rapid loss in skeletal-muscle mass despite optimal nutritional support. Growth hormone (GH) is responsible for a rise of lipolysis, enhancing the energetic balance, and of protein synthesis. Recombinant human GH (rhGH) is nowaday available for clinical use, but its cost is very high. Therefore, rhGH should only be prescribed to ICU patients when its efficacy can reasonably be anticipated (ie. when the patients are catabolic or stressed, but in order to avoid overprescription for unstressed patients and for those who are overly catabolic). Hence, we, as others, recently demonstrated that rhGH had no favorable effect in highly stressed ICU patients.

Objective: To detect on a clinical basis, low (LS), mild (MS) and severe stress (SS) states in ICU patients and validate this clinical judgement by objective metabolic mesurements, in order to select early those ICU patients potentially able to benefit from rhGH therapy.

Methods: 36 consecutive ICU patients were prospectively stratified as LS, MS and SS by two experienced ICU senior consultants (temperature; agitation; heart rate; arterial blood pressure; presence of an infection; respiratory rate; exogenous catecholamines). Anabolic (insulin, IGF-1, GH) and catabolic (cortisol, glucagon) hormones, and nitrogen balance were determined for each patient within 8 hours after admission in the ICU. Metabolic and clinical data were then compared.

Results: Clinical stress state correlates well with biological parameters:

		LS	MS	SS	p value
Insulin	(pmol/l)	40.9 ± 6.4	59.3 ± 9.9	80.3 ± 28.3	NS
IGF-1	(µg/l)	79.7 ± 6.7	67.4 ± 5.4	58.1 ± 8.7	NS
GH	(ng/dl)	1.59 ± 0.49	1.44 ± 0.38	3.14 ± 0.77	NS
Cortisol	(nmol/l)	530 ± 55	755 ± 70	878 ± 109	0.013
Glucagon	(pg/ml)	123 ± 40	163 ± 27	319 ± 64	0.009
Index Ana/Cata		0.24 ± 0.03	0.16 ± 0.02	0.14 ± 0.03	0.014
Nitrogen balance	(g/d)	-4.2 ± 1.2	-10.6 ± 1.6	-8.1 ± 2.2	0.037

(Means ± SE); Index Ana/Cata= anabolic hormones/catabolic hormones.
Statistics: Anova ; Nitrogen balance: mean on 3 consecutive days.

Conclusion: The clinical stress states determined by ICU physicians correlate with an objective metabolic assessment. Therefore, the patients who will more likely benefit from adjuvant rhGH therapy can be detected simply and early. A prospective study on rhGH therapy in MS ICU patients is in progress.

GASTROINTESTINAL FUNCTION AFTER CARDIAC SURGERY.

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Objective. Nutrition of the compromised cardiac surgical patient is challenging. Numerous factors influence the gastrointestinal (GI) absorption function, among which gut perfusion, which depends largely on the systemic hemodynamic status. Patients in hemodynamic failure are prone to organ failure, and may benefit from an early jejunal feeding. The study was designed to assess the absorption function after cardiac surgery in patients with adequate and altered hemodynamic status, using paracetamol as tracer of GI absorption.

Methods. After cardiac surgery, 24 patients, aged 63±8 years (mean±SD) were assigned to 2 groups (anaesthesia: fentanyl 20 µg/kg + midazolam): Group 1 (n=10): reference group, with normal hemodynamic status, easy recovery. Group 2 (n=14): patients in low output syndrome, cardiac index < 2.5 l/m2 on day 1 (D1) after surgery, requiring prolonged intensive care, mechanical ventilation + nutritional support. Paracetamol 1 g, was given intragastrically on D1 + D3: plasma levels measured (H.P.L.C), at administration (T0), T30-60-90-120-180-240 and 480 min. Hemodynamic status assessed with pulmonary artery catheter. 5 healthy subjects served as controls.

Results. Compared to healthy controls, absorption was strongly reduced on D1 in all patients (no difference between groups). On D3, peak paracetamol level was significantly lower in Group 2 (low cardiac output): in Group 2 the area under the curve on D1 and D3 were similar. There was a large inter-patient variability, reflecting the hemodynamic status.

Conclusion. GI absorption was decreased on D1 in all patients, and reverted to normal between D2 and D3 in case of normal cardiac function, but not in case of low output syndrome. The decrease on D1 can be attributed to fentanyl, known to slow down the GI transit. In patients with cardiac failure, correction of altered absorption was correlated with the hemodynamic status, suggesting that GI absorption is dependent on adequate splanchnic perfusion.

THE EFFECT OF ENTERAL NUTRITION IN INTENSIVE THERAPY OF THE PATIENTS WITH PERITONITIS

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The aim of the work was to define specific significance and evaluate efficiency of enteral component of infusion therapy in the intensive care of gastroenterologic patients of surgical profile with pyo-septic complecations. There were used the methods of radial diagnostics and polyelectrography; the laboratory control on oxygen-transporting function, volumetric and hemodynamic state, changes in metabolic, hormonal and immunologic status was conducted. From January, 1992 till November, 1994 there was carried out the randomized study of 155 patients with general purulent peritonitis; among them 70 persons constituted the control group and 85 - the main one. In the main group the intestinal lavage, enterosorption, enteral introduction of nutrient solutions with gradual turn to enteral nutrition by equalized mixture "Ovolact" were started from the first hours after operation. The data obtained allowed to define the specifity of the program of artificial medical nutrition in the group of examined patients, based on necessity of individual selection of media for enteral introduction depending on the stages of intestinal insufficiency syndrome. It was shown that inclusion of enteral component into the program of infusion therapy during early periods stabilized circulation in the regime of moderate hyperdynamia, considerably decreases the deficiency of circulating blood volume, normalizes the values of oxygen transport, consumption and extraction, provides the optimal level of mycardial adaptive possibilities without tension of its compensatory functions and pulmonary circulation overload. Due to combined application of parenteral and enteral nutrition the metabolic processes are shifted towards anabolism. This is supported by decrease to normal values in the contents of blood aggresive hormones (ACTH,hydrocortisone) and increase in somatotrophic hormone. The complete parenteral-and-enteral nutrition influences positively on restoration of cellular and humoral immunity, activates the factors of organism nonspecific protection and recovery from immunodepression, prevents the development of immunodeficiency.

A LARGE PROSPECTIVE RANDOMISED PLACEBO CONTROLLED TRIAL OF AN IMMUNONUTRIENT FEED IN A SINGLE CENTRE INTENSIVE CARE UNIT: IMPACT™ VS CONTROL.

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Objectives: Comparison of the effect of an immunonutrient enteral feed versus a control on the outcome of a mixed intensive care unit (ICU) population.
Methods: Admissions to this multidisciplinary adult ICU thought likely to stay more than three days and with tube access to the GI tract were randomised to receive either Impact™, a feed with supplemental arginine, dietary nucleotides and omega-3 fatty acids, or an isocaloric and isonitrogenous control feed. Study end points included mortality and ICU stay. Approval was obtained from the hospital ethics committee.
Results: 390 patients were entered into the trial. The two groups were well matched for age, sex, and admission APACHE II with an overall mean admission risk of death of 30.8 (std. dev. ± 22.9). On an intention to treat basis, there was a no significant difference in ICU mortality, ICU stay or standardised mortality ratio (S.M.R.) between the two groups (see table). Similarly, there were no differences after stratification for patients receiving 5 or more litres of feed.

	ICU mortality	ICU stay (median, range)	S.M.R.
Impact™	80/197 (40.6%)	7 (1-104)	1.49
Control	74/193 (38.3%)	8 (1-283)	1.50

Conclusion: There is no evidence of an effect of Impact®, an enteral immunonutrient feed, on pre-determined end-points (ICU mortality, ICU stay or standardised mortality ratio) in a mixed intensive care unit population over that of an isocaloric, isonitrogenous control feed.

BLOOD LACTATE LEVELS AFTER BEGINNING OF CONTINUOUS VENO-VENOUS HAEMODIAFILTRATION (CVVHD) TREATMENT

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Objectives: Evaluate changes of blood lactate levels according to patient medical status after CVVHD initiation using dialysate solution containing lactate.
Methods: Review of medical records of 20 consecutive patients treated by CVVHD (dialysate solution Hemosol LG2, Hospal,UK, lactate concentration 40 mmol/l). Data obtained 1 hr before and 4 - 6 hrs after CVVHD initiation were analysed.
Results: All data are presented as mean ± SEM. In one patient, pre and post filter lactate levels were measured during standard CVVHD setting (blood flow 100ml/min, dialysate solution flow 1 l/hr), and approximate daily lactate flux into the patient was calculated to be as high as 920 mmol/d.
Lactate levels measured after CVVHD initiation increased significantly compared to baseline levels (3.80+0.67 and 2.88±0.68,respectively; p<0.01,paired T-test). When patients with increased basal lactate (n=7) were compared to patients with normal basal values (n=13), no difference in lactate increase was found (p=0.22, MANOVA).
Patients with severe liver dysfunction (2 points in MOF scoring, n=9) had higher basal lactate levels than patients with normal or slightly abnormal liver tests (0 or 1 point in MOF scoring, n=11), the values being 4.04 ± 1.17 and 1.84 ± 0.23, respectively (p<0.05, Student T-test). Increase in blood lactate did not differ between these two groups after CVVHD was started (p=0.86, MANOVA).
In 11 patients with invasive hemodynamic monitoring, no correlation between changes in lactate levels and either changes in oxygen delivery (r2=0.01; p=0.81) or oxygen consumption (reversed Fick) (r2=0.07;p=0.66) were found after CVVHD initiation.
Conclusion: Blood lactate increases on CVVHD with dialysate solution rich in lactate. This increase is predominantly caused by influx of lactate into the blood via the filter and does not seem to depend on the liver function and/or oxygen metabolism changes.

Parenteral nutrition in trauma patients: effect on plasma proteins of two stress adapted aminoacids solutions

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Objectives: The study was designed in order to determine the effect on plasmatic proteins, of two types of aminoacids solutions of parenteral nutrition (PN) adapted to stress, having different concentration of branched chain aminoacids (BCAA), when applying to politraumatized critical patients.

Methods: A prospective study was performed using a randomized double blind design of 20 polytraumatized patients, split in two groups of ten patients each, with mean ages of 35 ± 17 an 45 ± 20 years.

Due to their condition, all patients required P.N. for at least 9 days. Both groups were subjected to isocaloric and isonitrogenous solutions (45 cl/kg/day and 0.24 g of Nitrogen/Kg/day), varying only in the concentration of BCAA; solution A having a 10 % concentration and solution B 23 %. Blood samples determinations during days 0, 3, 6, 9 after the beginning of treatment with P.N. were total proteins., Albumin, Trandferrine, Protein binding retinol; Prealbumine and Fibronectine.

The anova test (One and two way) was used to compare the values between the two groups.

Results: The administration of solution A, showed statistically significant increases in the determinations of the values of Protein binding retinol ($p < 0.05$) and prealbumin ($p < 0.05$). No significant increases were observed in the values of Total Protein, Albumin, Transferrine and Fibronectin.

Solution B produced statistically significant increases only in the values of total proteins ($p < 0.05$). The remaining proteins did not changed from their control values during the whole period of PN administration. Comparing both groups, no statistically significant differences were observed related to the type of diet. Nevertheless, differences were found in total proteins, albumin, protein binding retinol, fibronectin ($p < 0.05$) and prealbumin ($p < 0.005$) in relation to the time course of PN therapy. Only the albumin values showed significant differences ($p < 0.01$) when considering the interaction of both the type of diet and the time course of PN.

Conclusions: 1. Solutions of PN adapted to stress, can maintain the control values of slow turnover proteins and improve the values of rapid turnover proteins. 2. No significant differences on plasma proteins were found between the two solutions having 10 % or 23 % concentration of branched chain aminoacids. 3. Determination of rapid turnover proteins does not seems useful for discriminating different solutions of BCAA during PN.

CHANGES OF PANCREAS AND LIVER ASSOCIATED ENZYMES DURING TOTAL PARENTERAL NUTRITION WITH GLUCOSE AND XYLITOL

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Objectives: The hormonal changes in the post-traumatic situation often leads to an elevated blood glucose and a negative nitrogen balance. To reduce the elevated glucose production by aminoacids the application of xylitol may be an alternative energy source. In a double-blind randomized study we investigated the effects of a xylitol/glucose solution (group A: aminoacids 50 g/l; glucose/xylitol 80 g/40 g/l) on metabolism and particularly on pancreatic and liver enzymes compared to a glucose based nutrition solution regimen (group B: aminoacids 50 g/l; glucose 120 g/l).
Methods: The clinical trial was carried out after the approval by the local ethical committee on 31 patients with severe brain injury. There was no difference in Body Mass Index BMI (group A: 25.9 +/- 2.7 kg/m² and group B: 25.1 +/- 2.4 kg/m²), age, and sex. Daily individual energy expenditure was measured by indirect calorimetry (Deltatrac ™). Nutrition was started 24 - 48 hours after trauma or surgery with carbohydrates and aminoacids. Fat was added 24 h after nutrition had started. To analyze the effects on pancreatic and liver enzymes we investigated the following parameters for 4 days: blood glucose, serum lipase, serum amylase, ASAT, ALAT, γGT, AP, and serum cholinesterase (CHE).
Results: Due to the daily indirect calorimetric measurements energy requirements were satisfied. There was no difference in blood glucose concentration and cumulative nitrogen balance between the two groups. Neither were there any significant changes in ASAT, ALAT, AP, and CHE for 4 days in both groups. Serum lipase steadily rose to 202 IU/l in group A and 320.2 IU/l in group B, respectively.
Conclusions: There was no measurable influence of either nutrition solution on liver enzymes. The xylitol/glucose nutrition regimen does not have any advantage over the glucose based nutrition solution concerning blood glucose level or nitrogen balance. The elevation of serum lipase to a 2-fold level in either group needs further investigation on trauma patients.

SHORT HALF-LIFE PROTEINS AND CHOLESTEROL IN SEPTIC PATIENTS: INFLAMMATORY OR NUTRITIONAL MARKERS?

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Objective: To assess the influence of illness severity, degree of stress and inflammation on albumin, prealbumin, transferrin, retinol binding protein (RBP) and cholesterol plasma levels in septic patients.
Patients and methods: A prospective study was carried out during 48 months in septic patients on TPN (1.4 gr of aminoacids /Kg/d+ 35 Kcal /Kg/d). First nine days of therapy were evaluated.On first day and every third day APACHE II, oxygen consumption (VO_2)(Fick method), nitrogen balance, albumin, prealbumin, RBP, transferrin, cholesterol and protein C reactive were determined. Statistics: Student T test and linear regression.
Results: 171 patients (113 ♂ and 58 ♀). Age 52±16, APACHE II at admittance 17±6, reevaluated at 9th day 11±9 ($p<0.001$). Transferrin raised from 136±31 to 168±56 mg/dl ($p<0.001$); prealbumin from 9.7±4.7 to 16.6±8.7 mg/dl ($p<0.001$); RBP from 2.2+1.4 to 4.3± 2.7mg/dl ($p<0.001$); albumin 2.56±0.63 to 2.91±0.56 g/dl($p<0.001$); cholesterol from 104±38 to 136±44 mg/dl ($p<0.001$). N_2 balance ranged from -16.5±6.3 to -1.2±2.3 g/d ($p<0.001$). VO_2 fell from 268±88 to 231±78 ml/mn($p<0.01$) and C-reactive protein (PCR) from 217±70 to 137±78 mg/l ($p<0.05$).
N_2 balance significantly correlates with the other parameters. VO_2 correlated with cholesterol levels but not with protein values. PCR was significantly correlated with every other variable. APACHE II was correlated with albumin, prealbumin and transferrin.
Conclusions: Albumin, prealbumin and transferrin values are influenced by patient's APACHE II and inflammation. Cholesterol levels depend chiefly on degree of agression and underlying inflammation. RBP is only influenced by nutritional support or other undetermined factors.

FAT EMULSIONS EFFECT IN ACUTE RESPIRATORY DISTRESS SYNDROME.

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The effects of fat emulsions in lung function, particularly in lung-damaged patients, have been attributed to alterations in pulmonary vascular tone caused by eicosanoid production modifications. As the eicosanoid production may depend on the fatty acid profiles of the intravenous fat emulsion, haemodynamic, pulmonary gas exchange and plasma levels of prostanoids were investigated in Acute Respiratory Distress Syndrome (ARDS) patients, during different intravenous lipid emulsions (providing different prostanoid precursors).

We studied in a randomized double-blind design 3 groups (n=7 each) with ARDS. Group I (LCT) received a fat emulsion with long chain triglycerids (LCT-20%), Group II (MCT) an emulsion containing a mixture of medium and long chain triglycerids (MCT/LCT 50/50-20%) and Group III placebo (control), during 12 h (2 mg/Kg/min each). We measured before, at the end of 12 h infusion, and 12 h after the end of the infusion: lipaemia, arterial and venous blood gases, pulmonary and systemic haemodynamics, and plasmatic levels (arterial and in mixed venous sample) of eicosanoids (TXB_2, 6-keto PGF_{1a}, and LTB_4).

At the end of the fat emulsion, groups (I and II) studied with LCT and MCT increased the lipaemia ($p<0,05$), returning to normal levels 12 hours after: triglycerids (LCT: from 239±105 to 390±111 to 228±76 mg/dl; and MCT: from 152±78 to 485±333 to 225±143 mg/dl); free fatty acids (LCT: from 0,41±0,15 to 0,78±0,64 to 0,45±0,11 mmol/l; and MCT: from 0,42±0,21 to 1,10±0,56 to 0,51±0,36 mmol/l). The PaO_2/FiO_2 remained unchanged in the three groups; no changes in intrapulmonary shunt (Qs/Qt) were shown; neither in the mean pulmonary artery pressure. In contrast, only in the LCT group: cardiac output and oxygen consumption increased significantly (12.5% and 19%) ($p<0.05$). Eicosanoids were increased at baseline compared to reference values ($p<0,05$). A decrease ($p<0,05$) in the arterio-venous difference of the vasodilatador prostanoid (6-keto PGF_{1a}) was shown in LCT group.

Our results indicate that fat emulsions in ARDS patient do not influence pulmonary gas exchange, provided that the perfusion rate were keept at 2 mg/Kg/min.

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EFFECTS OF CARBOHYDRATE-BASED VERSUS FAT-BASED DIETS IN CHRONIC OBSTRUCTIVE LUNG DISEASE.

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The present study was designed to evaluate the metabolic changes of a carbohydrate-based diet versus a fat-based diet on oxidation rate of substrates and energy muscle metabolism in patients with an acute exacerbation of chronic obstructive lung disease. Patients were mechanically ventilated with a volume-cycled respirator. After an overnight fast, patients were randomnly treated with a continuous enteral feeding over a nasogastric tube with a carbohydrate/fat ratio of 2/1 in Group I (n=6), and a carbohydrate/fat ratio of 1/2 in Group II (n=6) during 8 consecutive days. Indirect calorimetry was set at baseline and 24 hours later the enteral feeding was started. Muscular quadriceps biopsy was performed on baseline and on day 8 of enteral feeding. Urine was collected during 24 hours and was used to measure 24h urea nitrogen production. The caloric intake was set according to the measured resting energy expenditure. Respiratory gas exchange rate were measured using a computerized open-circuit indirect calorimeter. Quadriceps femoral muscle samples were obtained by muscular biopsy after local anesthesia. Analyses of glycogen, glucose 6-phosphate, lactate, phosphocreatine and adenosine triphosphate (ATP) and enzymes (glycogen synthase and glycogen phosphorylase) were determined.
After 24 h of nutrition patients in Group I showed an increase in carbohydrate oxidation (from 17.8% to 55.4%, p=0.06), and in Group II a decrease in protein oxidation (from 27% to 21%, p=0.03).
After 8 days of enteral feeding a tendency to increase in glycogen concentration (Group I,p=0.06; and Group II,p=0.1) was observed. While patients in Group I showed a tendency (p=0.06) to decrease glycogen phosphorylase, patients in Group II maintained these enzymatic levels. The increased in glycogen was correlated in Group II with degradation enzyme (p=0.01). In Group I, the PaO_2/FiO_2 ratio increased after 8 days of treatment (from 235.9 to 284.5; p=0.03), but no changes in days of mechanically ventilation, length of stay in ICU, or mortality rate was evidenced between groups.
It is concluded that the oxidation rate of substrates used for energy production varies according to the caloric sources administered. With nutritional therapy muscle glycogen concentration increases in both diets, with different enzymatic influence. More studies are warranted to further assess the clinical implications of the different pathophysiologic behavior of the two diets.

GASTROINTESTINAL MUCOSAL PERMEABILITY IN CRITICALLY ILL PATIENTS.

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The gastrointestinal (GI) mucosa usually operates as a barrier limiting the systemic absorption of luminal microbes and microbial products. Under certain experimental and human conditions (radiation and/or thermal injury) the GI mucosa is unable to perform this protective function and could play an important role in the pathophysiology of the syndrome of multiple organ failure (SMOF).
The objective of the present multicenter study was to know the GI mucosal permeability in critically ill patients and the relationship with their outcome.
The method used to assess the integrity of the GI mucosal barrier measured mucosal permeability to various hydrophilic compounds. Specifically, we measured the urinary excretion ratio (UER) of two sugars (lactulose and mannitol) that had been previously administered through a nasogastric tube. Urinary excretion rate was measured in 10 healthy humans (control) and in 30 patients admitted to the Intensive Care Unit (ICU) at days 1, 3 and 5.
The APACHE II of the patients studied was 15±4. There was an increase of UER in the critically ill patients compared with controls (0.26±0.1 vs 0.036±0.01) ($p<0.001$). In contrast, no changes in UER between days 1, 3 and 5 were observed (0.26±0.1; 0.25±0.2; and, 0.22±0.2) and no correlation was shown between UER and secondary infection, development of SMOF or mortality. Nonseptic patients evidenced an UER ratio lower than the septic ones (0.19±0.1 vs 0.4±0.2) ($p<0.05$).
The present data suggest that GI mucosal permeability was increased in critically ill patients, particularly if sepsis is present. These findings may be of clinical interest for the daily management of patients.

IRON METABOLISM IN ELECTIVE SURGERY : THE ROLE OF ANAESTHESIA.

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Objective: To assess the influence of anaesthesia and blood transfusion on iron, transferrin, ferritin and C-reactive protein (CRP) on patients scheduled for surgery. Patients and methods: A prospective study was carried out during 12 months in surgical patients. Plasma levels were measured prior to surgery and 24 hours later. Hemoglobin, hematocrit, iron, transferrin, ferritin and CRP were determined. Anaesthesia technique and blood transfusion were recorded. Statistics: Student T test , linear regression and Anova significance.
Results: 108 patients (48 ♂ and 60 ♀). Age 62±16 years. Iron levels fell from 60.9±41.5 to 35.1±31.6 mcg/dl (p<0.001); transferrin from 269.4±94.6 to 233.3±88.3 mg/dl (p<0.001);PCR rose from 21.26+38.04 to 73.5±62.7 mg/l (p<0.001); ferritin from 108.9 ±139.6 to 139.2±130.6 ng/ml(p<0.001); hemoglobin from 13.4±1.9 to 11.9±2.1g/dl (p<0.001) and hematocrit ranged from 39.4±6.2 to 35.4 ±6.5 (p<0.001). Significant changes were also established in the different groups: major and minor surgery, general and epidural anaesthesia , transfused and non transfused patients except for iron and ferritin plasma levels which didn't change significantly in patients who had received blood. A positive significant correlation was established between CRP and ferritin (r=0.89) for patients under general anaesthesia, but not on epidural, regardless of the type of surgery.
Conclusions: Iron and transferrin plasma levels fell acutely in surgical patients while ferritin and CRP rose. Transfusion implied an acute iron load.The established correlation between CPR and ferritin in patients on general anaesthesia suggests that ferritin behave as an acute phase reactant in that setting, while epidural anaesthesia may ameliorate the inflammatory response.

EFFECT OF GASTROINTESTINAL COMPLICATIONS RELATED TO THE ENTERAL NUTRITION IN THE ADMINISTERED VOLUME OF DIET . A MULTICENTER STUDY.

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Objectives: To analize the effect of gastrointestinal complicacions (GIC) related to the enteral nutrition (EN) in the real volume of diet administered to ICU adult patients.

Material and methods: A prospective multicenter study was designed (COMGINE STUDY) in wich EN application, GIC definition and his management were defined by collaborative consensus.Patients treated with EN in one month period were included. In each case, daily volume of diet prescribed (PV) and administered (AV) was recorded and the volume ratio calculated (VR=PVx100/AV). Patients were divided for days of EN according to the presence (Group 1) or absence (Group 2) of GIC (abdominal distension, increase of gastric residuals,vomits or regurgitation, diarrhea,constipation and bronchoaspiration). Differences between groups were analized by ANOVA and Mann-Whitney U test with p<0.05 for statistical significance.

Results: A total of 3778 EN days were analized in 400 adult patients treated with EN in 37 Spain ICU. Percentage of patients presenting GIC /day of EN was 14.9±4.7% (x±ds). As a whole, VR was lower for patients in group 1 (G1:63.1±12.2% G2:93.3±2.9%)(x±sd)(p<0.001). Daily analysis showed also significantly lower VR for group 1 in days 1 to16, 20 to 22 and 25. Results are summarized in following table.

Day	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Group1(VR%)	53	61	58	69	67	63	65	72	62	60	64	59	67	74	61
Group2(VR%)	85	90	90	94	94	93	92	90	92	91	92	94	90	92	95

Day	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
Group1(VR%)	62	77	62	55	54	55	60	96	85	75	50	36	73	43	45
Group2(VR%)	94	93	91	94	96	94	94	93	98	99	96	99	93	91	93

Conclusions: 1) ICU patients with no GIC receive adequately their calculated nutrient requirements with EN. 2) Patients with GIC would present a "nutrient deficit". 3) This nutrient deficit would require complementary parenteral support.

APACHE II AND EVOLUTIVE VARIABLES IN PATIENTS WITH ENTERAL NUTRITION. A MULTICENTER STUDY.

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Tolerance to the enteral nutrition (EN) has been related to the severity of illness in ICU patients. The aim of this study was to evaluate this relationship.
Methods. A prospective, multicenter, study was performed (COMGINE STUDY) in wich EN application and related gastrointestinal complications (GIC) were defined by collaborative consensus. Adult ICU patients treated with EN in one month period were included. GIC were classified as: 1) Abdominal distension (ABD), 2) Increase of gastric residuals (IGR), 3) Vomits (VOM), 4) Diet regurgitation (REG), 5) Diarrhea (DIA) and 6) Constipation (CON). Patients were divided in two groups: Group A: patients with GIC during their evolution. Group B: patients without GIC. Differences between groups were analized for APACHE II admission score or evolutive variables (1.ICU days, 2.MOF development and 3.final outcome). Statistical analysis was done by CHI2 t test or ANOVA.
Results. 400 cases (age =56.8±17.9 yrs, APACHE II=18.2±6.3) (x±sd) in 37 Spain ICUs were included. A GIC was present in 56.25% of the patients. Mean APACHE II score was similar in both groups for each GIC analyzed. Total ICU days (x±ds) were superior for patients who developed IRG (A:22.1±16.8 B:17.7±16.8)(p<0.05), DIA (A:28.4±19.4 B:17.6±15.9)(p<0.01) or REG (A:34.8±31.4 B:18.4±15.1)(p<0.01). The presence of MOF was associated with an increased incidence of ABD (24.3% vs 9.5%)(p<0.01), IRG (48.6% vs 33.1%)(p<0.05) and REG (13.5% vs 3.1%)(p<0.05). Also, patients who died presented a superior incidence of ABD (26.9% vs 7.3%)(p<0.001), IRG (56.1% vs 28.7%)(p<0.001) and REG (11.2% vs 3.4%)(p<0.05).
Conclusions. 1. Incidence of GIC is high in ICU patients. 2. Admission APACHE II score do not predicts the EN tolerance after the onset of this treatment. 3. ICU days are superior in patients who develops IRG, DIA or REG. 4. The presence of MOF or the fatal outcome increases the incidence of ABD, IRG or REG.

CARBON DIOXIDE OUTPUT WITH DIFFERENT AMOUNT AND PROPORTIONS OF NUTRITIVE

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Carbon dioxide production is a major determent of work of breathing. Increase in CO_2 production during nutritional support may precipitate ventilatory failure and difficulty in weaning from mechanical ventilation. In the present study, CO_2 output was calculated while passive mechanically ventilated patient were fed with different amount of calories and different proportion of protein, carbohydrate and fat.
Four clinical stable and mechanically ventilated patients were studied. Carbon dioxide was calculated while patients were paralyzed, sedated and mechanically ventilated. Six nutritional regimens were used: a) no calories, b) 100gr glucose/24h, c) calories equal to rest energy expenditure in special formula with low carbohydrates and high fat (pulmocare) d) calories equal to rest energy expenditure in standard formula (nutrison) e) calories double to rest energy expenditure in standard formula (nutrison) and f) calories equal to rest energy expenditure parenteral (TPN). Carbon dioxide output was low while no calories and/or only 100 gr/24h glucose was provided, the mean values of VCO_2 output were 134±25 and 140±26 ml/min respectively. There was no difference in VCO_2 output between with low carbohydrates and high fat regimen and standard regimen, mean values were 161.5±27 and 163±26 respectively.The high calories regimen and TPN resulted in higher VCO_2 output, mean values 184±25 and 211±55 respectively.
We conclude that the special with low carbohydrates and high fat regimen did not reduce VCO_2 output, in the contrary, high calories intake as well as TPN increased VCO_2 output under tested conditions.

A NEW PREDICTIVE FACTOR FOR RHABDOMYOLYSIS-INDUCED SEVERE ACUTE RENAL FAILURE: CREATININE INDEX.

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Predictive factors for rhabdomyolysis (RH) -induced acute renal failure (ARF) were studied in a retrospective study from January 92 to January 95. 33 patients (pts) (male:23, female:10; mean age: 57±4 y.o.) were admitted with RH defined as CPK>1000 IU/l. Etiologies were: traumatic and ischaemic 24, infectious 4, toxic 4, excess activity 1. Factors studied were: simplified acute physiologic score (SAPS: 10.3±1.1), Organ Systemic Failure (OSF: 1.02±0.2), diagnosis delay (D: 33±5h), clinical parameters (sepsis, dehydration), blood chemistry data (CPK, BUN, creatinine, potassium, phosphorus, calcium, proteins, hematocrit) and urinary pH. Severity of RH was estimated by Ward Score determined according to phosphorus, albumin, potassium, CPK, dehydration and sepsis. Urea appearance rate (UAR) and creatinine index (CI*) were determined over a 24 hours period. ARF was observed in 25 pts. In non-ARF and ARF groups respectively, SAPS (5.5±0.5 vs 11.8±1.3), deshydratation (0 vs 11), sepsis (0 vs 12), phosphorus (1.03±0.16 vs 2.21±0.21), calcium (2.1±0.07 vs 1.8±0.07), Ward score (4±0.65 vs 11.8±0.8) were significantly different. However, no significance was observed in UAR (310±89 vs 210±35) and CI (26±7 vs 34±3). 16 patients required hemodialysis (HD) (8±2 sessions) and 9 remained dialysis free. Only OSF (1.1±0.1 vs 1.9±0.23), Ward score (9.2±0.95 vs 13.25±0.92) and CI (29±3 vs 41±3) appeared significantly higher in pts requiring HD. 5 pts died from associated disease. All patients suffering from ARF recovered a normal renal function.

We confirmed that an elevated Ward score (over 7) is a good predictive index of ARF. In addition we found that CI is a severity factor for ARF requiring HD. Thus, patients suffering for RH with elevated Ward Score and CI, have a fair chance of dialysis and should be treated more intensively.

* CI (expressed in mg/kg) = (CAR + Feces Creatinine) / Weight. Where CAR: creatinine appearence rate; Feces creat. = mean plasmatic creatinine x 0.043.

EFFECTS OF CONTINUOUS INFUSION WITH NORADRENALINE AND DOBUTAMINE ON CARBOHYDRATE METABOLISM IN HEALTHY VOLUNTEERS

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Introduction: Endogenous as well as exogenous adrenergic agonists have a profound effect on carbohydrate metabolism in human critical illness. In this study the effects of noradrenaline (NOR) and dobutamine (DOB) on carbohydrate metabolism during a 4 hr infusion were investigated .

Methods: After approval by the local ethic committee 14 healthy volunteers were studied. Hepatic glucose production (HGP [mg/kg/min]), using 6,6-D_2-glucose as stable isotope tracer, as well as plasma concentrations of glucose (GLC [mmol/l]) and lactate (LAC [mmol/l]) were measured prior and during infusion of NOR (0.14 µg/kg/min) and DOB (6 µg/kg/min). Blood samples were drawn before and during the agonist infusion.

Results: No major changes in insulin and glucagon plasma concentrations could be found during the study period.

NOR (n=7)	baseline	t=80	t=160	t=240
HGP #	2.43±0.24	2.78±0.22	2.25±0.26	1.99±0.26
GLC #	5.0±0.2	7.1±1.0	6.2±0.4	5.8±0.3
LAC	1.0±0.2	1.1±0.2	1.1±0.2	1.1±0.2
DOB (n=7)	**baseline**	**t=80**	**t=160**	**t=240**
HGP #	2.43±0.50	2.12±0.44	1.94±0.33	1.82±0.27
GLC #	4.8±0.2	4.6±0.2	4.6±0.2	4.6±0.2
LAC #	1.1±0.2	0.9±0.1	0.8±0.1	0.9±0.2

Mean±SD are shown. # $p<0.01$, ANOVA for repeated measurments.

Conclusions: The effect of NOR on HGP and GLC were smaller as compared to adrenaline (1) with a similar time course. In contrast to the effects of adrenaline and NOR, DOB had a different effect on carbohydrate metabolism: a decrease in HGP and GLC, which is uncommon for a β-adrenoceptor agonist. Since HGP is an energy consuming process that might deteriorate hepatic oxygen balance in critical illness, the differential effects of adrenergic agonists may be of importance and need further clarification.

(1) Ensinger H. et al., Intensive Care Med (1994) 20: 113

SOFTWARE FOR THE ARTIFICIAL NUTRITION

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The nutritional insufficiency often accompanies post-operative hypercaloric states, inanition, serious infections and weakening chronic illnesses. That is why the early nutritional support, sufficient and appropriate for each individual case, is a fundamental component of intensive care unit as an indispensable factor for recovery. For this reason, our Unit, developed a software for the implementation and nutritional control of the assisted patients. This software is incorporated is an expert system called TIMBU, designed and developed by the computational division of our Unit. This system arrives to inferred diagnoses such as : respiratory, hepatic, renal(with and without dialysis) dysfunctions, pancreatitis, ARDS, decrease of consciousness, diabetes. According to these data, the system automatically suggests, on screen, possible solutions: a) required caloric contribution according to corporal area and grade of stress; b) the adequate contribution of carbon hydrates, aminoacids and lipids, related to each failed organ; c) a balanced and rational contribution according to the weight and number of organs in failure if there is a multiple organic dysfunction. In order to elaborate the individual bag of feed under a laminar flow bell, physicians can incorporate, if they are necessary oligoelements and ions. Afterwards, the prescriptions are sent to the central pharmaceutical lab of the hospital. The use of this intelligent system helps the physician to choose the correct artificial nutrition, because the program is permanently checked by experts.

ENTERAL VS PARENTERAL NUTRITIONAL SUPPORT IN CRITICALLY ILL PATIENTS

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Objectives: To compare the effect of short term enteral feeding versus parenteral nutrition, when a isonitrogenous and isocaloric feeding solution is administered by either route.

Methods: In a prospective controlled clinical trial 30 patients were studied; all exhibited moderate degree of malnutrition, normal liver and kidneys, and a functióning gastrointestinal tract. The patients were randomized to receive a free amino acid and small peptide diet (15 patients) or an isonitrogenous isocaloric parenteral support (TPN) (15 patients) (total energy: 2880 Kcal, nitrogen: 14.5 g, carbohydrates: 380 g, fat: 112 g, N/non protein calories: 1/175) at least for 10 days.

Results: There were no significant changes in anthropometric parameters within either group. Nitrogen equilibrium was achieved by day 3 in the TPN group and by day 5 in the enteral group (66.6% of the enterally fed patients and 80% of the TPN patients maintained in positive balance the day 10 of the study). There were no significant changes in serum albumin within either group. Serum level of transferrin reached a significant increase in both groups ($p=0.003$). Thyroxine-binding prealbumin rose significantly in both groups as well ($p=0.019$ and 0.004 respectively). Statistically significant rises in lymphocyte counts ($p=0.003$ and 0.001 respectively), in levels of C_3 ($p=0.009$ and 0.001 respectively), IgA ($p=0.002$), IgG ($p=0.004$ and 0.003 respectively) and IgM ($p=0.004$) occurred in either treatment group. There was a high incidence of negative skin tests at the start of the study in the enteral group (73.3%) and the TPN group (60%). By the end of the study the incidence of negative responsiveness was 40.0% and 26.6% respectively. Despite maintenance of similar glucose levels in both groups, TPN led to significantly higher serum insulin levels. The serum insulin increased almost linearly over the study period and eventually prevented fat mobilization and lipolysis, so that free fatty acid levels had fallen significantly. A significant elevation of the liver enzymes over the study period occurred in 73.3% of the TPN group, but not in the enterally fed patients.

Conclusions: The present findings provide no evidence that enteral diets containing free amino acids and small peptides, as their nitrogen sources, are in any way inferior to isonitrogenous isocaloric regimes parenterally given.

The scope of practice of the critical care nurse in South Africa

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Aim: The aim of this study is to describe and explore the expectations of the functions of the critical care nurse to enable the formulation of guidelines for the scope of practice for the critical care nurse with a South African context.

Methods: Phase I was to determine the expectations of the critical care nurse, the nursing service managers and the doctors with regard to the functions of the critical care nurse. A focus group interview was held with a group of experts in the field of critical care. The results were used to compile a questionnaire. This questionnaire was sent to the critical care nurses, the nursing service managers and the doctors in South Africa for completion. From these results the functions of the critical care nurse were determined.

Phase II was to formulate guidelines for the scope of practice for the critical care nurse within a South African context. Through usage of the date (Phase I) the scope of practice was formulated.

Guidelines were formulated for the practise, education and research regarding the limitations of the professional-ethical authoration and the implementation of the scope of practice for the critical care nurse.

GASTROINTESTINAL MOTILITY IN CRITICALLY ILL PATIENTS WITH LARGE VOLUME OF GASTRIC ASPIRATES: MANOMETRIC EVIDENCE FOR INTESTINAL PSEUDOOBSTRUCTION.

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Objectives : High output gastric aspirates are occasionally observed during fasting in critically ill patients, preventing any attempt of feeding via the enteral route. Although these patients are often said to suffer from "gastroparesia", the motor correlates of this condition are largely unknown. In this study, we recorded the gastrointestinal motility of critically ill patients with abundant (>250 mL/24 hours) fasting gastric aspirates.

Methods : Antral (4 sites separated each other from 1.5 cm), duodenal (1 site) and jejunal (1 site) contractions were recorded simultaneously by means of a multilumen tube assembly positioned under fluoroscopic control (perfused catheter technique). Tracings from prolonged recordings were obtained on a multichannel recorder (7758A recorder, Hewlett-Packard) then analyzed visually, with a special attention for the following abnormalities which are characteristic of intestinal pseudoobstruction: 1) absence or aberrant propagation of the migrating motor complex (MMC), 2) presence of bursts (> 2min) of nonpropagated phasic pressure and 3) presence of sustained (>30 min) uncoordinate pressure activity. 11 patients with a volume of gastric aspirates of 731 ± 506 (SD) [median 500] mL/24 hrs were investigated for 538 ± 271 [median 455] minutes.

Results : Only one patient had no detectable motor abnormality. MMCs were either absent (n=4) or migrated abnormally (retrograde propagation : n=4; retrograde and stationnary : n=2) in 10 pts. Bursts of nonpropagated phasic pressure activity were present in the duodenum in 9 pts and sustained uncoordinate pressure activity was found in 2 pts. Additional abnormalities included episodes of prominent pyloric activity (n=1) and sustained antral pressure activity (n=2).

Conclusion : Critically ill patients with large volume of gastric aspirates have manometric evidence of intestinal pseudoobstruction. Prokinetic therapy in these patients should thus focus not only on enhancing gastric motility, but also on restoring a normal propagative contractile activity in the intestine.

MG-K RELATIONSHIP IN HYPOKALEMIC PATIENTS WITH SIMULTANEOUS POTASSIUM AND MAGNESIUM ADMINISTRATION

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OBJECTIVES: Since potassium (K) and magnesium (Mg) metabolism are closely linked, we evaluated whether Mg supplementation can facilitate K repletion in ICU patients.

METHODS: This prospective, open-label, randomized placebo-controlled study included 20 patients with hypokalemia in whom rapid potassium replacement (20 mEq KCl in 1 h) was performed: 14 patients received Mg sulfate (6 g in 3 hours) and 6 patients received a corresponding saline infusion. Measurements were made at time 0, +1, +3 and +6 hours.

RESULTS: K levels increased more in Mg treated patients than in the patients who received saline infusion at time 1 and 3 h ($p < 0.05$ - Students-Newman-Keuls). (Table 1).

BLOOD POTASSIUM LEVELS

	Baseline	1 hour	3 hours	6 hours
Saline	3.45±0.78	4.17±0.60	3.99±0.65	4.10±0.58
Magnesium	3.19±0.29	4.13±0.37*	3.92±0.27	3.99±0.22

*p<0.05 vs baseline. Table 1

CONCLUSION: Magnesium infusion in conjunction with potassium replacement showed to be effective in increasing K levels more than the replacement alone. Magnesium administration together with potassium replacement may be warranted in critically ill patients.

FLUOROSCOPIC PLACEMENT OF DUAL LUMEN NASO-GASTROJEJUNAL TUBES IN MECHANICALLY VENTILATED CRITICALLY ILL PATIENTS : ERYTHROMYCIN OVERCOMES THE NEED FOR ENDOSCOPY.

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Introduction. Dual lumen naso-gastrojejunal tubes are a major advance in nutritional therapy of mechanically ventilated critically ill patients since they authorize jejunal feeding with concurrent gastric decompression, thereby reducing the risk for aspiration. Unfortunately, placement of these tubes in the jejunum regularly dictates to resort to endoscopy in order to facilitate pyloric intubation. Recently, the remarkable gastrokinetic properties of the well known macrolide antibiotic erythromycin have been demonstrated in gastroparetic critically ill patients[1].

Aim. In the present study, we evaluated the feasibility of placing dual lumen naso-gastrojejunal feeding tubes at the bedside without endoscopy, using erythromycin to help transpyloric migration of the tube under fluoroscopic control.

Method. Each patient admitted in our ICU during a 2 months period and requiring artificial ventilation and enteral nutrition for a period of at least 3 days was included in the study. After inserting the tube (Stayput®, Sandoz, USA) in the gastric antrum, erythromycin (200 mg) was administered intravenously, to help fluoroscopic positioning of the tube into the jejunum. The total duration of the procedure (from nasal intubation to jejunal placement), as well as the duration of fluoroscopy were recorded in each patient.

Results. 15 patients (male/female : 13/2; Mean age : 56.9 ± 22.2 years; Mean Apachell score : 23.1 ± 7.0) were enrolled into the study. The procedure was performed within the 2 days following institution of mechanical ventilation. Jejunal access was obtained in all 15 patients without resort to endoscopy in 10.81 ± 7.31 min.(total duration of the procedure). Mean duration of fluoroscopy was 3.54 ± 2.97 min.

Conclusion. We conclude that placement of dual lumen naso-gastrojejunal tubes can be obtained in mechanically ventilated critically ill patients without resort to endoscopy, provided that erythromycin is used as gastrokinetic agent to help pyloric intubation.

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NUTRITIONAL STATUS ASSESSEMENT OF CRITICALLY ILL PATIENTS

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Objective: To determine the nutritional status of an Intensive Care Unit (ICU) patient population.

Materials and methods: a prospective clinical study was designed to assess the nutritional status, at admission (AD) and discharge (DIS) of patients admitted in our unit, during a year.

Patient exclusion criteria: length of stay < 6 days; clinically important renal or hepatic disfunction.

The following AD and DIS parameters were considered in all patients: - mid-arm circumference, triceps skinfold thickness, serum transferrin, albumine and lymphocites and urinary creatinine/height index.

Patients whose results were bellow 80% of normal values in 3 or more of the 6 above criteria were considered undernourished (UND).Statistical analysis was performed using $\chi 2$ analysis.Statistical significance was established at $p<0.05$.

Results: a total of 129 patients(47 female, 82 male) - with a mortality rate (♆) of 31,8% - were studied, aged 56±8 years and a median lenght of stay of 22 days.

Evolution of the nutritional status in ICU and ♆:

1 - nourished (NOU) at AD and at DIS - 22; ♆ 0%; 2 - NOU at AD and UND at DIS - 17; ♆ 41,2% ; 3 - UND at AD and UND at DIS - 73; ♆ 45.2%; 4 - UND at AD and NOU at DIS - 17; ♆ 5,9%.

We observed a $p< 0.05$ when we compared groups 1 and 2 ($p=0.0012$), and groups 1 and 3 ($p=0.00026$).

Variation in nutritional status and lenght of stay:

1- NOU at AD and NOU at DIS => median lenght of stay 18 days;
2-UND at AD and UND at DIS => median lenght of stay 22days;

Nutritional status and age at admission:

1- Age >= 60 years : NOU (13) , UND (53)
2- Age < 60 years: NOU (26), UND (37)

Nutritional status and age at discharge:

3- Age >= 60 years : NOU (12) , UND (54)
4- Age < 60 years: NOU (36), UND (27)

We observed a $p<0.05$ when we compared groups 1 and 2 ($p=0.01$) and groups 3 and 4 ($p=0.004$)

Conclusion: Such study permits to conclude that most of our patients (69.8%), staying in ICU for more than 6 days, were UND, namely the older. We observed that this kind of patient had a longer median length of stay in ICU, associated with higher mortality rate.

In conclusion, the nutritional management is an essential element in suportive care of critically ill patients.

PHARAMACOKINETIC PROFILE OF RECOMBINANT HUMAN INSULIN-LIKE GROWTH FACTOR-I (IGF-I) GIVEN SUBCUTANEOUSLY TO CRITICALLY ILL PATIENTS WITH SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS)

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Objectives: SIRS is associated with hypercatabolism and resistance to nutritional support, despite raised circulating levels of growth hormone and insulin. Serum IGF-I levels however are low; therefore rhIGF-I administration might produce useful anabolic effects. The pharmacokinetics of exogenously administration rhIGF-I in such patients are likely to differ from that seen in the less seriously ill due to changes in circulating blood volume, increased capillary permeability, poor nutritional status, and alterations in binding proteins. The objective of this study was to determine the clearance, apparent volume of distribution (Vd), time to peak concentration (Tmax) and elimination half-like (T½) of a single subcutaneous injection of rhIGF-I in patients with SIRS on the intensive care unit (ICU).

Methods: 9 ICU patients with SIRS were entered into the study, which had been approved by the Ethics Committee. In each patient 6 baseline blood samples for circulating IGF-I were obtained over a 24 hour period, prior to injection of 40 μg/Kg of rhIGF-I subcutaneously. A further 14 samples were taken from each subject over the next 48 hours. Circulating IGF-I was measured in serum at each time point by radioimmune assay, and the area under the curve following administration of rhIGF-I was derived for individual patients from baseline adjusted IGF-I levels. Clearance values were calculated by dividing the administered dose of rhIGF-I by the total area under the curve. Vd and T½ were calculated by regression analysis of the terminal part of the log serum concentration time profiles.

Results: Results are expressed as median (range). Age 35(29-73) years, APACHE II score 18(12-34), and length of ICU stay 26(10-92) days. Baseline circulating IGF-I levels were low 28(<20-166) ng/ml, reaching a peak of only 84(<20-246) ng/ml. 2 of the 9 patients had basal levels predominantly below the lower limit of detection of the assay, and showed no appreciable rise in serum IGF-I levels following rhIGF-I injection. Parmacokinetic variables could not therefore be determined in these two patients. Following rhIGF-I injection in the remaining 7 patients Tmax was at 3(2-6) hours, clearance was 89(31-452)0 ml/min, Vd was 0.29(0.12-0.73) L/Kg, and T½ 9.2(4.2-30.1) hours.

Conclusions: There was marked patient variability in response to rhIGF-I administration. Vd was similar to that seen in postoperative major surgery patients (0.29 vs 0.33 L/Kg), but clearance was greater (89 vs 25 ml/min), Tmax earlier (3 vs 5 hours) and T½ shorter (9.2 vs 10.8 hours). If rhIGF-I is to be administered to ritically ill patients the dose should be modified in the light of these findings.

5. Infection in the ICU

POSTOPERATIVE EVOLUTION OF ACUTE BACTERIAL ENDOCARDITIS SURGERY AT ICU

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Background: Acute bacterial endocarditis continues to be a condition with high morbidity and mortality. The majority of patients are treated with high dose antibiotics, but a patient group requires surgical treatment.

Methods and Results: From January 1991 to March 1994, 65 patients underwent surgery for acute bacterial endocarditis: 36 had native valve endocarditis and 29 had prosthetic valve endocarditis. There were 48 men and 17 women. *Streptococcus viridans* was the predominant infecting agent in native valve endocarditis and *Staphylococcus epidermidis* in prosthetic valve endocarditis. Progressive congestive failure, uncontrolled sepsis and peripheral emboli were the most common indication for surgery. Although the mitral valve is more commonly involved in acute bacterial endocarditis, the aortic valve most often requires surgical intervetion. The postoperative bleeding in the no-aprotinin group was 1902±1450cc and in the aprotinin was 850±80 ($p < 0,0001$). The mortality in ICU was 10,7%, the staphyloccocical endocarditis mortality was 18,2% and the no-staphyloccocical endocarditis mortality was 2,6% ($p<0,05$).

Conclusions: The early surgery is indicated if endocarditis has no response with medical treatment. The mortality of staphyloccocical endocarditis involving left valves was higher than caused by other infecting agents. Aprotinin treatment improved prostaglandin metabolism and preserved platelet function during open heart surgery and could be useful in this type of interventions. Urgent surgery had a high mortality (24%).

SELECTIVE DIGESTIVE DECONTAMINATION AND METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* COLONIZATION

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Selective digestive decontamination (SDD) has increasingly become the subject of critical discussion since the development of multiresistant organisms has become an issue. Moreover, a selection of gram-positive pathogens must also be taken into account when using the SDD regimen, which is primarily directed at the gram-negative bacterial spectrum, with the methicillin-resistant *Staphylococcus aureus* strains (MRSA) being of particular importance. The objective of our study was to determine the extent to which colonization with MRSA strains is promoted by SDD.

Method: 65 patients (ventilation period > 5 days) were randomized and allocated to the SDD group (n=32) or the control group (n=33). In their general intensive care therapy, there were no differences between the groups. The SDD regimen consisted of the four times daily administration of 50 mg polymixin, 80 mg tobramycin and 500 mg amphotericin B in the nose, mouth and stomach. Systemic prophylactic administration of antibiotics was not part of the SDD regimen. Smears were taken from the nose and the rectum twice weekly and from the pharynx and trachea once weekly, and tested for MRSA. Further samples were taken as clinically required.

Results: 625 smears were examined in the SDD group. MRSA strains were detected in 66 samples (10.5%) from 7 patients, and in 5 patients they were detected for a period of up to 4 weeks. The positive smears were distributed as follows: tracheal 11/117 (9.4%), nasal 28/199 (14.0%), pharyngeal 15/111 (13.5%) and rectal 12/198 (6.1%). Severe MRSA-induced infections were observed in 2 patients (infection rate 28.6% of the colonized SDD patients). 560 smears were examined in the control group. MRSA strains were detected in 15 samples (2.6%) from 6 patients, but only repeatedly over a period of up to 10 days in 3 patients. The positive smears were distributed as follows: tracheal 1/114 (0.8%), nasal 8/174 (4.6%), pharyngeal 4/98 (4.0%) and rectal 2/174 (1.1%). There were no MRSA infections in the control group.

Conclusion: The data collected support the view that the use of SDD promotes a selection and persistence of MRSA strains. Longer-term colonization with MRSA and severe systemic infections were only found in the SDD group. Although the clinical and epidemiological impact of resistance developing when SDD is applied remains unclear, this question should be given close scrutiny.

IMMUNOTHERAPY OF SEVERE SURGICAL INFECTIONS WITH INTERLEUKIN-2-TREATED MONONUCLEAR CELLS

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Objectives: Efficiency of immunotherapy with interleukin - 2 (IL-2) - activated peripheral blood mononuclear cells (PBMC) in critically ill patients with severe surgical infections has been analized.
Methods: From November 1993 to March 1995 60 patients were treated with recombinant IL-2-activated autologous PBMC. The course dose of infusing PBMC ranged from 1 to $6x10^9$ cells. The results of immunotherapy with IL-2-treated PBMC included the control of endotoxicosis, critical state favourable outcome and mortality decrease.
Results: The immune system cell investigations before the treatment revealed a significant depression of the T cell immunity. Immunotherapy with IL-2 PBMC results in the increase of lymphocyte counts, CD3 and CD4 cell percentages, CD4/CD8 ratio, ConA-induced proliferation and has an immunomodulating effect on spontaneous and LPS-stimulated TNF-alpha production by PBMC. Administration of IL-2-activated PBMC was accompained with the development of cytokine reactions that was essential for the benefit of intensive care.
Conclusions: IL-2-treated PBMC infusions in patients with severe infections due to immunological disfunction correction and acute phase response induction result in a significant mortality decrease (up to 16%) and recovery.

CLINICAL EFFICACY OF TAZOBACTAM/PIPERACILLIN 4.5g IN DEPENDANCE OF VARIOUS DOSAGE FREQUENCES

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Tazobactam/Piperacillin (TAZ/PIP) is a new broad spectrum antibiotic, in which the acylaminopenicillin Piperacillin is protected by the betalactamase inhibitor Tazobactam from hydrolization by bacterial enzymes. TAZ/PIP has shown to possess a high antibacterial activity against almost all clinically relevant bacteria and is a registered drug in Germany.
Objectives: Purpose of this investigation was to evaluate, whether TAZ/PIP 4.5g is suited for efficient antibacterial monotherapy of severe infections and what influence dosage frequency reveals on clinical efficacy.
Methods: 2151 hospitalized patients have been documented in this multicenter trial during a 2 year period. As this investigation should reflect the usual clinical treatment, the only criteria for enrolment were the typical signs of infection as e.g. temperature > 38°C, leucocytosis or an isolated pathogen. Exclusion criteria did not exist and the patients were treated in accordance to the severeness of infection, underlying diseases, risk factors etc. with TAZ/PIP 4.5g t.i.d. or b.i.d.
Results: Patients suffered in most cases from infections of the lower respiratory tract (n=926), followed by intraabdominal (n=765) and skin and soft tissue infections (n=460). 61% of the 926 LRTIs were nosocomial acquired and in 75% the treatment was conducted as monotherapy. In 53% the LRTI was treated with TAZ/PIP b.i.d. and in 45% t.i.d. Pseudomonas spp. (n=138) and Staph. aureus (n=134) were the most isolated pathogens pretreatment. The clinical response rates (cured/improved) after treatment with TAZ/PIP 4.5g b.i.d. and t.i.d. were 89% and 81% respectively. Results for intraabdominal- and skin and soft tissue infections will be presented.
Conclusions: In hospitalized patients with severe infections successful treatment with TAZ/PIP in monotherapy is possible. In this population a reduction of the dosage frequency to 4.5g b.i.d. revealed equivalent clinical response rates.

SEVERE GENERALIZED TETANUS TREATED IN THE ICU

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Objectives: Retrospective evaluation of 9 cases of severe generalized tetanus (SGT), treated in our ICU the last 7 years.
Material: We review 9 cases of SGT (6M, 3F), Mean age 66.7 years.
In 5 cases the entry site of C.Tetanus was a skin laceration, in 1 case it proved to be the external genitalia, while in the rest no portal of entry could be determined. In the first 6 cases incubation period was short (3-11days) and so was the period of onset (1-6 days). All patients needed mechanical ventilation (range 15-58 days), initally through an orotracheal tube and later through a tracheostomy, performed 6±2 days after admission.
Clinical manifestations of SGT included muscle rigidity and generalized spasms, persisting for up to 6 weeks in the most severe cases. Significant autonomic nervous system dysfunction was present in 3 cases occurring 5-12 days after the admission and following the time course of generalized spasm. Besides general supportive measures , specific treatment included passive +active immunization, Penicillin G, Magnesium Sulphate and sedation in a variety of regimens. Neuromuscular blockade was required in 5 cases. Nosocomial infections occurred in 7 cases, with sepsis and MOF in one.
Average stay in the ICU was 18-62 days. One patient died with severe septic complications and one was discharged with severe disability due to anoxaemic encephalopathy, after a cardiac arrest on admission.
Conclusions: Course and outcome in all cases was related to the severity of the complications, while the kind and intensity of clinical manifestations of SGT influenced the duration of the ICU stay. The combination of Clonidine + Morphine in iv infusion and Diazepam in Boluses q6h gave the best results in the control of spasms and cardiovascular instability.

DISINFECTANT TESTING - DIFFERENT METHODS

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Disinfectants are widely used in medicine, veterine and food industry. They have important significance in prevention of hospital infections. The choice of disinfectant should be made on the basis of their efficacy in vitro conditions.
Standards and tests on efficience are so different from country to country that European Community ser up European Committee for Standardization (ECS), Tc 216, in 1990.The mein task of ECS is to examine methods for testing of disinfectants efficience and to propose the standard test.
We performed this stady to estimate the destruction of L.monocytogenes (LM) by 14 commercial disinfectants.Three tests were performed to evaluate the effcacy of these disinfectants: suspension test, carrier test and Kelsey--Sykes capacity test. All tests were carried out with and without the presence of organic load.
Results of our stady indicate that LM is not resistant to the tested disinfectants.
In suspension test, without presence of organic load, 12 disinfectants showed efficacy on LM. In the carrier test, in the presence of organic load, 6 out of 14 examined disinfectants did not exposed efficacy on LM.
The results of examinations clearly showed that evaluation of disinfectant's efficacy partly depend on the used test method.

Comparation between simultaneously obtained hemocultures from the central venous catheter and peripheral vein

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Bacteremia and sepsis are frequent complications encouuntered in severe ICU patients.Microorganism identification with hemoculture presents the basis for adequate and successful antibiotic treatment.In many patients damage and vulnerability of the peripheral veins presents an obstacle for obtaining the blood culture from the central venous (CV) catheter sample could be also used.
Material and methods
Blood cultures were perfomed in 1o4 patients on blood samples simultaneously obtained from the peripheral vein and CV catheter three times in a 24-hour period.Criteria for the suspected bacteremia were body temperature above 38 C and leucocytosis above loooo leucocytes/dL.
The site for venipuncture and the CV catheter stopcock port were cleansed with povidon iodine.After the initial 5 mL of blood were discarded,lo mL were used for the blood culture.Standard laboratory technique for blood cultures was used.
Results and discussion
In 76 (73%) patients hemocultures was negative at both sites,whereas in the remaining 28 (27%) they were positive.For twentyone (2o%) of the positive patients the same results were obtained at both sites (peripheral vein and CV catheter),whereas in 7 (6.7%) patients the blood culture were positive only for the CV catheter samples.The CV catheters were in place for less than 4 days in 81 patients and for more than 7 days in 23 patients.From 7 patients with positive blood culture from the CV catheter,one patient had the catheter for three days,whereas the other 6 had the catheter from 6-lo days.

HIGH FREQUENCY OSCILLATION DOES NOT CHANGE THE HEMODYNAMIC FEATURES IN NEONATES.

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Few datas are available on systemic and pulmonary hemodynamic features in neonates traited with HFO.
Aim : to evaluate the possible hemodynamic changes when shifting conventional ventilation (CV) to HFO.
Methods : this randomised study inclueded twenty neonates, hospitalised in ICU of Tours, traited for membrane hyaline disease with an exogenous surfactant. The severity of the pulmonary disease was evalueted with oxygenation index. (mean air way pressure x FIO2 x 100/PaO2).
We recorded the first hemodynamic datas (HO) two hours after the exogenous surfactant intra tracheal injection. Then, neonates were randomised in Group I (GI) or Group II (GII). The Group I was the control group, where the CV was remained. In the Group II, the CV was switched to HFO.Two hours after randomisation and stabilisation of blood gases, we run the second echocardiography (H2).Echography was done with ULTRAMARK 4 ATL using a 7,5 MHZ probe and a 5 MHZ pulsed doppler crystal.The hemodynamic study inclued : heart rate (HR), arterial blood pressure, left atrial aortic root ratio, end diastolic and end systolic left ventricular (LV) size, LV fractional shortening (FS), direction and peak velocity of ductal flow, ductus arteriosus size, root aortic and left pulmonary artery (LPA) velocity time integral (VTI) and mean velocity in the LPA. Cardiac out was measured as :
aortic TIV x Π x (Aortic diameter)^2/4xHR/ body weight.
RESULTS : There were no significant differences between the two groups in the gestational age [32,3 SA (± 2,9) / 31,8 (± 2,44)], birth weight [1820 g (± 507) / 1645 g (± 530)], oxygenation index (11,9 / 12,5) and post natal age [7,4 hours (± 2,2) / 9,7 hours (± 2,6)].

We neither found significant differences in hemodynamic datas :

	cardiac out put	ml/kg/mn	LV FS	%	Aortic	VTI (m)	LPA (m)	VTI	mean velocity in LPA	m/sec
	GI	GII	GI	GII	GI	GII	GI	GII	GI	GII
H 0	357 (± 83,6)	399 (±71,7)	39 (±5,06)	37.4 (±6,5)	0.096 (±0,02)	0.113 (±0,02)	0.146 (±0,02)	0.175 (±0,04)	0.372 (±0,06)	0.4 (±0,06)
H 2	378 (±99,5)	413 (±82,3)	40.1 (±6,3)	36.8 (±5,3)	0.095 (±0,02)	0.113 (±0,03)	0.148 (±0,02)	0.174 (±0,03)	0.36 (±0,06)	0.39 (±0,07)
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Conclusion : Shifting from CV to HFO has no acute effects in hemodynamic datas , in neonates.

It is concluded that the blood sample for hemoculture should be obtained from the peripheral vein.However,if the blood sample is obtained from the CV catheter,the catheter shouldn't be in place for more than 4 days.

CULTURE RESULTS OF ENDOTRACHEAL ASPIRATED SPECIMENS IN ICU: TRANSFER OF BACTERIA BETWEEN PATIENTS AND STAFF.

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Objectives: 1. To count and evaluate bacteria isolated from endotracheal (ET) suction samples (with and without saline). 2. To establish the exogenous source(s) of pathogens isolated from carer's hands and the equipment involved in sampling in order to reduce the incidence of contamination and infection.
Methods: This prospective study included 20 consecutive ventilated patients (15 male and 5 female, 56±16 yr; APACHE II score 19±7) over a period of 3 months. ET aspirated samples with and without saline were taken daily from Day 0 of intubation until pathogens were presented in counts of $\geq 10^5$ per ml. At the same time, samples from both carer's hands were taken before and after ET suction and a swab from the ventilator tube.
Results: The overall length of intubation varied between 3 to 65 days. Bacterial transfer between staff and patients was noted in 80% of patients until Day 5 of intubation. There was no significant correlation between severity score and appearance of colonization. The incidence of pneumonia in studied patients was 45% with an overall mortality rate of 30%. *Acinetobacter anitratus* (No.15), *Staphylococcus aureus* (No.15), *Klebsiella pneumoniae* (No.9) and *Pseudomonas aeruginosa* (No.4) isolates predominated in all our specimens. We noticed increased resistance to most antibiotics with the exception of imipenem for Gram (-) bacteria and vancomycin for Gram (+) bacteria.
Conclusions: 1. Tracheobronchial colonization appears directly in the majority of intubated patients. 2. There is a close relationship between the microflora of personnel, patients and equipment. 3. Bacteria transfer was noted both to and from patients. 4. Strict hand disinfection policy remains an important measure for the proper care of mechanically ventilated patients to reduce respiratory infections.

NOSOCOMIAL INFECTION IN THE CRITICALLY ILL PATIENT - THE ROLE OF CARBAPENEMS

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Nosocomial pneumonia is the most common nosocomial infection in the ICU-setting, reported in up to 20% of patients admitted to the ICU following surgery. It is associated with significant mortality that ranges from 30% to 70%. Enteric gram-negative bacilli have been implicated in 75% to 85% of ventilator-associated pneumonias and *Pseudomonas aeruginosa* accounts for 27% to 40% of these pneumonias. Importantly, epidemics of β-lactamase-producing *Enterobacter* spp or *Klebsiella* spp that are resistant to extended spectrum cephalosporins or penicillins, pose serious obstacles to effective antibiotic choices. Carbapenems provide *in vitro* activity against a wide range of Enterobacteriaceae and other gram-negative aerobic bacteria, except *Stenotrophomonas maltophilia*. *In vitro* meropenem is more active against *Pseudomonas* spp than imipenem (especially *P. aeruginosa* and *P. cepacia*). Imipenem and meropenem are effective against more than 95% of strains responsible for nosocomial infections. All major pathogens associated with LRTI are usually covered by the carbapenems, exceptions are pathogens involved in so-called atypical pneuomonia like mycoplasma, chlamydia and legionella. Carbapenems are highly stable in the presence of most chromsomal and plasmid-mediated β-lactamases and usually offer a postantibiotic effect lasting for three hours against most of the Enterobacteriaceae. Recent studies comparing imipenem/cilastatin with other β-lactams and fluoroquinolones in severe LRTI in ICU patients resulted in favourable clinical cure rates and good tolerance, but development of resistance in *P. aeruginosa* and *S. aureus* during treatment were of some concern. Meropenem offers the advantage of greater stability against enzymatic degradation, so no concomitant administration of an enzyme inhibitor is necessary, and meropenem appears to be associated with a lower risk of seizures, particularly when used at high doses. Results from studies with meropenem in LRTI, especially in critically ill patients with acute exacerbations of chronic bronchitis, demonstrated excellent cure rates and better gastrointestinal tolerance of this new carbapenem. Both carbapenems are effective candidates for use as empiric monotherapy in nosocomial infections of critically ill patients.

PREVENTION OF INFECTION IN MULTIPLE TRAUMA PATIENTS BY IV HIGH DOSE OF IMMUNOGLOBULINS: EFFECT OF TEMPERATURE INCREASE ON SERUM BACTERICIDAL ACTIVITY

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Objectives: A favourable effect of IV immunoglobulins in septic surgical patients has been reported, but not sufficiently validated. We conducted this study on trauma patients to: i) investigate the effect of IVIG on septic complications and ii) quantify this effect by means of serum bactericidal activity (SBA) assessment and iii) to explore the effect of temperature increase (from 37 to 40° C) on the SBA.
Methods: Twenty trauma patients matched on admission for age, sex, injury severity score and Glasgow coma scale, were allocated to receive either IVIG (IVIG group; 10 patients) or equal volumes of human albumin 20% (Control group; 10 patients). IVIG (Sandoglobulin) was administered in a total dose of 1 g/kg divided in a four time regimen on days 1, 2, 3 and 6 post-admission. Three blood collections were performed: before the first dose (day 0) and 24 hours after the third and the fourth dose (days 4 and 7 respectively). Complement, IgG fractions, the SBA at 37° and at 40° C and clinical parameters were recorded.
Results: Similar IgG and IgG1 serum levels were found in groups IVIG and control on day 0 (743±130 vs 898±213 NS and 394±103 vs 472±101, NS), whereas they were significantly higher ($p<0.05$) in the IVIG group on days 4 (1700±274 vs 799±197, $p<0.05$) and 7 (1740±227 vs 864±164, $p<0.05$). The various complement-fractions increased in both groups without inter-group differences. The mean (±SD) SBAs (37° C) at 30 min in IVIG group vs control group were: -53±32 vs -56±51 NS for day 0, 9±46 vs -54±46 $p<0.05$ for day 4 and 7±34 vs -54±47 $p<0.05$ for day 7. The mean (±SD) SBAs (40° C) at 30 min presented a significant improvement over those of 37° C but for the control group remained negative and were respectively as following: -18±18 vs -26±33, NS for day 0, 22±39 vs -29±35, $p<0.05$ for day 4 and 24±31 vs -27±36, $p<0.05$ for day 7. The increase of temperature induced a 3-fold improvement of SBA in IVIG group and 2-fold of control-group. Positive blood cultures, and the product of the infectious episodes number multiplied by days of occurence, were significantly lower ($P<0.05$) in the IVIG group than in the control (2 vs 7, and 440 vs 1900, respectively).
Conclusions: Our study shows a significantly favourable effect of IVIG administration on septic complications and on SBA of trauma patients. The increase of temperature results in a significant improvement of SBA of patients that received IVIG, which theoretically means a further prevention of infection in the febrile state.

CURRENT RESISTANCE PATTERNS IN THE EUROPEAN ICU

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Infectious diseases in intensive care patients are common in comparison to patients on other wards and out-patients. The main difference is that intensive care patients are much more sensitive even to less virulent bacteria. Thus, the spectrum of infecting organisms is different. Strains often regarded as pathogens with low virulence cause serious infections in these patients. Strains such as Serratia, however, have intrinsic resistance to most commonly used agents such as 3rd generation cephalosporins. Furthermore, the common pathogens like staphylococci, Pseudomonas aeruginosa, enterococci and gram-negative bacteria, enterobacteriaeceae as well as the non-fermenters are less sensitive if isolated from intensive care patients. It is difficult to generalize on intensive care units as different patient groups are in different ICUs and there are great changes from one hospital to another and from one country to another. If we take S. aureus strains from one study from 1990 the overall resistance in intensive care units towards ofloxacin was 22%, whereas in other hospital wards the percentage of resistance was 5.3%, in out-patients, however, only 2.8%. The same trend was true for Entercoccus faecalis, coagulase-negative staphylococci, and other bacteria as well as other drugs. One most striking difference was found with Klebsiella pneumoniae and gentamycin resistance, which was 8 times higher in intensive care units as compared with out-patients, whereas in the same species no difference was to be seen with the resistance towards carbapenems. However, differences between countries seem to be even more striking, as example gentamycin resistance and Staph. aureus is given. The extreme difference is more than 60 fold. Thus, it is evident that there is a general trend towards higher resistance in intensive care units, but no generalization is possible. Therefore, surveillance studies in intensive care units are needed and the antibiotic policy has to be adapted to the specific needs of the unit. In the ICU setting the most potent antimicrobial agents are required to address problem organisms including those resistant to penicillins, cephalosporins and aminoglycosides. Carbapenems would appear to present a useful option in this setting.

SYSTEMIC CANDIDIASIS IN THE INTENSIVE CARE UNIT

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Objectives of this study was the evaluation of systemic candidiasis, in postoperative cardiac surgery patients (pts) with prolonged ICU stay.
Methods: Out of 2617 postoperative adults pts of mean age 61.1±8.9 years old, with a mean ICU stay of 1.6±0.6 days, following an open heart surgery from July 1993 to April 1995, 54 pts (2%) remained in ICU for more than 10 days because of severe perioperative complications. Patients were included in the protocol if they had clinical signs of infection or sepsis, and fungi isolated in blood culture or in culture from at least three different sites. The patients who developed systemic candidiasis received IV fluconazole (800 mg/day) (10 patients) or amphotericin-B for at least four weeks, and then they were closely monitored.
Results: Out of 54 postoperative pts with prolonged ICU stay, 11 pts (20.3%) developed systemic candidiasis, usually after the 20th postoperative day. They were 8 males and 3 females of mean age 64±7.4 years old. This group of pts had prolonged bypass and aortic cross-clamp time compared to control group (119 min vs 84, and 64 vs 49 min). All these pts received inotropes perioperatively (mean value=2.3). During their ICU stay, 9 pts developed sepsis of bacterial origin, while the other two severe infection, and received antibiotic regimens for prolonged period. The patients were submitted to mechanical ventilation for a median period of 50 days. The median ICU and hospital stay was 58 and 60 days respectively. All pts have been improved and finally negative cultures were obtained.
Conclusions: 1. A significant percentage of patients who remained in the postoperative ICU for more than 10 days developed systemic candidiasis. 2. All patients who developed systemic candidiasis had received antibiotics because of sepsis or severe infection, for prolonged period. 3. Fluconazole seems to be a very good alternative to amphotericin-B. 4. Fluconazole is a safe antifungal agent with few side effects.

BOTULISM: FOUR OUTBREAKS' DESCRIPTION

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Botulism is the most severe and an odd food poisoning. Although it is more commonly related to preserved meat derivatives, preserved fish and vegetables are also responsible for a number of cases.
Objectives: To evaluate four familiar outbreaks of botulism .
Methods: We study the patients that were admitted in our hospital because of botulism from May 1982 to February 1995.
Results: The thirteen pacients involved had a previous history of home preserved beans ingestion.
After a 24-hours incubation period, gastrointestinal symptoms (abdominal pain, vomits, constipation) appeared and lead them to hospital consultation in the 4th to 7th day after ingestion. Two patients died (acute respiratory failure before admission), seven were admitted in ICU, two in ward and two of them were discharged from emergency room. Clinical symptoms and the previous history of the ingestion established the diagnosis, that was EMG confirmed. In all cases, symptoms were consistent with B-toxin botulism. B-toxin was isolated in serum and food proceeding from the third outbreak, and the serum was negative in the other ones.
Neurological symptoms were predominant: midriasis (100%), dry mouth (100%), dysfagia (100%), asthenia (55%), palpebral ptosis (55%), accomodation paralisis (66%) and urinary retention (55%). Muscle weakness lead to acute respiratory failure in three patients (one of them required mechanical ventilation). Four patiens developed infections (respiratory, urinary and phlebitis). Both died patients and one another presented severe hypertension. All admitted patients were treated with polivalent anti-toxin. The two patients who underwent a more severe muscle weakness received also guanidine hydrochloride, with no answer in one case and provoquing a cholinergic crisis in the other one. ICU length of stay was 10 days. At hospital discharge, patients continued symptomatic, mainly with dry mouth, disfagia and impaired vision.
Conclusions: Although botulism is a serious illness, the pronostic seems favorable if treatment and support measures are avaible. Usually neurological symptoms are predominant and at discharge some of them could still persist.

PROSPECTIVE ASSESSMENT OF THE VALUE OF THE ARROW "HANDS-OFF" CATHETER IN THE PREVENTION OF SYSTEMIC INFECTIONS ASSOCIATED WITH PULMONARY ARTERY CATHETERS.

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The Arrow "Hands-Off" (AHO) thermodilution catheter (TC) is completely shielded during balloon testing, preparation, and the insertion procedure. In order to assess the value of the AHO thermodilution catheter in the prevention of systemic infections associated with pulmonary artery catheterization (SIAPA), we conducted a randomized prospective study over an 18-month period.
Methods : The patients (pts) were randomly assigned to two groups : Group 1 for a standard TC customarily used in the department, versus group 2 for the AHO thermodilution catheter. The diagnosis of SIAPA was determined on the basis of a positive culture of TC and bacteremia with the same organism, with out any other nearby focus, in association with regression or disappearance of the clinical signs of infection after removal of the thermodilution catheter.
Results (Mean ± SD) : A total of 166 TC were randomized among 150 pts. The two groups were comparable in terms of age (62.2 ± 13.4 vs 63.5 ±13.8 years), SAPS on admission (15.6 ± 5.2 vs 15.2 ± 6.2), SAPS on the day of catheter insertion (17.6 ± 4.8 vs 17.3 ± 5.8), the duration of the implantation procedure (22.8 ±11.3 vs 25.3 ± 19.5 minutes), the side of insertion (26 internal jugular (IJ), 28 subclavian (SC), and 14 femoral (FE) vs 36 IJ, 44 SC, and 8 FE), the hemodynamic diagnosis in pts (cardiogenic, 64 pts; septic, 12 pts; and hypovolemic, 2 pts vs cardiogenic, 78 pts; and septic, 10 pts), the duration of use of TC (3.6 ± 1.3 vs 3.5 ± 1.5 days) and the outcome for pts (44 vs 50 deaths). A total of 8 cases of SIAPA were diagnosed in group 1 (only among pts with cardiogenic indication for catheterization), and none in the AHO group ($p < 0.002$). The causative agents were *Pseudomonas aeruginosa* (2), *Klebsiella pneumoniae* (2), *Staphylococcus aureus* (3), and *Enterococcus faecalis* (1).
Conclusion : This study demonstrates the value of the AHO thermodilution catheter in the prevention of systemic infections associated with pulmonary artery catheterization.

TUBERCULOSIS (TB) REQUIRING INTENSIVE CARE: IS THERE A SPECIFIC PROGNOSTIC?

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Objectives: The mortality rate (MR) of TB requiring mechanical ventilation (MV) is high (70-100%). The aim of the study was to evaluate MR, associated factors, and prognostic significance of MV and hemodynamic disorders from TB in ICU in 35 patients with TB.
Methods: Clinical parameters on admission, and complications in ICU were related by univariate analysis to ICU, hospital, and 6 month outcome. 18 patients required MV; 10 were immunocompromised (IC) including 8 HIV. TB was pleuro-pulmonary in 24, disseminated in 9 and meningeal in 2.
Results: MR was 31% in ICU, 34% in hospital and 47% at 6 month.

Six month : outcome	Survivors (n=19)	Non Survivors (n=16)	p value
SAPS	9.9 ± 4	15.5 ± 6	0.004
Therapy delay (days)	5.5 ± 18	0.2 ± 12	ns
Initial shock	2/19 (10%)	8/16 (50%)	0.006
MV	5/19 (26%)	13/16 (81%)	0.005
Initial PO2/FiO2 ratio	279 ± 133	230 ± 96	ns
ARDS	2/19 (10%)	8/16 (50%)	0.027
Nosocomial septic. inf.	1/19 (5%)	12/16 (75%)	<0.001

Mortality was associated with a high SAPS score, initial shock, MV and nosocomial septicemia. The MR dramatically increased when ARDS occurred during illness, despite the lack of correlation between MR and initial PO2/FiO2 ratio or initial Murray score. The site of infection did not influence the MR. Surprisingly, the mean therapy delay was shorter for non survivors. MR was not related to IC status, nor HIVstatus, but was only related to previous steroid therapy.
Conclusion: MR of TB requiring ICU is high (47% at 6 month). Need for MV increased mortality (72% vs 18%). General severity and respiratory dysfunction seem to be major prognostic factors in ICU rather than TB *per se* or than therapy delay.

PNEUMOCOCCAL MENINGITIS: EVALUATION OF 42 CASES

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In spite of the improvement in the prognosis of pneumococcal meningitis (PM) with Third Generation Cephalosporins (TGC), this infection still presents a great mortality which could be increased with the appearance of antibiotic resistant Streptococcus Pneumoniae.

OBJECTIVES: To asses intensive care mortality and morbidity of PM and to define patients (pts) at risk of complicated evolution.

PATIENTS AND METHODS: A retrospective evaluation of PM cases (all diagnosed by CSF culture) admitted in our ICU from January 1985 til March 1995. In all pts we analized: demographic data, underlying disease, APACHE II score, clinical symtomps, treatment, complications and outcome. Statistical analysis was done using BMDP sofware package.

RESULTS: A total of 42 pts were studied, 26 males; mean age 55,8 ± 16 (16-81); APACHE II score 16,6 ± 7,9; Glasgow Coma Scale (GCS) at admission 12,5 ± 1,7; 17 (40%) pts suffer from cronic pathology; 5 (12%) pts diabetes mellitus (DM), 4 (9,5%) pts had had a previous cranial traumatism. In 22 cases the source of infection was otic and also in 22 (52%) episodes of PM there were bacteriemia. In 21 out of 26 (80%) pts that CT was performed no radiologic abnormalities were shown, 3 of them presented cerebral oedema and 1 pts a cerebral abscess. Twenty-eight percent presented seixures, 14% hemiparesia, 46,3% respiratory failure, 17,5% shock, 15% renal failure, 5,1% multiple organ failure (MOF). As for treatment refers 5,5% pts recieved only Penicillin, 69,4% pts only TCG, 11,1% pts TCG followed by Penicillin and 8,3% pts TCG + Vancomycin. Seventy-five percent of pts recieved Corticosteroids and 25,6% vasoactive drugs. The mean ICU stay was 7,5 ± 6 days (1-28). Twelve (28,5%) pts died, two of them presented PM relapse (resistant *Streptococcus pneumoniae*) and another two pts developed neurological sequelae.

Factors associated statistically with bad prognosis were DM, the use of vasoactive drugs, shock, MOF, the APACHE II score at admission, the GCS at the 48 and 72 hours from admission in the ICU but not the GCS at admission. Didn't resulted statisticaly signifcative age, previous cronic pathology, seizures, bacteriemia, renal failure and coagulation disorders.

CONCLUSIONS: Mortality was high and associated to APACHE II score at admission, to GCS at 48 and 72 hours after admission, shock, vasoactive drugs and MOF.

THE POSSIBILITY FOR EVALUATION OF IMMUNOLOGY - CAL PROBLEMS IN SURGICAL PATIENTS UNDERGOING INTENSIVE HEALTH CARE

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Objectives:The aim of the study was to analyse some of significant immunologycal changes in surgical patients, requiring intensive health care, and to determinate the possibility for evaluation, dynamical examination and importance of immunologycal problems for treatment.

Methodes:The study concerns a number of 30 patients with expanded surgical intervention or serious postoperative complications.The results has been carried out with flowcytometryc analyses of lymphocytic subpopulations and routins methods for investigation of humoral immunity.The "panel" for evaluation of 20 immunologycal parameters has been offered:T-calls total/CD3+/;T-helper/CD4+/;T-supressor/CD8+/Th/Ts ratio;B-cells/CD19+/;natural killer/NK/cells;skin test for cellular immune function;phagocytic and oxidative activity;serum levels of immunoglobulins-G, A, M;protease inhibitors;C-Reactive Protein.All patients have been studied during suffering and after surgical procedures dynamicaly.

Results:There have been estimated significant changes in immunologycal parameters especially:decrease of T-cells: CD3+mean=37.62%/14.3%-47.9%/and CD4+mean=22.11%/9% - 28.8%/;inverted Th/Ts ratio, mean=0.72/0.37-0.90/;reduced or negative skin teste;reduced phagocytic and oxidative activity before septic complications.

Conclusions:Dynamical examination of immunologycal parameters shows, that the prolonged T-total, T-helper lymphocytopenia with functional deficience of cells-mediated immunity correlates with the stage of clinical condition of the patients and has prognostic importance.It's clear, that immunologycal monitoring gives a possibility for immunocorrection.

Infectious Endocarditis in a Population With Human Imunodeficiency Virus Infection. A Clinical and Doppler Two-Dimensional Echocardiographic Prospective Study.

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Patients (pts) with the Human Imunodeficiency Virus (HIV) infection have a decreased immune response and are particularly susceptible to infectious endocarditis (IE). The aim of our study was to analyze the prevalence of IE, its clinical and therapeutic implications in a HIV population. We prospectively studied 245 pts, 9.4% (23/245-Group IE+) with IE during the clinical course of this disease. We analyzed the following parameters: age, gender, race, type of HIV, CDC classification, number of T4 and T8 type cell population and its ratio, therapeutic with AZT, type and number of opportunist infections (INF, Mycobacteriosis (MB), Neoplasm's (NEO). The echocardiographic parameters were LV internal diastolic and systolic diameters, LV percentage of fractional shortening, interventricular and posterior wall thickness, the degree of valvular regurgitations and the presence of pericardial effusion. EI was located at the MV in 2.7%, TV in 6.0%, AV in 2% and PV in 0.9%, and was multiple in 2.0%. HIV EI+ pts had larger LV diameters and more frequent significant valvular regurgitations (39%TR, PE 33%, Mortality 32%). These two groups differed significantly in the following clinical parameters:

	CDC	IVDA	T4/T8	Age	T4	Race
Group IE+	2.0±0.9	100%	0.32±0.2	25±4	664±545	96%
Group IE-	2.5±0.8	47%	0.25±0.2	35±11	210±139	82%
p Val	.0001	.001	.02	.0001	.001	.001

Conclusion: Valvular infectious endocarditis is a frequent and severe complication of HIV infection specially in early stages of HIV disease. The clinical evolution of the HIV associated infectious endocarditis is more common among young white IVDA patients, with a significant repercussion on left ventricular dimensions and overall survival.

POSTOPERATIVE ENTEROCOLITIS CAUSED BY METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS

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Objectives: Investigate the pathophysiology and countermeasures of postoperative enterocolitis by methicillin-resistant Staphylococcus Aureus(MRSA),one of the severe postoperative infections.

Methods: Criteria of MRSA enterocolitis were watery diarrhea or severe paralytic ileus and feces culture for MRSA over one positive sign.

Results: We have experienced 16 patients with MRSA enterocolitis (0.55 percent of 2910 surgical patients and 18.6 percent of 86 patients with MRSA) between 1988 and 1994. Postoperative MRSA enterocolitis was frequently occurred in compromized host with pre-existing diseases and malignant diseases,and was closely related to hypoacidity in gastric juice, because 14 of 16 patients underwent with gastrectomy, esophagectomy or recieved H2 blocker. The typical symptoms were watery diarrhea, high fever, tachycardia,luekocytopenia and oligouria within 7th postoperative days. The patients with MRSA enterocolitis had positive MRSA culture from the many materials except feces.MRSA strains frequently had coagulase type 2,enterotoxin A and toxic shock syndrome toxin-1.Eight of 16 patients had postoperative organ failure.Most of the MRSA strains in Japan were similar in coagulase type to our hospital and our department.All of MRSA strains were susceptible to vancomycin and arbekacin,though most of them showed resistant to many other antibiotics.We have employed guidelines for therapies such as oral or enteral administration of vancomycin and correction of the hemodynamics for dehydration and circulatory failure due to diarrhea from 1992.Futhermore we have placed colonized or infected patients in private room,worn gown and mask,and carefully washed our hands from 1992. These countermeasures for prevention of nosocomial infections after 1992 significantly reduced the incidence of MRSA enterocolitis.

Conclusions: Earlier diagnosis and treatment, and distric prophylactic measureres against MRSA infections are very important.

ACUTE RESPIRATORY DISTRESS SYNDROME IN PATIENT WITH LEPTOSPIROSIS

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Leptospirosis affects all the organs with widespread hemorrhage that is more prominent in skin, mucosa, skeletal muscles, liver and kidneys. Lung involvement is usually mild and less common. Still, it is very uncommon acute respiratory failure to be the presenting symptom. A case with leptospirosis which was presenting with acute respiratory failure is described. A 36 year-old man admitted to ICU because of fever, myalgia, severe dyspnea, hemoptysis. His blood gases showed: PaO2:46mmHg with FiO2:1.0, PCO2:27 mmHg, pH:7.4, HCO3:20mEq Chest x-ray film demonstrated diffuse bilateral alveolar pattern occupying both lungs(4/4). Transaminase, billirubin, CPK and ESR were elevated, WBC was 8.700/mm3, Platelet: 40.000/mm3, Hematocrit:30%, Hemoglobin: 9gr/dL. There was no clinical or echographic evidence of left heart failure.Patient fulfilled the criteria for diagnosis ARDS
He was found to have an agglutination titer for leptostiral antigens(indirect hemagglutination assay, IHA) very high (1/800, negative<1/100) and IgM antibodies also very high (ELISA, A=1.492, negative<0.150) strongly suggesting leptospirosis. Treatment with tetracycline and non-invasive mechanical ventilation by nasal mask were started. Pressure support mode and CPAP was used. The following days the clinical picture,the oxygenation and the chest X-ray of the patients were improved, and patient discharged from the ICU.
The control of leptospiremic phase as well as his good cooperation during NIPSV contributed to rapid recovery and excellent outcome

PNEUMONIAS AND HIV INFECTION. PROGNOSTIC FACTORS

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In HIV infections, Pneumonias (PNM), mainly due to Pneumocystis carinii (PC) have an outstanding place in pulmonary complications. The aim of this work was to compare two groups of patients admitted with PNM in our ICU during the same period (1990-94): Group A, 19 patients HIV+, and Group B, 152 patients HIV-. APACHE II was identical in the 2 groups (p=ns). Group A required more often mechanical ventilation (p=0,007), had a higher P(A-a)O2 (p=0,004) and metabolic acidosis was more frequent (p=0,001). Regarding laboratorial parameters Group A had a lower no. of linfocytes (p=0,02), a higher LDH (p=0,04) and a more marked hypoalbuminemia (p=0,03). Mortality was higer in Group A (52,6%) than in Group B (29,6%), (p=0,04). Analysing the A group patients, we found no significant differences between alive and deceased patients, with exception for albuminemia, which was lower in the deceased patients (p=0,02).
In conclusion, the HIV+ patient's PNM have a more agressive behavior when compared with community acquired HIV- patient's PNM. The prognosis was not influenced by the APACHE II. Perhaps other parameters such as P(A-a)O2, metabolic acidosis, linfocytes, LDH and albumin shoud be more evaluated as possible predictive indices.
Some prognostic factors, usually accepted as predictive in the analysis of HIV+ patients do not seem to be worth in the late stages of AIDS, mainly when they require intensive care.

COMPARISON OF TWO REGIMENS FOR ANTIBIOTIC PROPHYLAXIS IN CARDIAC SURGERY

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Objectives of this study was the comparison of two different antibiotic regimens as prophylaxis in cardiac surgery patients.

Methods: In a prospective randomised comparative study, two different forms of antibiotic regimens were investigated : a single dose of cefuroxime (Zinacef, 3 gr) (group A) given during the induction of anaesthesia, versus a four days combination of amoxicilline (Amoxil, 2 gr tid) plus netilmicin (Netromycin, 150 mg bid) (group B). A total of 926 patients (pts) (767 males and 159 females, of mean age 60.6±8.7 years old) were included in the study over a period of one year; 424 in group A and 502 in the group B. Patients were checked for the occurrence of infection during the first postoperative month.

Results: The total rate of infection in cardiac surgery pts was 5.8%; 5.4% in group A and 6.1% in group B (p=NS). 34 pts (4.7%) developed infection following CABG, 17 pts (7.9%) following valve replacement and 6 pts (17.6%) after other cardiac surgery. They were 43 males (5.6%) and 11 females (6.9%). Endocarditis has occurred 0.4 % in group A and 0.2 % in group B. Severe wound infection was recorded in 0.4% in group A and in 0.8% in group B. One case of sepsis (0.2%) in group A and in group B (0.2%). Respiratory infection occurred in 11 pts of group A (2.6%) and in 11 pts of group B (2.2%). Two cases of urinary tract infection was in group A and one in group B. Catheter-related infection was occurred in 5 (1.1%) in group A and 6 (1.1%) pts in group B. 3 pts (0.6%) had fever of unclear aetiology in group B.

Conclusions: There was no statistically significant difference regarding the rate of infection in both groups. A single dose administration of cefuroxime is accordingly just as effective as a four days regimen of amoxicilline plus netilmicin.

LEGIONELLA pneumophila PNEUMONIA (LpP) - A RESPORATORY ICU EXPERIENCE

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Legionella pneumophila is a common bacteria of the environment, and it is an agent responsible for severe community acquired pneumonia (CAP). We analyzed the 8 patients with LpP admitted in our ICU during the last 8 years (1986-1994). They represented 4.6% of CAP. Seven patients were males and 1 female, with mean age 46.7±12.1 years. Tiss was 24.1±10.9 and APACHE II 21.0±5.2. All, but 1 patient, were under mechanical ventilation (MV) during a mean period of 11.7±14.9 (min-1, max-44) days.
Two pneumonias occurred beyond the season, while 4 patients had an epidemiological history. Only 1 patient had no risk factor. In all the others tobacco smoking and alcohol abuse was quite frequent. Diagnosis was based on serologic test and culture or direct fluorescent antibody staining of bronchial secretions.
Seven patients had a multisystemic disease with hepatic dysfunction in 5, renal failure in 4 (due to rhabdomyolysis in 3). One patient had a prosthetic valve endocarditis and another developped ARDS. Nosocomial septicaemie occurred in 3 patients.
Mortality rate was 50%. Deceased patients had initially higher APACHE II, (A-a) O2, and lower natriemia.
Comparing LpP with the other CAP (n=84), both submitted to MV, mortality rate was similar (57,1% versus 54.7%).
In conclusion LpP can occur all over the year. There was a high incidence of severe complications and outcome was similar to the other CAP when requiring MV.

ASSESSMENT OF EFFICIENCY OF THE ASSOCIATION AMPICILLIN - SULBACTAM IN COMMUNITY ACQUIRED PNEUMONIAE HOSPITALIZED IN ICU (ABOUT 63 PATIENTS)

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Among 138 patients observed in a prospective study in 18 ICU from décember 92 to january 94, showing an acute community acquired pneumonia, 73 presented a positive culture from one of following exams.
Prospective specimen brush (PSB) with culture ≥ 10 CFU 10^3 CFU/ml. Broncho-alvéolar lavage (BAL) ≥ 10^4 CFU/ml or positive blood culture.
10 were excluded for rupture of treatment ; 63 were analysed (shift with oral antibiotics : 3 ; prohibited antibiotics associations : 5 ; resistant germ : 2).
Clinical data : age 60,6 ± 18,7 ; SAPS 12 ± 2,86 ; MAC CABE I : 76,2% - II : 22,2 % - III : 1,6.
63,5% of the patients were intubated and under mechanical ventilation. The pneumoniae were : primitive in 35 (55,6%), COPD 9 (14,3%), aspiration pneumonia 19 (30,2%). 75 germs were isolated (PSB 67, BAL 1, blood culture 7) : S. pneumoniae 28 (37,3%), H. influenzae 14 (18,7%), Streptococcus 10 (13,3%), S.Auréus 10 (13,3%), Enterobactériacae 5 (6,7%), Morexella catarrhalis 2 (2,7%), others 6.
71/75 (94,7%) were sensitive to treatment. The treatment was 100 mg/kg/d of AMPICILLIN and 50 mg/kg/d of SULBACTAM in continuous IV administration during at least 10 days. Clinical efficiency : success 46 (73%), Failures 17 (27%) with superinfection 7, worsening or relapse 3, dead 5, side effects 2. There was no difference between etiologies : primitive 74,3%, COPD 77,8%, aspiration pneumoniae 68,4%. The bacteriological efficiency was evaluated only for 41 patients with eradication 30 (73,2%), eradication but superinfection 6 (14,6%) : with Pseudomonas aéroginosa 2, Enterobacteriacae 3 ; bacteriological failure 5 (12,2%).
In conclusion, the association AMPICILLIN - SULBACTAM is effective for the treatment of severe acquired community pneumoniae.

PROSPECTIVE STUDY OF INFECTIONS RELATED TO PERIPHERAL CATHETERS IN AN INTENSIVE CARE UNIT. IMPACT OF CLINICAL SURVEY TO PREVENT INFECTION.

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Objectives: Evaluate the nosocomial risk due to peripheral venous inserted short catheters, and the quality of care.
Patients-Methods: The intensive care unit (I.C.U.) is a 9 beds unit. The prospective study includes all the patients coming in from 01/01/1993 to 30/03/1995. The recruitement uses an evaluation schedule of local clinical signs. The nurses aimed to create this evaluation data which includes the place of entry site, the duration of catheterization and the cause of withdrawal. Only patients staying longer than 2 days in the I.C.U. are accounted for. The diagnosis of nosocomial infection is assured by the physician taking care of the patient and by the hospital epidemiologist on the next signs: evident pus at the catheter entry site, positive culture of the strain, with or without the same pathogen in the blood stream,the patient having no other distant source of infection. Analyses were performed on EPI INFO.
Results: The occurrence of 3 nosocomial infections: 1 abcess and 2 bacteremia during the first part of the study lent the medical staff to modify the protocol of insertion and survey of the device. So we analysed 2 different periods: Period 1(1/01/93 to 31/10/93) and Period 2 (01/11/93 to 30/03/95) for all the peripheral catheters inserted in the I.C.U.

	Period 1	Period 2
No.Peripheral catheters inserted and/or surveyed in I.C.U.	488 on 223 patients during 1130 days	940 on 393 patients during 1849 days
Average lenght of use	2,2 days ± 1,4	1,9 days ± 1,2
No. Bacteremia occuring with peripheral catheter inserted in ICU	3 ‰ days	0 ‰ days

Cause of withdrawal	Catheters inserted before entrance in ICU (n = 590)	Catheters inserted in ICU Period 1 (n = 286)	Catheters inserted in ICU Period 2 (n = 552)
Infiltration	19,4 %	20,3 %	21,2 %
Inflammation/infection signs	28,9 %	26,8 %	17,6 %(p=0,002)
-Blush	26,3 %	25,0 %	16,8 %
-Purulence at the entry site	2,3 %	0,9 %	0,0 %
-Fiever	0,3 %	0,9 %	0,8 %
Maximum duration > 72 h	7,6 %	8,0 %	15,0 %
Others (useless,...)	44,1 %	44,9 %	46,2 %

Conclusions: The risk to develop an infection due to peripheral venous device is a daily threat. The severity of some clinical situations requiring admission in ICU proves it. The motivation of nurses for rigid adherence to established protocol, the daily survey of the entry site, the withdrawal of the peripheral catheter every 72 hours aimed to reduce significantly the local signs of inflammation and infection of peripheral catheters inserted inside the I.C.U.

TOPICAL OROPHARYNGEAL CHLORHEXIDINE GEL PREVENTS TRACHEAL COLONIZATION BY GRAM-NEGATIVE BACILLI : A PROSPECTIVE DOUBLE BLIND PILOT STUDY IN VENTILATED PATIENTS

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Oropharynx (OP) is an important source of gram-negative bacilli (GNB) colonizing and infecting the lower respiratory tract of ventilated patients (Vpts).
Objectives : To assess the efficacy of chlorhexidine (CL) gel or suspension applied in the nose and in the OP for the prevention of the tracheobronchial colonization.
Methods : Thirty-seven patients expected to be intubated for > 48h were randomized to received topical application of a CL suspension (2%) q8hrs, a CL gel (1%) q6hrs or a placebo. In addition all Vpts received a nasal and a OP spray (2%) of either CL or placebo administrated according to the same schedule. Semi-quantitative cultures of the anterior nares, the oropharynx (OP) and the trachea were obtained on admission and once a day until extubation (just before the next application). The results were assessed according to the following criteria: success = no acquisition of GNB in the trachea ; failure = acquisition of GNB in the trachea. Acquisition was defined by a follow-up culture positive for a GNB not present in the trachea on admission.

Results :

	CL susp. n=8	placebo n=10	CL gel n=9	placebo n=10
success	5/8	6/10	7/9*	3/10
failure	3/8	4/10	2/9*	7/10
nosocomial pneumonia	1/8	2/10	3/9	4/10
overall mortality	0/8	1/10	2/9	2/10

*p = 0,03 by Fisher's Exact test

Conclusions : these results suggest that topical CL gel administered q6hrs may prevent tracheal colonization by GNB.

EVALUATION OF THE USE OF METABOLIC MONITORING AND P0.1 MEASUREMENTS DURING WEANING FROM MECHANICAL VENTILATION USING INSPIRATORY PRESSURE SUPPORT (IPS)

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Objectives: To investigate the use of a new metabolic monitoring device for different IPS levels by comparing oxygen consumption (VO_2) to measurements of the mechanical work of breathing (WOB) and P0.1.
Methods: The study was approved by the institutional ethics committee. Eight patients were investigated during weaning after prolonged mechanical ventilation (6-75 days) for various diagnoses when the clinical physician judged the patient to be ready for weaning. IPS was set to 15, 10, 5, 0 mbar for 20 min periods each. All patients had a PEEP between 5-8 mbar.. Respiratory frequency (f), tidal volume (T_V), minute ventilation (Ve) were read from the ventilator display (7200ae, Puritan Bennett, Carlsbad, USA). Flow and airway pressure were measured at the endotracheal tube site. Esophageal pressure was measured using an esophageal balloon catheter (Fa. Ruesch, FRG). WOB was determined as the area subtended by the pleural-pressure-volume curve. P0.1 was determined by using standard occlusion technique and graphical analysis of the airway pressure tracing. VO_2 and VCO_2 were measured using the PB 7250 metabolic monitor (Puritan Bennett, Carlsbad, USA) connected to the PB 7200ae ventilator. All data are given as mean±standard deviation for each IPS level. Comparison between the different IPS levels was performed using ANOVA for repeated measurements. Significance was considered at $p<0.05$, compared to IPS 0 mbar.
Results: The values for breathing pattern, WOB, P0.1, VO_2 and VCO_2 are given in the table for the different IPS levels; significance is indicated by *.

IPS (mbar)	**0**	**5**	**10**	**15**
f (1/min)	30,5±4,9	27,2±5,8 *	25,9±6,9 *	24,3±7,5 *
T_V (ml)	555±109	575±132	615±122 *	667±126 *
Ve (l/min)	16,8±3,7	15,4±3,6	15,6±4,2	15,9±5,1
P0.1 (mbar)	3,4±2,1	2,7±1,4	2,1±1,3 *	1,6±0,9 *
WOB (mJ/l)	780,9±672,0	385,4±234,4	99,3±66,0 *	17,2±10,6 *
VO_2 (ml/min)	393,7±85,0	375,0±82,2	367,9±87,2	371,0±85,6
VCO_2 (ml/min)	300,1±69,9	299,0±72,3	293,8±72,7 *	300,8±74,7

Changes in VO_2 due to the changed IPS level correlated well with changes for WOB ($r=0.68$, $p<0.01$) and P0.1 ($r=0.72$, $p<0.01$). P0.1 and WOB correlated well for absolute values ($r=0.72$, $p<0.01$) as well as for differences between the IPS levels ($r=0.85$, $p<0.01$).
Conclusion: We conclude that metabolic monitoring and P0.1 are useful to estimate the changes of the mechanical workload of a patient when altering the IPS level during weaning.

PROSPECTIVE STUDY OF THE BACTERIOLOGICAL HAZARD OF A FLUIDIZED BED IN MECHANICALLY VENTILATED PATIENTS. L. Mier, M. Billiard, K. Djedaïni, F. Meignant, F. Coste, D. Dreyfuss, Y. Boussougant. Services de Réanimation et de Bactériologie, Hôpital Louis Mourier-92700 - Colombes, France.

Objectives: Fluidized beds are often used in the management of critically ill mechanically ventilated patients. Critically ill patients are increasingly colonized with resistent pathogens [ie: *P. aeruginosa*, methicillin-resistent *S. aureus* (MRSA), extended spectrum ß-lactamase producing *enterobacteriaceae*] that can ultimately cause nosocomial infection.
Methods: We prospectively monitored bacterial colonization of mechanically ventilated patients and of the fluidized bed (Clinitron) in which they were treated. Multiple samples for quantitative bacterial cultures were taken from oropharynx, trachea, feces and bedsores. Samples of ceramic beads from the bed were also taken both during and after patient stay (after bed operation in the absence of patient).
Results: 13 episodes in 12 consecutive patients (mean age: 57.6 years) were analyzed. All had bedsores and/or urinary catheters and fecal incontinence. 7 patients had nosocomial pneumonia, 6 had urinary tract infection [2 with extended spectrum ß-lactamase producing *Klebsiella pneumoniae* (KßLSE)], one had positive blood cultures with MRSA, and one patient had a KßLSE found in high concentrations (10^3 - 10^5 CFU/ml) in 2 occasions in feces. Patients were heavily colonized: the Table shows the distribution of organism concentrations:

	≤ 10^2 CFU/ml	10^2-10^5 CFU/ml	≥ 10^5 CFU/ml
Oropharynx	11	37	42
Trachea	11	39	45
Feces	7	51	32
Bedsores	6	14	27

Predominant organisms consisted of S. *aureus, Streptococcus spp, Enterobacteriaceae,* P. *aeruginosa, Acinetobacter spp* and C *Albicans.* Despite this heavy patient colonization with multiple resistent organisms (3 had a KßLSE infection or colonisation), samples from ceramic beads showed no growth or became sterile without any sterilisation procedure (even in one case of presence of KßLSE) during the patient stay .
Conclusions: Fluidized beds do not put patients at high risk of acquiring nosocomial pathogens, and cross-contamination between patients seems unlikely, even when multiple resistent organisms were initially present. The recommandation from some manufacturers to undergo extensive sterilization of fluidized beds after use does not seem warranted, at least with the bed used in this study.

CHANGING HEAT AND MOISTURE EXCHANGERS EVERY 48 HOURS RATHER THAN 24 HOURS DOES NOT AFFECT THEIR EFFICACY AND THE INCIDENCE OF NOSOCOMIAL PNEUMONIA. K. Djedaïni, M. Billiard, L. Mier, G. Le Bourdellès, P. Brun, P. Markowicz, P. Estagnasié, F. Coste, Y. Boussougant, D. Dreyfuss. Services de Réanimation et de Bactériologie, Hôpital Louis Mourier-92700-Colombes, France.

Objectives: The use of heat and moisture exchangers (HMEs) during long term mechanical ventilation (MV) is increasing. In ICU patients, they are routinely changed every day, according to the recommendations of the manufacturers, but the clinical basis for such a daily practice is lacking. We therefore prospectively assessed whether changing HMEs (DAR Hygrobac, SpA, Mirandola, Italy) every 48h only would affect their clinical and bacteriological efficiency.
Methods: Two consecutive groups of patients requiring MV for >48h were compared: Group1= HME replaced every day, n= 61 episodes of MV in 61 patients; Group 2= HME changed every 48h, n=68 episodes in 64 patients. Tubings were not changed in the same patient during the whole length of ventilatory support. Diagnosis of nosocomial pneumonia (NP) was based on a positive quantitative culture (≥10^3 CFU/ml) of a protected specimen brush in patients with clinical signs of pneumonia. Quantitative cultures of pharynx, trachea and y-connector were performed every 48h.
Results: The groups were similar in terms of age, indication for and overall duration of MV (10±8.6 vs 10±9days, p=0.9), and severity of illness (SAPS: 16±4.9 vs 16.4±5.5, p=0.6). The maximal values for peak airway pressure were identical in both groups (33.4±7.8 vs 33.7±8.5 cmH2O, p=0.9). Obstruction of the tracheal tube was observed in only one instance in a Group 1 patient who had tracheal bleeding. Circuit colonization was very rare, and of low grade in both groups. The level of patient colonization and the type of organisms were identical in both groups. More importantly, the incidence of NP was the same (6/61 vs 8/68, p=0.7), as was duration of MV before the occurence of pneumonia (9±5.9 vs 10.5±4.7, p=0.6) and overall mortality rate (17/61 vs 17/68, p=0.7).
Conclusions: the clinical efficiency of this HME does not seem altered after 2 days of use. Indeed, replacing this HME every 48h only neither affect circuit and patient bacterial colonization nor the incidence of NP. Therefore, substantial savings could be obtained changing HMEs every other day only.

COST OF ANTIBIOTIC THERAPY IN COPD PATIENTS IN ICU

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The cost-effectiveness issue is becoming vital in modern medicine and may lead to moral dilemmas since sometimes certain groups of patients may not have access to highly specialised modalities.
Objective: Our study compared the mean daily cost for antimicrobial medication in COPD patients treated in ICU versus all other patients in the context of relevant epidemiological, prognostic and outcome data.
Methods: Age, sex APACHE II score, length of ICU stay (LOS) and in - ICU fatality were retrieved from the files of all ICU admissions over 1994. Mean daily cost for antimicrobial therapy per patient (DCAT) was estimated. These variables were statistically compared between COPD and non-COPD patients. Significance was assumed at $p<0.05$
Results: 140 of the total 178 admissions were fully evaluable. 38 of them (27%) were COPD patients. Data (m±SD) results for statistical test are given in Table I. COPD patients were significantly older spent more time in the ICU and presented with significantly higher APACHE II scores. Outcome and DCAT were comparable in the two groups.

	Age	APACHE II Score	ICU fatality rate	LOS	D CAT
NON-COPD	59 ± 20.4	16.5 ± 6.4	34%	15.8 ± 14.1	$ 77.52 ± 43.66
COPD	68.6 ± 9.2	21.06 ± 5.5	45%	25.3 ±23.2	$ 77.50 ± 42.7
Significance	p<0.001	p<0.001	NS	p<0.05	NS

Conclusion: Although presenting as a high-risk group, COPD patients may benefit from ICU treatment, comparably to other patients. This benefit does not impart higher cost to the unit, at least with regard to antimicrobial therapy.

ANTIBIOTIC SENSITIVITY TESTING AS A COST FACTOR FOR ICU PATIENTS

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Infection is a serious complication in ICU treated patients, significantly affecting the outcome and cost of treatment.
Objective: This study investigates the contribution of culture and sensitivity testing in ICU patients to the cost of antimicrobial treatment.
Methods: Data were retrieved from the files of our ICU, including all admissions over 1994. 108 fully evaluable patients were given antibiotics because of signs of infection. In these patients antibiotics were given based on clinical judgment (73 patients) or on positive cultures and full sensitivity testing results (35 patients). The mean daily cost of antibiotic therapy per patient (DCAT), APACHE II score, fatality rate and lengh of ICU stay (LOS) were compared in the two groups. Significance was assumed at $p<0.05$.
Results: The two groups presented with comparable APACHE II scores, LOS, and in ICU fatality. The mean DCAT was not significantly different (Table I, mean ± SD)

	Age	APACHE II Score	ICU fatality rate	LOS	DCAT
Empirical Therapy	56.5 ± 18.9	17.7 ± 7.02	30%	17.2 ± 13.4	$ 85.02 ± 42.1
Therapy based on sensitivity testing	59.6 ± 19.8	19.3 ± 5.12	37%	21.6 ±15.5	$ 91.10 ± 40.4
Significance	NS	NS	NS	NS	NS

Conclusion: Our data show that adjustment of antimicrobial therapy according to sensitivity testing does not significantly alter the cost of treatment or outcome provided the patients are at similar risk. Therefore, cost considerations are not sufficient to change a general trend towards vigorous treatment in ICU infections according to clinical judgment and sensitivity testing where necessary.

PHARMACOKINETIC OF TEICOPLANIN AT THE STEADY STATE DURING CONTINUOUS VENOVENOUS HAEMODIA--FILTRATION (CVVHD).

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Introduction: Data on kinetics of drugs during continuous renal replacement therapy are scarce and limited almost exclusively to the first days of therapy. Teicoplanin (T) is an alternative to vancomycin ; but little is known about his pharmacokinetics during CVVHD.
Objective: To study kinetics of T at the steady state during CVVHD, including determination of his Sieving coefficient (Si) and the fraction of the drug removed by the extracorporeal route (Fr extra) .
Methods: We studied 5 patients (age 72.4±5.22; weight 83.6±11.7 kg; SAPS2 59.8±5.85; OSF 3.2±1.1) treated by CVVHD (pump BSM22®, PAN haemofilter AN69S®, dialysate Hemosol L2D®, HospalSA, Lyon, France; blood flow 100 ml/min, flow of dialysate: 1l/h) and receiving T for 5 days (400mg each 12 hours during 36 hours, then 400 mg per day). Concentration of T (mg/l) was determined by FPIA (TDx, Abbott®) in the blood and in the combined dialysate and ultrafiltrate 30 min and 1 h after the end of the infusion, each h during the 6 first h and each 6 h untill the 24th h.

Results:	concentration of T	Si	Fr extra
pt 1	23.3±5.6	0.26±0.05	43.4%
pt 2	24.9±6.5	0.22±0.04	37.7%
pt 3	23.7±5.4	0.26±0.07	35.8%
pt 4	25.5±4	0.15±0.04	24.0%
pt 5	25.0±8.8	0.3±0.06	50.9%

In the 3 patients who where not anuric, the amount of drug removed by the kidneys was very low (1.72%-6.3% of the dose).
Conclusion: Published data about kinetics of T during continuous renal replacement therapy proposed a Si of 0.10 and a Fr extra range from 12 to 24%,depending on the D+UF flow rate (Reetze-Bonorden Clin Pharmacokinet 1993;24:362-79). Our data seems to indicate that a larger amount of drug could be removed through the haemofilter. Dosage adjustment of T during CVVHD should be based on plasma concentration monitoring. If not avalaible, then a dose of 400mg/d seems to be adequate for the treatment of severe staphylococcemia.

BLOOD CRP LEVELS CAN BE USEFUL TO RULE OUT THE PRESENCE OF INFECTION IN FEBRILE PATIENTS

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Objective: To evaluate the relative value of white blood cells count (WBC), C-reactive protein (CRP) and blood lactate in discriminating infected from non-infected patients who develop fever in the ICU.
Methods: From February 21 to April 21, 1995, we prospectively monitored WBC, CRP and lactate levels in all adult (>16 years) patients who stayed for at least 48 hours in a multidisciplinary ICU and who developed temperature ≥ 38.2° C. Patients were classified in three groups according to the presence of infection (Center for Disease Control criteria) as well as the isolation of a pathogen: *Documented Infection* : CDC criteria + isolation of pathogen; Possible Infection : CDC criteria without isolation of pathogen; *Unlikely Infection* : patients who did not meet the CDC criteria.
Results: Of a total of 208 ICU patients, 74 developed fever: 39 patients had documented infection (52.7%), 15 possible infection (20.3%) and 20 unlikely infection (27.0%). CRP values discriminated patients with unlikely infection (table). A CRP less than 6 mg/dl was found in only 7 of 37 patients with documented infection (19%), but it was observed in 12 of the 17 (71%) patients with unlikely infection ($p = 0.001$). Blood lactate and WBC did not differentiate groups.

1st day of fever (highest values)	WBC	Lactate	CRP
Documented Infection	14 429 ± 6 482	2.24 ±1.56	12.6 ± 8.2 *
Possible Infection	11 873 ± 6 527	2.17 ± 1.55	10.5 ± 8.0⊗
Unlikely Infection	12 975 ± 5 290	2.69 ± 2.50	5.4 ± 6.4

* $p < 0.001$, ⊗ $p < 0.05$, vs. Unlikely Infection

Conclusions: In febrile ICU patients the highest CRP of the first day of fever can be useful to rule out an infection. WBC and lactate levels are not helpful for this purpose.

VALUE OF MAGNETIC RESONANCE IMAGING (MRI), SINGLE PHOTON EMISSION COMPUTED TOMOSCINTIGRAPHY (SPECT), AND MULTI-MODALITY EVOKED POTENTIALS (EPs) FOR THE MANAGEMENT OF ACUTE VIRAL ENCEPHALITIS IN ICU PATIENTS.

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Objectives: To evaluate the usefulness of different paraclinical investigations for the diagnosis and prognosis of acute viral encephalitis in ICU patients.
Methods: We reviewed 13 patients (pts) admitted to our ICU from july 1989 to december 1993 with the diagnosis of acute viral encephalitis. All were in coma and were initially treated as presumed herpes simplex virus (HSV) encephalitis. The causative agents were: HSV (2 cases), Herpes zoster varicellae (1), measle (1), rabies (1), unidentified (8). Eleven pts survived and three presented neurologic sequelae. Twelve pts were investigated by MRI, and eleven also by SPECT and multi-modality EPs, including brainstem auditory EPs (BAEPs). These investigations were obtained as soon as possible following admission and were repeated during ICU stay when possible. The clinical outcome was noted.
Results: Six pts (6/12) had an abnormal MRI. Among them, 2 pts made a complete recovery, in comparison with 5/6 pts with a normal MRI. In one HSV infected patient, MRI remained normal despite clinical deterioration and bad outcome. When repeated, MRI became abnormal in 3 cases (with poor outcome in one) and was improved in one. SPECT was found abnormal in 10/11 pts (among them, 4 pts had thus a normal MRI). The correlation regarding the topography of brain lesions was poor between MRI and SPECT. The findings of SPECT could not be correlated with a poor outcome. The BAEPs confirmed in 56% of the pts the clinical diagnosis of brainstem involvement. Changes in visual and somatosensory EPs were mild in all the pts and were not helpful for the prognosis. EPs were otherwise interesting for the follow-up of the coma in these sedated and ventilated pts.
Conclusions: The value of MRI and EPs for the diagnosis of acute viral encephalitis is of limited interest. SPECT seems to show early modifications, even in pts with a normal MRI, but this test is poorly specific and does not correlate with MRI changes when present. Concerning the prognosis, larger studies should probably confirm that a normal MRI could usually result in a good outcome. This serie illustrates also that HSV encephalitis could be demonstrated only in a small number of cases and that the prognosis of non HSV encephalitis is not easily assessed.

INFLUENCE OF NOSOCOMIAL BRONCHOPNEUMONIA ON LIVER FUNCTION IN MECHANICALLY VENTILATED (MV) PATIENTS (PTS).

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Objectives: To study the influence of Gram (-) bacterial lung infections on liver function in MV ICU pts.
Pts and methods: We studied 102 pts, 68 ♂ (66,7%), 34 ♀ (33,3%). Mean age:48,3±14,2 years (16-82). Mean stay in ICU:13,3±4,9 days (8-75). They were divided in 2 groups: A(44 pts) who did not suffer from pneumonia and B (58 pts) who developed a Gram(-) bacterial pneumonia. Both groups were consisted of pts with same age, sex and disease distribution and same systemic failures. We measured SGOT, SGPT, total bilirubin(TB), direct bilirubin (DB), alk.phosphatase (Al.ph.), γ-GT and albumin (Alb.) 3 times: on days 0, 4 and 7 of the pneumonia for group B and respectively for group A.
Results:

	Group A(44 pts)			Group B(58 pts)		
	Day 0	Day 4	Day 7	Day 0	Day 4	Day 7
SGOT	31±8	30±8	27±6	30±6	60±14^x	69±16^y
SGPT	34±9	35±8	32±9	32±7	68±12^y	88±19^z
TB	1,0±0,3	1,3±0,4	1,1±0,3	1,0±0,2	2±0,4^x	2±0,4^y
DB	0,4±0,2	0,6±0,2	0,5±0,1	0,3±0,1	1±0,2^x	1±0,2^y
Al.ph.	58±17	72±24	67±18	51±13	99±24^y	107±17^y
γ-GT	34±8	40±10	42±12	29±6	66±17^x	69±18^x
Alb.	33±0,4	2,8±0,3	2,7±0,4	3,2±0,5	3±0,4	3±0,4^x

x=p<0,05 y=p<0,01 z=p<0,001

Conclusions: Respiratory Gram(-) bacterial infections provoke a significant deterioration of liver function. This disfunction might be mediated through Gram (-) endotoxin and therefore every effort should be made to prevent nosocomial lung infection in ICU pts.

MICROBIAL SPECTRUM OF NOSOCOMIAL PNEUMONIA (NP) IN INTUBATED ELDERLY PATIENTS (PTS).

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Objectives: To estimate the microbial spectrum of nosocomial pneumonia in intubated elderly pts in an ICU.
Pts and methods: 422 pts, 297 ♂, 125 ♀ had a NP in the ICU, diagnosed with clinical and laboratory findings. All of them were under mechanical ventilation. From them, 121 (28,7%) were > 65 years old, 91 ♂ (75,2%), 30 ♀ (24,8%). Mean age: 71,2±3,2 years (66-85). Mean stay in ICU: 11,9±4,4 days (4-120).
Results: In cultures of bronchial secretions were isolated: Pseud.aeruginosa 56, Acinetob.baumanii 44, Klebs.pneumoniae (KP) 34, Staph.aureus 11, Serr.marcescens 7, Xanthom.maltophila 5, Staph.epiderm. 5, Enterob.cloacae 3, Citrobacter spp. 2. Bacteremia with the same pathogen as in bronchial secretions was noticed in 19 pts (15,7%).
Conclusions: 1) In elderly intubated pts of an ICU, KP is isolated more frequently than in ICU pts<65 years (p<0,01). 2) The frequency of isolation of KP in ICU pts during 1985-92 was 25-30%, but now (1992-95) KP becomes more and more rare (12-15%) and is isolated especially in elderly pts. 3) Its sensibility to antibiotics remains always the same. 4) The prognosis of NP in our study was independent from age (p<0,1), sex, presence of bacteremia (p<0,1) and type of invading microorganism.

NEBULIZED VS IV ADMINISTRATION OF AMINOGLYCOSIDES

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Objectives: Lower Respiratory Tract Infections (LTRI) due to Gram neg bacteria and Renal Failure (RF) from aminoglycoside toxicity are common and serious complications in critically ill patients. The aim of this prospective, pilot study was to compare the safety and adequancy of the endotracheal (ET) vs the intravenous (IV) administration of aminoglycosides.
Methods: Using immunoassays the levels of Gentamycin (GM) were measured in the plasma and the bronchial secretions at 1 and 4 hours after the IV (bolus) or the ET (nebulized) administration of 80 mg of GM in seven criticcally ill patients (3 with established renal failure). *Safety* was defined as peak and trough plasma GM levels ≤ than 8 and 2 μg/ml respectively and *adequancy* as GM levels in bronchial secretions ≥ 0,5 μg/ml.
Results: Gentamicin was administered by the ET and IV routes in 18 and 7 separate sessions respectively. A total of 107 samples were assayed, 69 in bronchial secretions (bs) and 38 in serum. The ET route resulted in higher GM levels in the bronchial secretions compared to the IV route (3,26 ± 2,86 vs 2,1 ± 2,1 μg/ml respectively, p = NS). Adequate bronchial GM levels were achieved in 100% of patients after ET administration, compared to 66% after IV administration. The blood levels of GM were significahtly lower after the ET vs the IV route (1,56 ± 1,95 vs 5,56 ± 1,96 μg/ml respectively, p ≤ 0.01). The ET administration resulted in toxic bronchial GM levels in 47% of the specimens. 66% of these samples were from patients with renal failure, however toxic blood levels were reached in only 12% of these.
Conclusions: The entotracheal administration of nebulized Gentamicin seems to be a safe and adequate alternative route of treatment for the LRTI. However, in patients with renal failure the ET administration of the aminoglycosides should also be modified and continuously monitored.

IMMUNE RESPONSE TO ANAEROBIC BACTERIA SPECIES IN PATIENTS WITH NOSOCOMIAL PNEUMONIA WITH ANAEROBES.

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In order to evaluate the pathogenic role of anaerobes in nosocomial pneumonia (NP), we investigated the systemic humoral response in patients who developed a NP with anaerobic bacteria, especially *Prevotella* species.
Methods: Blood samples from 4 groups of patients were tested. Group I: 13 patients with a NP in which *Prevotella spp.* was isolated from protected specimen brush (PSB), Group II: a control group of 30 patients with a NP without anaerobic bacteria, Group III: a control group of 27 patients with dental stumps but without pulmonary infection, Group IV: a control group of 30 healthy voluntary people with *Prevotella spp.* isolated from the dental plaque. An ELISA was used to evaluate the total antibodies level against a mixture of four *Prevotella* strains and a Western-blot method was done to identify the antigenic proteins.
Results: Data are expressed as means ± SD. The antibody levels in patients of group I (63±45) was statistically higher (p=0.005) than in the 3 control groups (respectively: 29±25, 32±25, 31±23). Using Western-Blot method, the intensity of the response was roughly superposable to levels obtained by ELISA and the profiles were different according to the *Prevotella* species.
Conclusion: The occurence of a NP with anaerobic bacteria (*Prevotella* species) isolated from PSB leads to an antibody response which seems specific of the *Prevotella* species isolated.

EVALUATION OF FEVER AND ITS RELATION TO INFECTION IN THE INTENSIVE CARE UNIT

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Objectives: Fever is common in the Intensive Care Unit, but is not always related to an infection. We sought to define the epidemiology of febrile patients in a general medical/surgical ICU.
Methods: We prospectively analysed the source of fever (T >38.2° C) in all adult patients admitted for ≥ 48 hours in the ICU during a two month period. These patients were studied for 14 consecutive days, and were classified in 3 groups according to the evidence of infection (Center for Disease Control criteria) after complete evaluation: *Documented infection*: CDC criteria + isolation of pathogen (D); *Possible infection*: CDC criteria without isolation of pathogen (P); *Unlikely infection*: patients who did not meet the CDC criteria (U).
Results: Of a total of 208 patients studied, 74 developed fever (35.6%), including (after complete evaluation) 39 D, 15 P and 20 U patients. Both the highest temperature in the first day of fever and the maximal temperature were higher in D than in U (38.7±0.6°C versus 38.5±0.3°C and 39.2±0.9°C versus 38.6±0.4, respectively p= 0.05 and p= 0.003). Most common sources of infection in D were the lungs in 25 patients (64%) and urinary tract in 4 (10%). 14 of these patients had positive blood cultures (36%). The overall mortality was 27% (23% in D, 40% in P and 25% in U, differences NS). Antibiotics were given in 100% of D, 73% of P and 15% of U (3 patients). In P there was a non significant lower mortality in patients who received antibiotics (3 /11 (27%) versus 3 /4 (75%) patients, respectively) .
Conclusions: In febrile ICU patients both the highest first day temperature and maximal temperature are significantly higher in infected than in non infected patients, but the differences are too small to be useful clinically. Mortality rate is not significantly influenced either by the presence of an infection or by the administration of antibiotics.

INFLUENCE OF FUNGAL INFECTION ON OUTCOME IN ICU PATIENTS

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Objective: Retrospective study to determine the influence of candida infection on ICU outcome.

Methods: 126 patient with a stay of more than 7 days in intensive care were screened for candida infection. 70 patients were treated with antifungal therapy due to either an increased antigen titre of ≥ 1:8 or clinical evidence of candida colonization. Serological Candida-antigens (RAMCO, Pastorex) and antibody titres (hemagglutination, IgG-, IgM-ELISA) were examined routinely. Seroconversion was defined as a threefold increase of antibody titre or a titre of 1:640 or higher.

Results: The median length of stay was 37 (ranging from 8 to 132) days, the mean APACHE II score on admission was 18 (± 5.8 SD) points. Of 126 patients 31 patients died (24.6%). In the group treated with antifungals (71 patients) 19 patients died (26.7 %). Although of the 126 patients only 51 (40.4 %) developed a candida infection as defined above the mortality in the group that showed signs of infection was significantly higher (37.2% vs. 14.6%, $p < 0.05$ [Chi-square-test]). In 34 patients an antigen concentration ≥ 1:16 was measured. Seroconversion was found in 41 patients. The most common fungus was Candida albicans (66.4 %). Furthermore, Candida glabrata was found in 21.1 %. Most of the patients were treated with 2 x 200 mg fluconazole (66 patients). In 38 patients therapy was changed to amphotericin B/flucytosine. In 5 patients therapy was started with amphotericine B and flucytosine. In 40 patients a threefold decrease of candida antigen titre was found. 27 patients showed a decrease of candida antibody titre.

Conclusions: Meticulous screening for candida infection seems to be necessary since the number of patients with fatal outcome is significantly higher in the group with signs of fungal infections and thus requires immediate antifungal treatment.

INCIDENCE OF ANAEROBES IN MECHANICALLY VENTILATED PATIENTS WITH PNEUMONIA : PROSPECTIVE STUDY.

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The role of anaerobes in mechanically ventilated patients with pneumonia (MVP) have been poorly investigated

Aim of the study : Analyse the prevalence of anaerobic isolation in MVP.

Methods : Between october 1992 and february 1995 all suspected MVP were investigated using protected specimen brush (PSB) technique. Brushes were rapidly transported in Shaedler broth to laboratory. A special care was tooken for anaerobic isolation.

Results : Among the 153 PSB performed for suspected MVP (132 nosocomial and 21 community-acquired pneumonia), 81 yielded at least one micro-organism (positive PSB : 53%). 63 of positive PSB demonstrated only aerobic bacteria and 18 (23%) yielded with anaerobes. In 14 out 18 patients, anaerobes were associated with aerobic bacteria. Anaerobes were mostly isolated in nosocomial pneumonia (17/76 positive PSB). 27 strains of anaerobes were isolated. *Prevotella* species represent 19 out these 27 strains (70%) The most frequent anaerobic species were *Prevotella oralis* (6) *P. intermedia* (5) and *P. buccae* (4).

Comments : Using adequate methods, anaerobic bacteria are frequently isolated in MVP. It could be off importance to take in account anaerobes in the choice of empirical antibiotic therapy in MVP.

THE USEFULNESS OF GRAM STAIN IN BRONCHOALVEOLAR LAVAGE SPECIMENS IN PATIENTS WITH SUSPECTED VENTILATOR ASSOCIATED PNEUMONIA.

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Objective: Early diagnosis of patients with ventilator-associated pneumonia (VAP), and subsequent identification of causative microorganism, and selection of the appropriate therapy are critical important points that affect morbidity and mortality. The results of the quantitative bacterial cultures are not available for at least 24 hours, while a two hours period, since the specimen are obtained is enough to know the gram stain results. The aim of this study is to determine the usefulness of gram stain in specimens obtained by bronchoalveolar lavage (BAL), through the bronchoscope.

Material and Methods: We studied 47 patients (36 males and 11 females, age 49 ± 23) with suspected ventilator-associated pneumonia. The BAL gram stain was considered positive when the specimen after a centrifugation at 1500 rpm for 15 min revealed: i) more than 20 leukocytes per optic field, ii) squamous epithelial cell less than 1 percent and iii) one or more microorganisms per optic field on 1000 magnification. All patients had been receiving antibiotics, with no change during the last 3 days, prior to bronchoscopy.

Results: 8 patients had VAP and 39 patients did not. In 5 cases the BAL specimens (quantitative bacterial cultures) established the diagnosis of VAP In the remaining three patients the VAP diagnosis was established by other procedures (blood or pleural fluid culture, clinical outcome, autopsy). Apache II score in patients with VAP was 15,7 ± 5,5, while in patients without VAP was 17,9 ± 6,4. There was a significantly higher incidence of VAP in patients who had i) coma (GCS <8) and II) been receiving neuromuscular blockade ($p<0.05$) . The sensitivity of the gram stain for VAP diagnosis was 75%, the specificity 89,5%, the positive predictive value 60%, and the negative predictive value 94,6%.

Conclusion: Our data indicate that the gram stain of BAL specimens is useful for the early diagnosis of VAP and the subsequent administration of the appropriate treatment.

RISK FACTORS OF VENTILATOR ASSOCIATED PNEUMONIA IN PATIENTS WITH MULTIPLE TRAUMA OR MAJOR SURGERY.

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Objectives: The majority of patients with multiple trauma are considered immunocompromised. The aim of this study was to identify risk factors of pneumonia in mechanically ventilated patients with multiple trauma or after surgery.

Methods: In this prospective study we studied 64 multi-trauma patients (mean age 58 ± 19 years, Apache II 16.5 ± 6), admitted to a general intensive care unit (ICU). All patients were intubated and mechanically ventilated. We were considered that a patient had Ventilator associated pneumonia (VAP) when the specimens of Bronchoalveolar Lavage (BAL) or Protected Specimen Brush (PSB), obtained through the bronchoscope, had one or more microorganisms in concentrations greater than 10^5 and 10^3 cfu/ml respectively. All patients had been receiving antibiotics, with no change during the last 3 days, prior to bronchoscopy.

Results: 14 patients had VAP, and 50 patients didn't. In the bivariate analysis, the Glasgow Coma scale (GCS)<8 ($x^2=4.15$, $P<0.05$), the administration of neuromuscular blockade ($x^2=7.9$, $p<0.05$), the duration of mechanical ventilation to be greater than 5 days ($x^2=5.5$, $p<0.05$), the flail chest ($x^2=4.1$, $p<0.05$), the parenteral nutrition ($x^2=5.6$, $p<0.05$), the ARDS ($x^2=3.9$, $p<0.05$), the Abbreviated Injury Scale (AIS) of more than 4 for thorax ($x^2=5.9$, $p<0.05$), the pneumothorax ($x^2=5.1$, $p<0.05$) were statistically significant related to development of VAP. In multivariate regression analysis, using the stepwise technique, three of the seventeen studied factors showed to have an indepentent association with the development of VAP:The administration of neuromuscular blockade (F: 4.8, $p<0.001$), flail chest (F:3.0, $p=0.003$), and GCS (< 8) (F:2.1, p= 0.039).

Conclusions: In patients admitted to ICU for multiple trauma or major surgery, the administration of neuromuscular blockade, the flail chest, and the GCS (<8), in the population under study, were the indepedent risk factors for VAP.

6. MOF

Approach to estimation of probability of MOF development among patients with sepsis and septic shock.

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MOF is a sereous complication of different states: infection, sterile inflamation, extensive tissure injure, intoxication, ets. There is close correlation between extension of MOF and death, developement of nasocomial infection, immunologic disfunction.

In order to prgnose probability of risk of MOF development among the patients with sepsis and septic shock, we achived an eqation, allowing to recive a coeficient, closely connected with this probabiliti.

We have used retrospective analisis of 160 cases of sepsis. Diagnosis of sepsis was based according to Bone's criterions of sepsis. MOF was assessed as disfunction of 2 or more systems according to Bone's classification of MOF.

Having used correlation analisis we have estimated factors which have had high correlation coeficient with the probability of development of MOF. There were: APACHE-II score points, evidenceof septic shock, endocrinopathy.

With the help of multyple regression analisis we acheved next equation:

$$y = 0,2042 + 0,0243x_1 + 0,2931x_2 + 0,1504x_3.$$

Were x_1-APACHE-II score points, x_2-evidence of septic shock, x_3-endocrinopathy.

The explanatory power of this quation was evidenced by ROC of 0.88, SE (W) -0.033

INDICATORS OF HEPATIC DYSFUNCTION FOLLOWING TRAUMA, ABDOMINAL SEPSIS AND ACUTE NECROTIZING PANCREATITIS

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Introduction: The presence of liver dysfunction in the process of multiple organ failure is associated with an adverse outcome, particularly when it becomes progressive to liver failure. Disturbances of liver function may occur early and their detection may be of significant importance for the further development of organ failure. Routinely used liver function tests appear to be inconsistent indicators of hepatic damage. In this study, we used plasma disappearance rate (PDR) of indocyanin-green dye (ICG) as an early estimate of liver function.

Methods: We serially evaluated PDR and routine liver function tests (serum bilirubin, SGOT, SGPT), as well as acute phase and non-acute phase proteins (CRP, transferrin) in 26 patients during the first week after trauma or the onset of sepsis.

Patients: Group 1: (n = 11) multiple trauma ISS > 30, Group 2: (n = 15): abdominal sepsis, acute necrotizing pancreatitis (ANP) grade III. Patients were selected on the basis of clinical estimates that these patients would require continued ICU observation. PDR was determined by means of a fiberoptic catheter and a computerized system (COLD Z-021, Pulsion), which permits repeated bedside measurements.

Results: The initial values of PDR, serum bilirubin and transaminases were not significantly different in trauma, sepsis and ANP. In trauma patients PDR improved during the first week. In patients with sepsis and ANP PDR remained low and worsened with time. The decrease in PDR preceeded an increase in biochemical liver function tests in these patients.

Table:

	PDR %	Bilirubin mg/dl	SGOT U/L	CRP mg/dl	Transf. mg/dl	MOF score
Trauma:						
day 1	14.2±2.8	1.3±0.4	27±5.1	5.7±1.1	114±6.9	5(3-6)
day 7	24.5±2.9	1.3±0.4	17±4.3	9.3±1.7	159±7.9	4(2-5)
Abdominal sepsis, ANP:						
day 1	14.5±1.4	1.7±0.3	30.6±7.1	22.2±3.9	135±12	5(3-7)
day 7	9.0±1.1	7.2±1.1	55.9±12	25.1±4.4	110±11	7(4-9)

Discussion: Routinely available blood tests of liver function are usually altered several days after injury . However, they are generally non-specific indicators and they are influenced by extrahepatic factors. PDR seems to be useful to evaluate impaired liver function early after the onset of sepsis and trauma.

FREQUENCY OF ORGAN SYSTEM FAILURE IN GRANULOCYTOPENIC PATIENTS WITH SEPTIC SHOCK.

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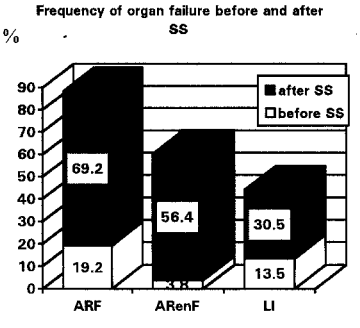
Objectives: To study frequency of organ system failure (OSF) and it's influence on outcome in granulocytopenic patients with hematological malignancies and septic shock(SS).

Materials and Method: Retrospective review of medical records of 52 granulocytopenic(WBC<0,5x10^9) patients with hematological malignancies and SS, who were admitted to the Intensive Care Unit (ICU). Frequency of OSF before and after SS was analysed. The patients were categorised on survival and non-survival.

Results: Signs of OSF were observed in 28.8% of patients before SS and in all patients after SS. Only 3 patients presented with hypotension refractory to inotropic therapy. Nevertheless there was a significant increase of frequency of acute respiratory failure (ARF), acute renal failure (ARenF) and liver injury (LI) after SS occurred(showed on the figure). Only 5 (9,6%) patients survived and were discharged from ICU. No one who developed OSF before SS or had more than three of organ systems failure, had survived.



Conclusion: Despite of different reasons (chemotherapy toxicity, infection, malignancy itself) for development OSF in these patients, signs of OSF before SS and failure more then three organ system after it point to poor outcome

HOMEOSTASIS-SECURING THERAPY AND STATUSMETRIA

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Objectives: Statusmetria allows to define the effective level of oxygen status and accordance to it means of carbon dioxide and electrolytes in critical care. The conception of syndrome intensive care (SIC) is exhausted itself and invariable outcomes of SIC of Multiorgan System Failure (MOSF) confirms that. Therefore, an alternative to SIC should be advanced.

Methods: Efficiency of treatment has been assessed in 257 patients with MOSF using value of metabolic rate and ability of an organism to cover it by oxygen and substrate supply. Oxygen pulse (OP) and Index of Efficacy of Oxygen Transport ($IETO_2$) was monitored.

Results: Intensive care is considered to be Homeostasis-Securing Therapy (HST) if energostructure deficit is eliminated and necessary for recovery regeneration rate is restored. OP in patients with MOSF was 0.8 ml·m^{-2} and less and $IETO_2$ was 2.4 units in SIC. We managed to maintain OP of 1.0-1.7 ml·m^{-2} and $IETO_2$ of 1.9-2.4 units in HST. 41 patients from 135 with MOSF survived in SIC and 96 patients from 122 survived in HST. Efficiency of HST appeared to be two times as much as efficiency of SIC.

Conclusions: Conception of homeostasis-securing therapy is advancing. The conception provides restoration of regeneration rate due to effective then in SIC elimination of energostructure deficit. The conception may be a basis of new technology for treatment of MOSF.

EVIDENCE OF REPERFUSION INJURY IN MULTI ORGAN DYSFUNCTION SYNDROME

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Objectives: Xanthine dehydrogenase is converted under conditions of ischemia, reperfusion and endothelial damage to xanthine oxidase, with superoxide anion as a co-product of its catalytic activity. Multiorgan dysfunction syndrome is associated with splanchnic vasoconstriction resulting in significant and prolonged gut ischaemia. Aggressive volume resuscitation with prompt restoration of blood flow results in reperfusion of the tissue and is likely to cause xanthine oxidase-mediated release of oxygen-derived radicals. This study investigates xanthine oxidase activation and oxygen-derived free radical-mediated damage in such patients.
Methods: Fourteen consecutive patients on ITU who met established criteria for septic shock and secondary organ dysfunction were studied. Serum xanthine oxidase activity was measured using oxidation of a chromagen in a dual enzyme system and plasma malondialdehyde was measured using a specific spectrophotometric assay. APACHE II scores, blood pressure, SVR, cardiac output and 28 day survival were also recorded. Biochemical data were compared with results from 20 healthy subjects.
Results: Xanthine oxidase activity was 6.30 ± 1.59 units/l in patients (mean ± SEM) and 0.74 ± 0.12 units/l in controls ($p<0.01$, Mann Whitney U test), and was highest in the 6 patients who survived ($p<0.05$). Malondialdehyde concentrations were elevated (0.81 ± 0.11 µmol/l compared with 0.29 ± 0.05 µmol/l in controls, $p<0.001$). Xanthine oxidase activity did not relate to APACHE score or any of the cardiovascular parameters recorded, and was not influenced by the degree of organ dysfunction.
Conclusions:
Patients with sepsis and secondary organ dysfunction have xanthine oxidase activation and evidence of free radical damage. The finding that activity was highest in those patients who survived suggests that reperfusion was incomplete in patients who died, with decreased tissue xanthine oxidase 'wash out' into the circulation.

INFLUENCE OF EARLY INFLAMMATORY RESPONSE ON THE ABILITY TO ELIMINATE OXYGEN DEBT IN PATIENTS AFTER TRAUMA OR SURGERY.

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Objectives: Evaluate the influence of inflammatory response (IR) on the ability to eliminate oxygen debt after trauma or surgery.
Methods: Ten high risk patients were included in study. Therapeutic approach with maximal efforts to enhance DO_2I was used. For statistical analysis patients were divided into two groups (responders: R-group and nonresponders: NR-group) according to elimination lactate load up to first 24 Hrs. The changes in hemodynamic and oxygenation data morbidity and mortality rate were evaluated.
Results: There were five responders and five nonresponders. Four patients from NR-group died. In R-group all patients survived. IR started in NR-group up to 24 Hrs but in R-group it was 52±12 Hrs in average. In R-group there were significant increase in CI, LVSWI, DO_2I up to 24 Hrs. In NR-group these parameters didn't change, but significantly decreased SVRI, O_2ER and significantly increased HR and Qs/Qt. DO_2I was supranormal in both groups. VO_2I was supranormal in R-group but in NR-group VO_2I did not meet supranormal range. Significant differencies in organs dysfunctions we noted. Only 22% of microbiological examinations were positive in NR-group up to 48 Hrs.
Conclusion: We conclude that early IR may be a reason of inability to eliminate oxygen debt up to 24 Hrs after trauma or surgery despite supranormal values of DO_2I.

MULTIPLE ORGAN FAILURE IN THE CRITICALLY ILL OUTCOME AND COSTS - A SIX MONTH FOLLOW-UP STUDY

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Background: Multiple organ failure (MOF) in the critically ill remains a lethal condition and it is not clear that patient outcomes justify the considerable investment in terms of intensive care and human suffering.
Methods: Over a one year period, we prospectively studied 1106 patients in our Intensive Care Unit [ICU] of whom 92 patients (8.3%) had MOF. 64 patients with MOF stayed for more than 72 hours of whom 25 patients survived to leave hospital and were assessed at six months to determine their quality of life. Organ failure scores (OFS) and ICU costs were calculated and related to outcome.
Results: Whilst the ICU cost for the 92 patients with MOF was £1,122,741 (29% ICU expenditure), the ***effective cost per hospital survivor*** (ECPS) was only £38,715. 28 patients spent less than 72 hours in the ICU (24 deaths) giving an ECPS of £21,012. In contrast, the 64 patients staying more than 72 hours (31 ICU and 8 ward deaths) gave an ECPS of £41,548; 18 of the 25 hospital survivors who were assessed at six months were found to have an acceptable or good quality of life; 2 had a poor quality of life, 3 were dead, 2 did not respond. Organ failure scores were significantly different between survivors and patients who died, notably on the day of ICU discharge in the 8 ward deaths compared with the 25 hospital survivors.
Conclusions: Patients with MOF form a small minority in the ICU but consume a disproportionate share of available resources, directly related to length of stay. Whilst the ECPS was not excessive, it might be reduced still further if ward deaths following ICU discharge could be prevented.

PRELIMINARY EVALUATION OF A FIBRE-OPTIC SENSOR FOR MEASURING INTRAGASTRIC CARBON DIOXIDE TENSION

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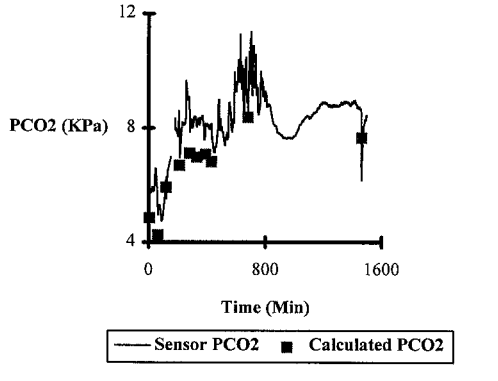
Objective: Evaluation of the feasibility of measuring the intragastric partial pressure of carbon dioxide (PCO_2) using a chemiluminescent optode and fibre-optics originally developed for intravascular blood gas monitoring(P7).
Methods: The PCO_2 electrode was calibrated *in-vitro* according to the manufacturers instructions. The sensor was then stripped of its outer casing and threaded down the pilot tube of a gastric tonometer (GT) so that the sensing portion sat well within the balloon. The modified GT was inserted nasogastrically after induction of anaesthesia in ten patients undergoing cardiopulmonary bypass. Throughout the procedure and for a variable period post-operatively, PCO_2 registered by the sensor was recorded directly into a notebook PC at 1 minute intervals. Intragastric PCO_2 was also calculated according to the GT manufacturers instructions (allowing 30 minutes dwell time) before, during and after cardiopulmonary bypass and at hourly intervals on the intensive care unit post operatively. At the end of patient monitoring the GT-P7 apparatus was tested against known PCO_2's in a laboratory tonometer.
Results: A total of 76 comparisons were made. Monitoring times were between 3.3 and 36 hours. Bias and precision are shown in the table below.

	Mean Bias (Kpa)	Mean Precision (KPa)	Mean Bias (%)	Mean Precision (%)
PCO_2 Pre-instillation *Vs* Calculated PCO_2	2.476	1.543	43.495	24.496
PCO_2 15 Minutes Post aspiration *Vs* Calculated PCO_2	2.469	1.242	44.933	18.351
PCO_2 at aspiration: Sensor *Vs* Blood gas analyser	3.24	0.937	69.859	19.053
Sensor PCO_2 *Vs* Known value	1.984	0.746	35.531	7.51

A Typical profile of continuous and intermittant monitoring with time is shown below.



Conclusions: The reading displayed by the fibre-optic sensor reflected changes in intra-gastric PCO_2. A large bias and poor precision were seen *in vivo*, however when tested *in vitro* at the end of patient monitoring the precision was within acceptable limits. The apparently poor performance seen *in vivo* may well be due to changes in intragastric PCO_2 during the comparison period, non uniform diffusion of CO_2 through the saline, innacuracies in the measurement of PCO_2 in conventional blood gas analysers, damage to the sensor during insertion, or any combination of these factors. Direct continuous measurement of intragastric PCO_2 using a fibre-optic sensor is possible, improvements in accuracy may be achieved by calibration of a sensor already placed at the tip of a nasogastric tube.

SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) AND MULTIPLE ORGAN FAILURE (MOF) IN PATIENTS ADMITTED TO MICU FOR GASTROINTESTINAL BLEEDING (GIB)

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Objectives: To determine the role of SIRS & MOF on the mortality of patients admitted to the MICU for GIB.
Methods: Records of 102 cases, treated in 1991-94, were reviewed. Demographics, GIB source, APACHE II score, presence of SIRS, sepsis, severe sepsis & septic shock defined according to the ACCP/SCCM Consensus Conference were recorded.
Results: 55 cases were male, 48(47%) were black & 47 (46%) white. Mean age (±SD) was 54.6(±16.8) years & APACHE II score 13.8(±6.6). Bleeding source was upper GI in 90(88%) & lower GI in 8(8%). SIRS developed in 34 (33%). Causes of SIRS were sepsis in 32(94%) & surgery & delirium tremens in 1 each. Severe sepsis was present in 13 & septic shock in 7. The most common source of sepsis was nosocomial pneumonia in 16, 15 required ventilators. The number of organ failures was 0 in 37(36%), 1 in 24 (24%), 2 in 10, 3 in 11, 4 in 6, 5 in 7 & 6 in 7 cases. In-hospital mortality rate was 31/102(30%). Causes of death were MOF in 11(35%), GIB in 8(25%), underlying chronic disease in 4, sepsis in 3, respiratory failure in 3, liver & renal failure in 1 each. The APACHE II predicted mortality (29.3%) correlated well with the actual mortality rate of 30%. 62% of the patients with SIRS died compared to 15% of those without SIRS (p 0.0001). None of the patients with no organ failure died compared to 48%(31/65) of those with 1 or more organ failure (p 0.0001).
Conclusions: MOF & SIRS are common in patients admitted to MICU for GIB. The causes of most deaths are directly related not to the bleeding but to the in-hospital complications. Prevention of sepsis & MOF can improve survival.

HEMODYNAMIC CHANGES CORRECTION IN ACUTE RENAL FAILURE PATIENTS

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Objectives: the patients with acute renal failure (ARF) have hemodynamic disorders in 100% of cases.The purpose of our study was to reveal the early disorders of hemodynamics and to correct them. 153 patients with severe ARF (different ethiology) were studied.
Methods:for the estimation of functional state of cardiovascular system the complex of methods was used:integral rheography by M.Tishenko, ECG, intravascular volume,the central venous pressure.
Results: according to the datas of integral rheography 70% of patients were revealed to have hypodynamic type of blood circulation (cardiac output was decreased on 35-40% and general peripheral resistance increased on 80-100%). It was effective to use complamin (xantinoli nicotinas) in the complex therapy of such patients. The dosage was 10-15 mg/kg during 4-6 days. As a result of such therapy was also the oliguric stage shortening (AC N 1464083). In 9,6% of the cases unsatisfactory datas of central hemodynamic,combined with high (more than 15 cm H2O) venous pressure,lung oedema.Then nanipruss (0,5-1,5mkg/kg/min) was succesfully used in complex with routine therapy.In the patients with low cardiac output and low general peripheral resistance mesaton (0,25-0,5 mg/kg) and dopamine (5-10 mkg/ kg/min) were effective.Change for the worse in the hemodynamics datas, inspite of therapy during 5-7 days,was prognostically unfavourable.
Conclusions:we consider early diagnostic of hemodynamic disorders and adequate correction of them is one of the most important factors, determined the outcome and prognosis in ARF patients.

CYTOKINE PRODUCTION IN RESPONSE TO ACUTE HYPOXIA IN HUMANS

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Objectives: Severe sustained hypoxia provokes systemic responses characterized by cellular damage, multiorgan dysfuction an frequently death. The objective of this study is to explore inflamatory mediator responses during acute hypoxia. Six healthy subjects aged 24-43 breathed 10% oxygen (O_2) for 30 minutes while monitoring arterial O_2 saturation (SaO_2), systolic/diastolic (BP S/D) and mean blood pressure (BPm), heart rate (HR) and EKG.
Methods: Interleukin-1 beta (IL-1ß) and Interleukin-1 receptor antagonist (IL-1ra) were determined by ELISA in the supernatant of whole blood incubated with Endotoxin by the method of Nerad and Dinarello, before (T0), at the end of 30 minutes of hypoxia (T30) and also at 90 (T90) and 180 (T180) minutes following resumption of air breathing.
Results: IL-1ra production increased significantly during hypoxia and remained elevated at T180. Between T0 and T30 $Sa0_2$ fell from 98% to 76%, BP S/D fell from 134/78 mmHg to 127/70 mmHg and BPm from 97 mmHg to 89 mmHg. HR increased from 71 to 84/min. No significant changes in IL-1ß production were noted.

IL-1ra pg/ml	T0	T30	T90	T180
MEAN	14942	18780	25498 p=<0.02	30047 p=<0.01

Conclusion: Acute hypoxia is associated with activation of circulating immune cells and increased cytokine production.

RENAL REPLACEMENT THERAPY IN SURGICAL ICU PATIENTS; MORTALITY IN RELATION TO DIAGNOSIS AND ORGAN FAILURE.

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Objective: To evaluate the results of renal replacement therapy (RRT) in surgical ICU patients with acute renal failure (ARF). ARF in ICU patients is associated with high mortality rates. We investigated the relation between mortality and organ failure in 4 different categories of surgical ICU patients receiving renal replacement therapy (RRT) for ARF.
Methods: The records of 76 surgical ICU patients with ARF requiring RRT (haemodialysis or CAVHD) were examined. Five different patient categories were defined;
1.Ruptured aneurysm of the abdominal aorta (RAAA) N=20
2.Elective vascular surgery (EVS) N=20
3.Abdominal sepsis N=17
4.Trauma N=8
5.Others (e.g. malignancy, obstetric emergencies) N=11
Seven organ systems (CNS,circulatory,respiratory,hepatic,renal,digestive,haematologic) were scored for possible failure using the MOF score.
Results: Mortality was as follows: all patients 72% , group 1 75% , group 2 70% , group 3 88% , group 4 38 % , group 5 75 % . Mortality increased with the number of failing organ systems; mortality for all patients with > 4 failing organsystems was 80% the only exception being the subgroup of trauma patients where mortality under these circumstances was 50%
Conclusions: Mortality in surgical ICU patients receiving RRT for ARF is high. No significant difference in mortality is found between RAAA and EVS. Mortality increases with the number of failing organ systems. The subgroup trauma patients shows a lower mortality compared to the group as a whole, even with > 4 failing organ systems.

MULTIPLE ORGAN FAILURE FOLLOWING KIDNEY TRANSPLANTATION

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Objectives: To look for the most accurate scoring system to measure the severity of the complications occuring in the early phase (first 30 day) of kidney transplantation and to asses their prognostic value.
Methods: In our retrospective study we applied the APACHE II and the Goris scoring system for the kidney recipients who developed multiple organ failure (MOF) as a consequence of their pulmonary and. cardiovascular complications following kidney transplantation. We evaluated the recipients according to both scoring systems on the day of the transplantation, on the day of the onset of pulmonary or cardiovascular complication and then, every day till the recovery or till the death of the patient.
Results: During the period from 1973 to 1994 MOF occured in 18 cases (1.9%) out of 945 kidney transplantation at our department. 4 patients survived. 14 died. There was no significant difference in the age (30 ± 16.6 ↔ 37.7 ± 17.4 year), and in the duration of treatment (47.2 ± 21.9 ↔ 37 ± 17.9 day) in the groups of survivals and the death.
The distribution of the women and men (60% ↔ 40 %) was the same as in the kidney recipients. Applying the APACHE II system most of the patients had their score between 10 and 19, and the function of 2,3 or 4 organs were affected at the time of the onset of MOF. The APACHE II system gave adequeate information about the disturbance of the function of other organs beside the kidney failure even at the time of the transplantation. The scores and the number of the affected organs correlated with the condition of the patients in the Goris scoring system but not as sensitively as in the APACHE II scoring system.
Conclusions: Both the Goris and the APACHE II scoring system can be applied to measure the severity of the multiple organ failure occuring during the early phase of kidney transplantation. However the APACHE II system is more suitable to follow not only the stateof the patients at the time of the admission but also the changes occuring in their condition during the complication.

OPTIMIZATION OF ANTIBACTERIAL THERAPY OF PATIENTS WITH SUPPURATIVE-SEPTIC COMPLICATIONS (SSC) AFTER CRITICAL STATES OF VARIOUS ETHIOLOGY

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Objectives: The analysis of SSC and results of their treatment in patients following critical states showed the necessity of developing a combined antibacterial therapy.
Methods: According to the protocol 97 patients (18-60 years old) with combined trauma and massive hemorrhagy following vast and traumatic operations were examined. Microflora's composition and resistence to up-to-date antibiotics was studied using the analyser IEMS Reader by "Labsisteme"(Finland). General clinical, bacteriological, immunological indices, as well as the duration of the treatment and recovering rate served as criteria of the combined antibacterial therapy effectiveness.
Results: It was proved expedient to administer antibiotics in staphylococcus infection in the following combinations: Riphampizin with fluoroquinolones; I-II degeneration, cephalosporins with aminoglycosides; cephalosporins with fluoroquinolones. In case of singling out the exciters of the Euterobacteriaceae family, including the Pseudomonas aereginosa, - fluoroquinolones combined with modern amynoglycosides; fluoroquinolones with ureidopenicillines; ureidopenicillines with amynoglycosides; amynoglycosides with the II-III generation cephalosporins; cephalosporins with fluoroquinolones. In severe SSC caused by combined infection (including anaerobes) clindamicin with modern amynoglycosides was prescribed.
Conclusion: The combined antibacterial therapy allows: 1) to increase the effect on microbic agents and the efficacy of treatment in combined infections; 2) to lessen the possibility of the exciters'resistence to antibiotics; 3) to prevent the development of superinfection: 4) to decrease the doses of medicine and its toxic effect.

AUTOMATIC ADMINISTRATION SYSTEM FOR LOW DOSE CARBON MONOXIDE TO MEASURE CIRCULATING BLOOD VOLUME.

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Objectives: Two methods of blood volume measurement in a group of critically ill patients were compared to investigate the practical possibilities of a new easy to use method based on carbon monoxide (CO) uptake.

Methods: All patients had multi-organ failure and haemodynamic monitoring with a Swan-Ganz catheter. Mean APACHE II score was 19 (10-25). When indicated, 9 patients had blood volume measurements simultaneously based on the techniques of, i) dilution of ^{51}Cr labelled red cells, and ii) inhalation of carbon monoxide gas with measurement of the rise of carboxyhaemoglobin produced. The CO was administered via a newly designed, ventilator driven, fully closed circle system ensuring CO retention and CO_2 removal with automatic addition of oxygen to match patient uptake. A portable computer performed all necessary calculations.

Results: Volumes obtained by CO uptake were compared with the "gold standard" radiolabelling method. Mean blood volume determined by the CO method was 6310ml (4710-7959ml) compared with 4690ml(3755-5778ml) with ^{51}Cr labelled red cells (r=0.9). Regression analysis produced an intercept at 769ml. The slope of the regression line was 0.62 (0.33-0.9, 95% confidence limits).

Discussion: The CO method produces volumes in excess of the radiolabelling method. There appears to be a systematic error, and one possible explanation is CO binding to substances other than haemoglobin.

Conclusion: The CO method is easier to use than radiolabelling and of the lower cost, since COHb measurement only is required. Accuracy is sufficient for clinical use and our preliminary findings suggest this system will meet the requirements.

INVOLVEMENT OF NITRIC OXIDE IN HEMORRHAGIC SHOCK: EFFECTS OF N^G-MONOMETHYL-L-ARGININE ON HEMODYNAMICS AND ORGAN INJURY

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Objectives: This study was conducted to determine the role of nitric oxide (NO) in the pathophysiologic alterations and multiple organ damage, and the possible effects of N^G-monomethyl-L-arginine (L-NMMA) on hemodynamics and mortality in rats caused by a prolonged hypovolemic insult.
Methods: A prolonged hemorrhagic shock (30-35 mmHg for 180 min) was induced in anesthetized rats followed by adequate resuscitation. L-NMMA was administered intravenously at doses of 2.0 mg/kg or 20.0 mg/kg at the end of resuscitation.
Results: Infusion of 2.0 mg/kg L-NMMA diminished the fall in mean arterial pressure, significantly increased the cardiac index (CI) and stroke volume (SV), together with remarkable protection from multiple organ damage compared to the controls. The 48 h survival rate was significantly improved from 26.7% in the control group to 68.8% in the treatment group ($p<0.05$). In contrast, the high dose of 20.0 mg/kg L-NMMA resulted in a strong blood pressure response but a marked reduction in CI and SV concomitant with an increased total peripheral resistance index within the observation period, and caused severe damage to various organs at 2 h after treatment. In addition, marked elevation in both endotoxin and TNF levels were observed in animals subjected to shock insult.
Conclusions: These results suggest that NO induced by hemorrhagic shock in rats is an important mediator for pathophysiologic alterations associating with cardiovascular abnormalities, multiple organ dysfunction, and even lethality. Thus, regulation of NO generation and use of NO inhibitors might provide new aspects in the treatment of hemorrhage related disorders, and the use of L-NMMA would be either deleterious or salutary in a dose dependent manner.

RISK FACTORS FOR HEPATIC DYSFUNCTION DURING MULTIPLE ORGAN SYSTEM FAILURE.

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Objectives: Patients with hepatic dysfunction account for 50 % of mulptiple organ system failure (MOSF) patients (Hebert, Chest-1993). The purpose of this study was to assess the risk factors for hepatic dysfunction in MOSF.
Methods: 733 patients have been hospitalized in our ICU from January 1992 to May 1994, 198 (27%) with MOSF. Among MOSF patients, 57 (29%) have had hepatic dysfunction defined according to Hebert (bilirubin ≥ 60 µmol/l, Chest 1993). Thirty six of these 57 patients acquired hepatic dysfunction after admission in the ICU. These 36 patients were compared with 36 MOSF patients without hepatic dysfunction selected blindly. Chronic diseases, severity scores, cause of admission, clinico-biological and hemodynamic parameters, use of vasopressors, use of hepatotoxic drugs, use of nutritional support and mortality were compared for hepatic failure and non hepatic failure groups.Twenty nine patients had post-mortem hepatic histologic examination.
Results: Univariate analysis: only parameters with $p \leq 0.05$ are presented.

Name of variable	Patients with hepatic failure	Patients without hepatic failure	p
Age (years)	61.2	69.7	0.01
Death (%)	75	61	0.21
Recent vascular surgery (%)	25	2.8	≤0.05
COPD (%)	22	50	0.01
Alcoholism (%)	30.5	8.3	0.02
Cirrhosis (%)	22	0	≤0.05
Cardiac failure (%)	30.6	75	9.10^{-3}
SAPS at admission	14.6	18	0.007
SAPS the first day of MOSF	15.4	19.7	0.002
Systolic blood pressure on day1 of MOSF (mmHg)	83	74	0.04
Platelet count (/mm3)	161000	231000	0.01
Number of red blood cells infused in the 5 days before MOSF	6.2	2.9	0.01
Vasopressors (%)	63.8	91.7	0.01
Sucralfate (%)	44.5	91.7	0.004
Glucidic nutritional support on day1 of MOSF (Kcal)	458	648	0.003
Lipidic nutritional support on day 1 of MOSF (Kcal)	261	467	0.049

Including these parameters in a multivariate analysis, only cirrhosis and vascular surgery remain independent risk factors for hepatic dysfunction. In particular, PaO2/FiO2, arterial lactate, DO2 were not different between the two groups. Some degree of histological abnormalities was found in all liver samples, despite a normal bilirubin level in 15 % of the cases
Conclusions: In our patients, contrary to previous studies, hypoxic and hemodynamic parameters were not independent risk factors for hepatic dysfuntion. This might be due to the inadequacy of the usual biologic definition of hepatic dysfunction as well as to the poor sensitivity of general hemodynamic parameters.

EFFECTS OF DIFFERENT DIALYSIS MEMBRANES ON CLEARANCE CHARACTERISTICS FOR TREATMENT OF ACUTE RENAL FAILURE

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Objectives: We compared three different dialysis membranes to find out whether or not there were differences between their clearance characteristics on substances such as inuline, creatinine, urea, and phosphate to be eliminated in acute renal failure (ARF). Moreover, if a loss of clearance did occur we were interested in whether this was due to heparinization and a high production of the thrombine-anti-thrombine-complex (TAT).
Methods: We carried out a randomized controlled study on 13 consecutive critically ill patients presenting with ARF, most of them in association with multi-organ failure, to be treated by continuous pump-driven arterio-venous renal replacement therapy on continuous low-dose heparinization. Three different types of high-flux filter membranes (F 60 ™ [Fresenius], CT 190™ [Baxter], and Filtral 16™ [Hospal]) were assessed. Each filter was changed intentionally after a 24 hours´ use. Together the data of 54 filters were evaluated, each at three different times (immediately after its onset [0 h], after 8 h, and after 24 h). The clearances of creatinine, urea, phosphate, and inuline were measured.
Results: There were some significant differences in clearance characteristics of inuline, creatinine, urea and phosphate between the filters ($p<0,05$) showing the F 60™ membrane excelling Filtral 16™and CT 190™ the more. The loss of inuline clearance (3 ml/min/m^2) after 24 h, however, was insignificant for all 3 filter types. A continuous low-dose heparinization scheme was applied without any relevant prolongation of the aPTT. Even lower losses were noted for the clearances of creatinine, urea, and phosphate. We found the TAT-production increased after 8 h ($p<0,05$), but it did not rise any further.
Conclusions: As we could demonstrate in our study the clearance data of different types of filter membranes applied during continuous renal replacement therapy do show significant differences. On the other side, no relevant loss of clearance occurs during a 24 hours´ period indicating a high efficiency over time. To consider commercial aspects as well it shows that inexpensive conventional filter membranes can successfully be applied even for a longer renal replacement period, if needed.

EXTRAVASCULAR LANG WATER (EVLW) - A CRITERION OF CRITICAL STATE SEVERITY

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Critical states of various origin are complicated with the multiorgan failure (MOF) occurrence. Due to their structural and functional features the lungs become the primary damage target in various critical states. ARDS that occurs in such states is associated with pulmonary edema development because of capillary permeability increase mediated by humoral and cellular responses to damaging factors exposure. It must be emphasized that mediators and effectors of this response affect not only pulmonary capillaries, but other organs capillaries as well,enhancing their permeability. Organs edema is a common finding at the autopsy of patients died from MOF.Clinical and radiologial findings allow to have a diagnosis of pulmonary edema before similar lesions in other organs occur. Additionally, there are some techniques that permit quantitative assessment of pulmonary edema fluid (EVLW) volume. In conclusion, we suggest that EVLW changes in dynamics in patients with MOF are considered as a critical state severity measure which reflects indirectly the edema in other organs.

ACUTE RENAL FAILURE AND DIALYSIS IN INTENSIVE CARE

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A retrospective study was performed on 100 patients with acute renal failure (ARF). We analysed survival in continuous (CD) and intermittent dialysis (HD). Mean age of the patients was 60 years (y), 57 patients (57 %) were <65 y, 43 patients (43%) were >= 65 y. The incidence of dialysed ARF in our mixed Intensive Care Departement is 3%/admission/y.
Statistics: Fischer's Exact Test, Mann-Whitney-U test.
Etiology: the contribution sepsis, cardiac failure and aminoglycosides was respectively 70%, 44 % and 35 %.
Treatment: CAVH (CD) or CVVH (CD) was used in 40 patients (40%), hemodialysis (HD) was used in 60 patients (60 %).
Data: Mean Apache 2 scores were the same for CD and HD (27 for both groups). Patients treated with continuous dialysis techniques had significantly ($p<0.05$) more need for ventilation (100 % vs 70 %), elevated bilirubin (82 % vs 57 %) and a higher vasopressor need (89 % vs 46 %) than patients treated with hemodialysis. There was a trend towards more sepsis (83 % vs 62 %; $p=0.06$) and coagulation disorders (50 % vs 27 %; $p=0.07$) in CD. There were significantly more younger patients (<65 y) treated with CD (70 % vs 30 %, $p<0.05$).
Mean Apache 2 score was significantly lower in patients<65 y than as patients>=65 y (26 vs 30; $p<0.05$). Patients<65 y had significantly ($p<0.05$) more coagulation disorders (53 % vs 17 %) and elevated bilirubin (81 % vs 52 %). There was no significant difference in vasopressor need and ventilation between age groups.
Outcome:. HD had a better SR compared to CD (43 % vs 15%, $p<0.05$). Patients>=65 y had a comparable SR vs patients<65 y (37 % vs 28 %; p=n.s.). The global survival rate (SR) was 32 % (32 patients).
Conclusions : Dialysed ARF has a well known low survival rate (32 %). Hemodialysed patients had a better survival rate than patients treated with continuous dialysis. This can be explained by the fact that the latter were in a worse condition considering organ failure (more ventilation, elevated bilirubin and need for vasopressors), Apache 2 score couldn't illustrate that. Patients>=65 y with ARF have the same survival rate as patients<65 y: Although Patients >=65 y have a higher Apache 2 score they have less organ failure.
The Apache 2 score is not a good predictor of survival in P with organ failure.

USE OF A GUT PROTECTION PROTOCOL (GPP) IN A MULTIDISCIPLINARY INTENSIVE CARE UNIT - A RANDOMISED CONTROLLED TRIAL

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Objectives: A randomised controlled trial of a management protocol utilising the regular measurement of gastric intramucosal pH (pHim) to control the administration of dopexamine.
Methods: Patients admitted to a multidisciplinary teaching hospital intensive care unit (ICU) undergoing insertion of a pulmonary artery catheter were managed according to a resuscitation protocol. Randomisation was to either the protocol alone or to insertion of a nasogastric tonometer and subsequent management guided by pHim. pHim ≤ 7.32 initiated volume and inotrope resuscitation and, if unsuccessful in elevating pHim, dopexamine was commenced. Approval was obtained from the hospital ethics committee.
Results: 94 patients were considered for analysis and the two groups were well matched for age and sex. Overall, there was a high hospital mortality of 64.9%. There was no difference in ICU or hospital mortality between the two groups (see table).

	Trial randomisation	
Protocol	GPP	Non GPP
Patient numbers	45	49
ICU mortality	62.2% (28/45)	59.2% (29/49)
Hospital mortality	64.4% (29/45)	65.3% (32/49)

At 12 hours following randomisation there was a significant increase in mean arterial blood pressure (79 vs 74 mmHg, p=0.01) and a concomitant decrease in pulse rate (111 vs 124 , p=0.04) in patients randomised to the pHim protocol. Other measures of ICU outcome , including intervention scores were unaffected by the use of this management protocol.
Conclusion: The high mortality in this group of patients precludes demonstration of an effect of pHim guided therapy but in may result in changes in physiological variables.

A MAJOR INJURY AND MULTISYSTEM ORGAN FAILU (CASE REPORT)

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Ironically, because more patients are now successfully resuscitated after severe trauma, MSOF is becoming more common. A 25 - year - old student, suffered femur amd pelvis fractures, a mild pulmonary contusion, and a lacerated liver in a high - speed automobile accident. Hypotensive at the scene, he required emergency surgery on admission to repair the liver laceration and to reduce and set the fractures. On the fourth postoperative day, he had fever, tachycardia, labored breathing, hypotension, m. acidosis and hypoxemia, stool positive for blood. Over the next few days, he remains hemodinamically unstable, his respiratory status fails to improve, and he goes into acute renal failure (ARF). Besides tube feedings and TPN, his treatment at this point includes a complex drug regimen to maintain blood presure and cardiac output, ventilator support and hemodialysis.

After 10 days, his condition takes a surprising turn for the better. Approximately 7 weeks after admission, his's successfully weaned from the ventilator. Following 4 months of rehabilitation, his's dicharged home.

DEVELOPING A NURSING CARE PLAN FOR MSOF

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The multisystem organ failu (MSOF), patients represents a complex nursing challenge. Everything occuring at the bedside, from tube feeding to hemodynamic monitoring, can affect the outcome. Intensive collaboration is required from all members of the health care team: nurses, doctors, respiratory therapists, occupational therapists, pharmacists, physical therapists, nutritional support services, social services and rehabilitation services.

Specific goals of care focus on restoring the balance between oxygen supply and demand, minimizing further inflammation or activation of the IIR, correcting the underlying problem, and providing metabolic support. Individual organ support (for example, with hemodialysis and arteficial ventilation) is necessary, too.

MSOF is so difficult to reverse, prevention is the key to treatment. Of course, many of this interventions would be part of routine nursing care for any patients. But don't understimate their importance. For a patient at risk for MSOF, they could be lifesaving.

Clinical evaluation of esophageal doppler monitoring (ODMH) versus continuous carciac output/SvO_2 monitoring system in cardiac surgery patients.

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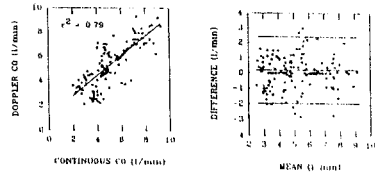
Objectives: To compare Cardiac Output (CO) measurements between continuous termodilution (CCO) by thermal wire on pulmonary artery catheter (CCO/SvO2 Vigilance. Baxter Critical Care), and CO measurement using a trans-esophageal Doppler (DCO) ultrasound system (ODM II, Abbott Laboratories), in the immediate postoperative period of cardiac surgery.

Methods: 15 patients undergoing myocardial revascularization were monitored with CCO by a Swan-Ganz catheter and an intra-esophageal DCO probe, after induction of anesthesia. Exclusion criteria were: Aortic valve disfunction, previous valvular surgery esophageal disease, absense of sinus cardiac rhythm, and need of ventricular or intraaortic assistance.

Hemodynamic parameters, CO by both CCO and DCO, SvO2. SaO2, diuresis, pHa, and hemoglobin were repeatedly registered during the first 6 hours after surgery, as the patients were kept under sedation and mechanical ventilation. Results were compared using the method described by Bland and Altman.

Results: 176 measurements of CO were obtained, ranging 2.2–8.0 l/min. BIAS, accuracy and regression results follow:

	BIAS	Accuracy	Regression	r^2
CCO vs. DCO	196	2.188	CCO = 78* DCO + 92	782



Conclusions: The good correlation index and the acceptable BIAS index suggest a good correspondence between CCO and DCO, although accuracy is not completely satisfactory. Thus, DCO may be accepted as a reliable, non-invasive method of CO monitoring. Analysis of the shape of the flow velocity curves displayed on the DCO monitor serves as warning and/or guideline for therapeutic decisions.

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Change of gastric intramucosal pH as indicator of the postoperative course of cardiac surgery patients.

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Objectives: A decreased tissue oxygen delivery is responsible for a higher morbi-mortality rate among surgical patients; this diminished oxygen delivery/consumption rate (DO_2/VO_2) may origin the lactic acidosis observed in the gastrointestinal tract, reported in patients undergoing hypothermic cardiopulmonary extra corporeal surgery, and can be registered by tonometry as result of the gastric mucose pH.

The purpose of this study is to evaluate the reliability of the intramucosal pH (pHi) measurement by a nasogastric catheter as indicator of the DO_2/VO_2, its correlation to other parameters of DO_2/VO_2 disturbance, and with postoperative complications and clinical course.

Methods: 20 patients (16 male, 4 female) undergoing cardiac surgical procedures were included (16 myocardial revascularizations, 3 valvular substitutions, 1 constrictive pericarditis). Mean age was 63 ± 12 years, mean weight 70 ± 10 kg.

A nasogastric probe (TRIP, Tonometrics) was placed after anesthesia induction; pHi values were registered in the postoperative period (90′, 120′, 240′, 360′ and 18 h after surgery end). The corresponding hemodynamic parameters, venous oxygen saturation (SvO_2), diuresis and arterial pH (pHa) were also recorded.

Results: pHi values ranged 7.20 to 7.65 (mean 7.40 (0.8); the mean values of clinical evolution were: extubation time, 20 ± 12 hr.; discharge from postoperative care unit, 88 ± 50 hr.; and hospital total postoperative time, 10 ±2.2 days. Complications registered were: 2 perioperative acute myocardial infarctions, 2 cases of respiratory insufficiency, 1 occlusion of coronary bypass, an 1 case of hyperamilasemia.

All patients with severe complications needing specific treatment showed either a low pHi value, or a considerable descent in comparison with the initial register. Statistic correlation between low pHi and presence of complications was found; the low significance ($p > 0.05$) degree may be due to the low population size.

Conclusions: pHi measurement in cardiac surgery patients is a non invasive, uncomplicated method for prediction of DO_2/VO_2 disturbances, thus reflecting risk of increased major complications, and may precede changes in other usual indicators (SvO_2, pHa, Cardiac Output, ...). Work-in-progress with a greater population size may offer more significant results.

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Does blood transfusion improve systemic oxygen parameters in critically ill/septic patients?

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The haemoglobin-level (hb) is besides the arterial oxygen saturation and the cardiac index one of the relevant parameters of oxygen supply to the tissue. In contrast to otherwise healthy patients, there is no agreement on the so-called transfusion-trigger in critically ill patients. In front of this background the question arises, whether and to what extent blood transfusion in critically ill patients improves oxygen supply to the tissue.

This study was performed in 34 critically ill/septic patients in the postoperative period after an infective/septic revision operation of the hip or knee joint. On cardiac/septic reasons monitoring consisted beside other measures of a pulmonary artery catheter and of an indwelling arterial line for measurering/calculating standard haemodynamic as well as systemic oxygen parameters. The indication for blood transfusion was given by hb together with the clinical status of the patient (ASA-score and multiple organ dysfunction (MOD)). Statistical analysis was performed by MANN-WHITNEY-U-test, by FISHER's exact-test and by WILCOXON-test; statistical significance was set with $p<0.05$.

According to the pretransfusion value of hb and of lactate (lac) patients were divided into groups as follows: **A:** hb<8 and **B:** >8g/dl; **I:** lac<2.8 and **II:** >2.8mM. In either group blood transfusion results in a significant increase in hb (**A:** 7.5±0.4 to 9.4±0.8 g/dl; **B:** 9.0±0.8 to 10.5±0.09 g/dl; **I:** 8.0±1.0 to 10.2±0.6 g/dl; **II:** 8.4±0.9 to 10.1±0.7 g/dl). While, however, haemodynamic parameters do not differ significantly from each other before and after blood transfusion, oxygen delivery (DO_2 - ml/min x m^2) increases significantly in either group studied (**A:** 467±86 to 581±158; **B:** 521±125 to 577±137; **I:** 512 ±113 to 599±141; **II:** 516±123 to 632±214). In contrast oxygen consumption (VO_2 - ml/min x m^2) does not change significantly in either group (**A:** 168±148 to 158±38; **B:** 180±162 to 175±52; **I:** 171±38 to 179±35; **II:** 199±60 to 219±71); oxygen extraction ratio decreases.

This study in critically ill/septic patients demonstrates, that in this group of patients studied blood transfusion at a base-line-value of >7.5±0.4 g/dl expectedly rises DO_2, however, it does not improve VO_2; even not in septic patients with elevated lac-values.

PACLITAXEL AS POSSIBLE CO-FACTOR WITH ANTHRACYCLINES IN THE INDUCTION OF ACUTE, LETHAL, DILATATIVE CARDIOMYOPATHY

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Paclitaxel in a new anticancer agent, extract from the bark of the yew tree (Taxus brevifolia), employed against breast and ovarian cancers resistant to chemotherapy. It promotes the polymerization of tubuline, and disrupts the normal microtubule dynamics. Hematologic toxicity, hypersensitivity reactions (bronchospasm, urticaria and hypotension), and peripheral neuropathy are the main reported toxic effects. Cardiac side effects are rare: atrioventricular blocks of higher degree are reported in 0.1% of patients; congestive cardiotoxicity was discussed only in one trial in patients treated with paclitaxel and doxorubicin.

We describe the history of a 48-years-old wom an with a breast cancer, diagnosed in 1989, initial staging T3N1M0, treated with mastectomy, axillary lymphadenectomy, andchemotherapy with a cumulative dose of anthracyclines of 678 mg/m2 until August 1994. The patient complained of dyspnea and severe hypotension immediately after an intravenous infusion of 100 mg paclitaxel, given over 1 hour for the treatment of bilateral, malignant pleural effusion. At echocardiography the left ventricular ejection fraction was reduced to 20%. She died 20 days later because of a severe cardiac low output with hepatic and renal failure; an impressive hepatic cytolysis was observed. The post-mortem examination confirmed the dilatation of the cardiac cavities, especially of the right ventricle, bilateral pleural fluid, and ascites. The histology was suggestive for a cardiomyopathy secondary to anthracyclines. The electron microscopy revealed a deposition of an unusual pathological pigment in the myocytes; subsarcolemmal deposition or membranous were absent.

We hypothesize that paclitaxel was the cause of a major hypersensitivity reaction with shock and severe hepatic cytolysis, worsening the myocardial damage induced by anthracyclines. The possibility that a low dose of paclitaxel could directly increase anthracyclines cardiotoxicity -as decribed in the medical literature -will be discussed.

PLASMA LEVELS OF SOLUBLE ADHESION MOLECULES IN PATIENTS WITH SEPSIS AND SEPTIC MULTIPLE ORGAN FAILURE

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Objectives: Activated endothelial cells release soluble intercellular adhesion molecule-1 (sICAM-1), vascular cell adhesion molecule-1 (sVCAM-1), and E-selectin (sELAM-1). sICAM-1, sVCAM-1, sELAM-1, and inflammatory cytokines were determined.

Methods: sICAM-1, sVCAM-1, and sELAM-1 were determined by ELISA. TNF-α, IL-6, and IL-8 were also measured by ELISA. Endotoxin was measured by an endotoxin-specific Endospecy test after pretreatment of new PCA method.

Results: The sICAM-1 and s VCAM-1 levels were significantly higher in the septic multiple organ failure (MOF) and sepsis groups than in the non-septic MOF group. The sELAM-1 level was slightly higher in the septic MOF group than in the sepsis withut MOF group and non-septic MOF group. The increases of soluble adhesion molecules were not in agreement with changes of plasma endotoxin level. Levels of soluble adhesion molecules were correlated with the levels of plasma TNF-α and IL-8, but the level of IL-6.

Discussion and Conclusion: The sICAM-1 and sVCAM-1 levels in septic patients closely reflected the severity of the pathophysiological conditon. It was possible that the release of sluble adhesion molecules were not stimulated by plasma endotoxin, but endotoxin in the local infectious region. TNF-α and IL-8 also were suggested to be involved in the release of these soluble adhesion molecules.

EFFECT OF FUT-175 ON SOLUBLE ADHESION MOLECULES FOLLOWING CARDIOPULMONARY BYPASS SURGERY

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Objectives: Cardiopulmonary bypass (CPB) surgery is associated with a systemic inflammatory response attributable to the release of various inflammatory mediators and the activation of complement or coagulofibrinolytic system. In addition, adhesion molecules, such as ICAM-1, ELAM-1, and VCAM-1, appear to be of central importance in the inflammatory process following CPB surgery. We previously reported the effects of a synthetic protease inhibitor, FUT-175, reduced release of inflammatory cytokines (TNF, IL-1ß, IL-6), activation of complement (C3a, C4a) or coagulofibrinolytic system (TAT, PIC, FPA) and protected platelet function (GPIb, GPIIb/IIIa) following CPB surgery.
Methods: In this study, we analyzed FUT-175 on soluble adhesion molecules following CPB surgery. 20 patients undergoing CPB surgery were divided into two groups. Group A consisted of 10 patients who received 10mg of FUT-175 in priming solution, followed by a continuous infusion at 2mg/kg/hr during CPB in addition to initial heparin dose of 3mg/kg. Group B, a control group, included 10 patients who were injected with heparin only. The plasma sICAM-1, sELAM-1, and sVCAM-1 concentration was measured by ELISA.
Results: Every soluble adhesion molecules decreased during CPB in both groups, and rose after CPB. sELAM-1 and sICAM-1 reached their peaks on 3 hours after CPB and on POD 1 respectively in both groups, but they remained lower in group A (sELAM-1: 32.1±11.5 vs. 38.6±8.9 ng/ml, $p<0.05$, sICAM-1: 327±97 vs. 483±106 ng/ml, $p<0.05$). sVCAM-1, in both groups, remained lower than preoperative levels, but did much lower in group A.
Conclusions: FUT-175 reduced adhesion molecules and suggested to be the effect on postoperative organ dysfunction.

The removal of several cytokines is dependend on filtration rate in CVVH

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In the last few years the conditions of treatment in continuous hemofiltration/hemodiafiltration were discussed controversially. A significant removal of TNF-alpha and IL-1 could be demonstrated in CVVHD. The aim of our study was to investigate the elimination of TNF-alpha, IL-2, IL-6, IL-8, s-CD-14 and IFN-gamma in CVVH by measurement in plasma and hemofiltrate of 10 critically ill patients with an acute renal failure. The patients of our study were treated with a continuous veno-venous-hemofiltration (polysulfone-filter, blood flow: 100-130 ml/h, filtration rate 500 ml/h). The samples, hemofiltrate and plasma, were taken one hour after the start of treatment. The patients suffered from septic shock (4), the so called hepatorenal syndrome (3) and a severe pancreatitis (3). The cytokine concentrations were measured with ELISA-method. In contrast to elevated concentrations in plasma for TNF-alpha (5 cases), SCD 14 (9 cases), IL-2 (1 case) and IL-6 (4 cases), hemofiltrates contained no activities. Only IL-8 was removed in significant amounts with even higher levels in hemofiltrate than in plasma. This phenomenon was described so far for TNF-alpha and IL-1 and may be due to the absence of metabolic properties (possibily enzymatic) in hemofiltrate. It can be shown, that TNF-alpha, IL-2, IL-6 could not be eliminated in CVVH with a filtration rate to 500 ml/h. In contrast to findings of other investigators with a higher filtration rate (>1000 ml/h), we found no significant concentrations of TNF-alpha and IL 6 in hemofiltrate. We conclude, that for a significant removal of important cytokines higher filtration rates (>1000 ml/h) are necessary.

EFFECT OF HEMODIAFILTRATION ON MULTIPLE ORGAN DYSFUNCTION SYNDROME IN SEVERE SEPSIS

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Objectives: Multiple organ dysfunction syndrome including liver and renal impairment is a fatal complication in patients with the diagnosis of sever sepsis. This study focused to the effects of removing toxic substances from inflammatory tissue by hemodiafiltration.
Methods: Eleven patients were admitted to the ICU in emergency center and met the criteria of systemic inflammatory response syndrome in association with infection. All patients developed liver and renal dysfunction and were treated by hemodiafiltration with high flux membranes (FB-U:Nipro). The hemodiafiltration were performed 19 times using nafamostat mesilate as an anticoagulant in 5 hours with 12 L of substitution fluid (HF-B:Fuso). The serum levels of endotoxin, cytokines, endothelin-1 (ET-1), human neutrophil elastase α1-proteinase inhibitor complex (HNE-PI), fibronectin (FN), lactate, and amino acids were measured before and after the hemodiafiltration.

Results:	n	before	after	P
Endotoxin(pg/ml)	19	33.5±72.1	40.2±90.2	
IL-6(pg/ml)	17	234±236	268±230	
IL-8(pg/ml)	11	105±69	109±85	
ET-1(pg/ml)	14	8.3±3.6	6.3±2.7	<0.01
HNE-PI(μg/L)	18	396±203	986±787	<0.01
FN(μg/ml)	17	287±111	316±142	<0.05
Lactate(mg/dl)	17	11.0±6.0	10.8±5.5	
BCAA/AAA	15	1.37±0.90	1.66±0.78	<0.01
PaO_2 /FiO_2	13	297±106	277±107	

Then, six patients (55%) survived over 8 weeks.
Conclusions: The hemodiafiltration would be effective to renal dysfunction by reducing endothelin and beneficial to tissue metabolism represented in Fisher's ratio, but might be harmful to respiratory function by activating neutropils in patients of severe sepsis.

COMPARED EFFICACY OF INTERMITTENT HEMODIALYSIS (HD) AND CONTINUOUS VENO-VENOUS HEMOFILTRATION (CVVHF) IN THE EARLY PHASE OF ACUTE RENAL FAILURE (ARF) IN HEMODYNAMICALLY UNSTABLE PATIENTS

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Background : Intermittent HD may be poorly tolerated in the early phase of ARF in hemodynamically unstable patients (pts). This technic may fail to achieve steady state urea low levels in hypercatabolic pts.
Method : N_1 = 25 consecutive pts treated with HD; N_2 = 25 consecutive pts treated with CVVHF. Hemodynamic unstability is defined by arterial hypotension and requirement of inotropic support despite adequate filling. Rate of change in urea (U), creatinin (Cr), K^+, pH were computed from a linear regression analysis of data vs time in each treatment group during the 5 first days of application of the two technics (ANOVA). Daily worst values were recorded.
Results : HD-group : $Apache_{II}$ score = 22 ± 7; mean number of organ system failure (OSF) = 1.5 ± 1; mean blood pressure (MBP) = 75 ± 22 mmHg (first day of application of HD). CVVHF-group : $Apache_{II}$ score : 25 ± 6; OSF = 3 ± 1; MBP = 57 ± 20 mmHg (first day of application of CVVHF).

RATE OF CHANGE / DAY

	HD	CVVHF
U (mg/l)	-42.9 ± 33.4 (NS)	-128.8 ± 51.1 (p=0.01)
Cr (mg/l)	0.017 ± 0.17 NS)	-4.28 ± 1.14 (p = 0.0004)
K^+* (mEq/l)	-0.1 ± 0.05 (NS)	-0.1 ± 0.07 (NS)
pH*	0.004 ± 0.006 (NS)	0.003 ± 0.01 (NS)
MBP (mmHg)	-1.8 ± 1.5 (NS)	4.8 ± 2 (p = 0.02)

* initial values (days 1) within normal range for the two groups

Discussion : During the 5 first days of application of HD/CVVHF, U and Cr decreased much more rapidly in the CVVHF-group. K^+ and pH were maintained within normal range in the two groups . Initial MBP which was much lower in the CVVHF-group significantly improved during the application of CVVHF while MBP remained unchanged in the HD-group.
Conclusion : Despite higher severity of disease in CVVHF group ($Apache_{II}$ score, OSF, lower initial MBP), we obtained a better performance with CVVHF regarding the decrease of U and Cr and the improvement of MBP.

CONTINOUS VENOVENOUS HEMOFILTRATION (CVVH): IDEAL TECHNIQUE USEDAS A RENAL REPLACEMENT THERAPY FOR PATIENTS WITH MULTIORGANIC FAILURE (MOF).

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In relation to the different and continuous renal replacement techniques, the continuous venovenous one is the alternative method to continuous arteriovenous for critical patients with acute renal failure (ARF). We present you our experience with CVVH in patients with MOF.

MATERIAL AND METHODS

In our Intensive Care Unit (ICU) 20 patients with MOF were treated with CVVH in the period between January in 1992 to March in 1995. The mean (±SD) age of our patient population was 62,1±16,23 years, being 65% male and 35% female. The whole patient population was with MOF just at the moment the technique was accomplished; 75% was in mechanical ventilation, 90% needed vasopressor support and 65% required both of them (mechanical ventilation and vasopressor support). Apache II score mean of the patient population was 17,84±6,97 (range 5-28) and all of them were with ARF oligoanuric.

Technique: CVVH was accomplished using a single-dual lumen catheter, placed in either a femoral or subclavian vein by the standard Seldinger technique. Polisulfone hemofilters were also used, and the extracorporeal circuit used standard arterial-venous blood tubing. Blood flow and hence ultrafiltration pressure, within the circuit was generated by a roller blood pump. The modulus has a roller pump, a pressure transducer connected in an arterious and venous line, such as an air-transducer which is adapted to a drip-chamber in the return way. The replacement used was a peritoneal dialysis solution.

RESULTS

The average of this treatment was 101,35±69,3 hours (range 14-296 h). The hour ultrafiltrated average production was 547±122,12 ml/h (range 359-800 ml/h); using 1,6 filters /patient, with 63,34 hours / filter as a mean. All patients, except one, received an average heparin dose 761±165,35 UI/h (range 350-1000 UI/h), without any kind of serious problems except a hemorrhagic complication related to an unsuitable heparin dose. The replacements were accomplished every hour according to the necessities of each patient in every moment. Adequate control of azotemia was accomplished when CVVH was uninterrupted in these patients with meaningful decreases in urea and creatinine figures at the beginning and the end of this technique (Initial mean urea 210 mg/dl; Final mean urea 171 mg/dl. Initial mean creatinine 5,24 mg/dl; Final mean creatinine 4,01 mg/dl. p<0,05). 30% patient survived and they were discharged from the ICU. 20% patients were discharged from the hospital.

CONCLUSION

CVVH eliminated the need for large-bore arterial access, and the high blood flow rate used in CVVH may have contributed to the low heparin doses required to prevent hemofilter clotting, and subsequently, to the low rate of hemorrhagic complications experienced by our patients. The high ultrafiltrate production rate in CVVH allowed this therapy to control azotemia effectively and the constant ultrafiltrate production rate resulted in a predictable filtrate replacement rate. For that, we think CVVH should be the preferred continous renal replacement therapy for patients with MOF.

THE INFLAMMATORY EFFECT OF BETA 2 ANTAGONIST ON HEPATIC ENDOTHELIUM IN PORCINE PERITONITIS.

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Hepatic sinusoidal endothelium shows a major inflammatory response in porcine sepsis that can be attenuated by the administration of dopexamine hydrochloride. Dopexamine is a beta 2 and dopaminergic receptor agonist. The specific beta 2 adrenoceptor antagonist ICI 118551 has been shown to reduce the protective effects of dopexamine. We investigated the effect of this antagonist on hepatic ultrastructure in porcine sepsis. Six pigs (25-30Kg) divided into 2 groups were anaesthetised and intubated. Cardiac output and portal blood flow were measured using standard techniques. The 2 groups were; placebo, (peritonitis induced); blocker, (peritonitis induced and 200 µg/kg ICI 118551 bolus infused then given hourly). Caecal content was aspirated and peritonitis induced. Colloid was infused to maintain PAWP at 10-12mm Hg for eight hours the animals culled, hepatic tissue removed and prepared for electron microscopy.

In the placebo group hepatic endothelium was swollen and the sinusoids occluded by WBC. But in the ICI 118551 blocker group, much of the sinusoidal endothelium was absent and there where large extra sinusoidal spaces among the hepatocytes. An assessment of the two groups showed worse hepatic architecture in the blocker group. The b2 antagonist blocked any protective effect of endogenous beta 2 adrenoceptor agonist (adrenaline) on hepatic endothelium in porcine sepsis.

ANTI-INFLAMMATORY EFFECT OF DOPEXAMINE ON CEREBRAL OEDEMA IN PORCINE PERITONITIS.

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Dopexamine hydrochloride, a beta 2 and dopaminergic receptor agonist reduces hepatic damage in porcine sepsis. We tested dopexamine's effect on cerebral oedema. The beta 2 adrenoceptor antagonist ICI 118551 was infused to block any protective effect of dopexamine. Nine anaesthetised pigs (25-30Kg) were randomised into 3 groups; placebo, (peritonitis induced); dopexamine, (peritonitis induced and 5 µg/kg/hr of dopexamine infused); blocker, (as in dopexamine group but in addition 200 µg/kg ICI 118527 bolus given then infused at that rate hourly). Caecal peritoneum was induced and colloid infused to maintain PAWP at 10-12mmHg for eight hours when the animals were culled, cerebral tissue removed, prepared for electron microscopy and digitisation. Digitisation of the area of oedema surrounding the blood vessel and expressed as a percentage of the micrograph. **Placebo 30.5±4.1, Dopexamine 13.5±2.9*, Blocker 31.5±3.7.** Data expressed as mean ± SD. Significance $p<0.05$. * dopexamine compared to placebo and blocker. In the dopexamine group the area of tissue oedema was significantly lower than either the placebo or blocker groups. There were no significant differences between the placebo or blocker groups. The β2 antagonist completely blocked the protective effect of the drug on cerebral oedema in porcine sepsis. Beta 2 adrenoceptor stimulation is protective of cerebral oedema in porcine sepsis.

HEPATIC HEMODYNAMICS IN LIVER OF MOF

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Objectives: The hemodynamics of hepatic circulation during multiple organ failure (MOF) have not been sufficiently studied. We investigated liver hemodynamics in two subgroups of patients with MOF, those with either liver or lungs as the main organ of involvement.

Methods: Three groups of patients were created: i) MOF-hepatic involvement (MOF-HI) (7 patients) with bilirubin >3.5 mg/dL and lung injury score <1.8, ii) MOF-ARDS (9 patients) with respective values <2.0 and >2, iii) 5 patients with head injury with respective values <2 and <1, served as group control. All patients were in haemodynamically stable state with an oxygen delivery index >300 ml/min/m2 prior to measurements. Two Swan-Ganz catheters were inserted, one in the hepatic veins and one in pulmonary artery and the following measurements were determined: the hepatic vein free pressure (HVFP), the hepatic vein wedge pressure (HVWP), CVP, PAOP and CO. The gradient of HVWP-HVFP represents liver perfusion pressures. By injecting contrast media at dose of 1mL/10kg with the balloon inflated to achieve sinusoidal image, the hepatic blood flow (HBF) was concluded by the time in seconds of media removal after balloon deflation.

Results: The CO, CWP and CVP were comparable to all three groups. Namely, for MOF-HI, MOF-ARDS and control groups the mean (±SD) value of CO was 7.2±0.8 vs 6.9±0.3 (NS) and 6.3±0.6 respectively, of the PAOP was 8.7±1.6 vs 10±3 (NS) and 8.2±3.1 respectively and of the CVP was 12±2.3 vs 11.6±2.3 (NS) and 5.8 respectively. In contrast the two MOF groups were different after the cut-off inclusion criteria ie the mean (±SD) value for bilirubin was 6.8±2.5 vs 1.20±0.7 ($p<0.05$) and 0.8±0.2 respectively and lung injury score was 1.4±0.4 vs 2.4±0.2 ($p<0.05$) and 0 respectively. The HVWP-HVFP gradient was found to be comparable in MOF-ARDS and control groups (3.4 ± 1.5 and 2.8 ± 1.3, NS respectively) but greater in patients with MOF-HI (12 ± 8.5, $p<0.05$). This was primarily due to the higher values of HVWP in MOF-HI group in relation to MOF-ARDS and control groups (25.8 ± 7 vs 8.8 ± 1.5 and 10 ± 3 respectively, $p<0.05$). Similarly HBF was higher in group MOF-HI than in the other two groups (8.6 ± 1.8 vs 15 ± 4.3 and 18 ± 3.6 seconds respectively $p<0.05$).

Conclusions: These data show that there is an hepatic hyperdynamic state in patients with MOF and hepatic involvement, in contrast to those MOF patients with normal liver function.

CONTINUOUS ON-LINE OXYGEN CONSUMPTION MONITORING IN CRITICALLY ILL PATIENTS WITH A NEW METABOLIC MONITOR INTEGRATED IN THE VENTILATOR

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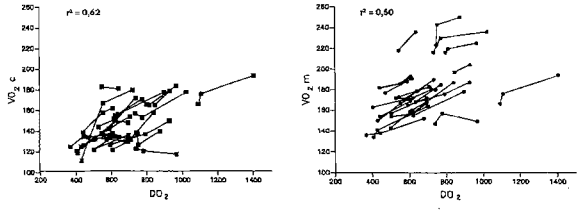
Objectives: Oxygen delivery (DO_2) and oxygen consumption (VO_2) are increasingly monitored parameters in the ICU. There still remain controversies about an oxygen supply dependency in critical illness particularly with respect to VO_2 determination by either indirect calorimetry (VO_2m) or fick calculation (VO_2c). The purpose of this study was to investigate the changes in VO_2m and VO_2c following DO_2 increase.

Methods: The relatives of 24 critically ill patients (mean age 63 years, mean APACHE II 24, mean MOF-score 9) gave their written informed consent to participate in this institutionally approved, prospective study. DO_2 was increased by fluid loading (hydroxyethylstarch 10%: mean volume 750 ml, mean duration of infusion 80 min) and catecholamine support (dobutamine: mean dose 14,3 µg/kg/min). Changes in VO_2m and VO_2c were recorded simultaneously before, during and following interventions. Calorimetry was obtained with the Metabolic Monitor 7250 integrated in the Ventilator 7200 (Puritan Bennett, Carlsbad, CA). The Pearson correlation coefficient was calculated.

Results: The responses of VO_2c (left) and VO_2m (right) to increases in DO_2 by fluid loading and/or catecholamine support are shown in the figures below.



Conclusions: With the new ventilator-integrated Metabolic Monitor 7250 continuous monitoring of calorimetric data is available. Further studies are required to investigate the benefit for critically ill patients with respect to outcome.

HEMODYNAMIC CHANGES CORRECTION DURING ISOLATED ULTRAFILTRATION (IU) IN POST-PARTUM WOMEN WITH ECLAMPTIC COMA (EC)

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Objectives: The IU is effective during brain and pulmonary oedema in EC [1]. Though hemoconcentration during IU leads to Cardiac Output (CO) and Total Peripheral Vascular Resistance (TPVR) increase [2]. Undesirable deterioration of organ perfusion caused by eclampsia requires special treatment.

Patients and methods: The research aims to analyse the results of Dopamine, Nitro-glycerine and 10% Human Albumin infusions used to correct undesirable hemodynamic changes during IU of 25 post-partum women with EC (the main group of patients). Recognised brain oedema treatment was based on cuprophane membrane IU as a constituent part of resuscitation protocol. Liquid remove velocity was 12,3±1,1 ml/kg/hr. During IU CO, Cerebral Blood Flow (CBF) (impedance technique), NIBP, HR were measured. Dopamine (1,5 - 3 mcg/kg/min) and Nitro-glycerine (1,5 - 3 mcg/kg/min) infusions were performed by the pump. 100 ml 10% Human Albumin (2ml/min) were infused.

Results: The research results of main patient group were compared to the hemodynamic changes of control team (6 eclamptic post-partum women during IU without correcting treatment). In the control team CO has decreased to 45% and TPVR has increased to 52% from baseline, CBF increased to 25% only when the IU was finished. The tendency for CO reduction and TPVR increase was lower in the main group (-17% and +16%). CBF has increased to normal value.

Conclusions: Infusions of Human Albumin and low doses of Dopamine and Nitro-glycerine level undesirable hemodynamic IU effects during eclamptic coma.

Reference: 1. V.Bukin: 10th WCA, Hague, Abstr.: 98 (1992)
2. B.Wehle & al.: Kidney Int. 15:411-418 (1979)

CHANGES IN CORTISOL LEVEL AND RAAS IN PATIENTS WITH SEVERE PERITONITIS AND MOF

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Adaptive endocrine response of organism to septic shock consisting in activation of the production of adrenal hormons, renin - angiotensin - aldosterone system (RAAS) and other hormonal systems has an influence over microvascular changes in these states and for development of multiple organ failure (MOF).

In 25 patients with peritonitis of different origins (18 nonsurvivors and 7 survivors) were followed the changes in cortisol level and RAAS by radioimmunological methods and many variables for evaluation of respiratory, renal, hepatic function, coagulation etc. as a signs of MOF. It was observed significant increase of the level of cortisol (1099 ± 4,83 nmol/l), aldosterone (0,895 ± 0,687 nmol/l). By factorial statistical analysis we found significantly high correlations between hormonal changes and respiratory function (for example $r = -0,539$, $p < 0,02$ between cortisol and PaO_2; $r = 0,817$, $p < 0,001$ between cortisol and $D_{(a-v)}O_2$; olso renin - CaO_2 $r = -0,824$, $p < 0,001$, renin $D_{(a-v)}O_2$ $r = 0,626$, $p < 0,001$). Such significant correlations was found and for RAAS with respiratory, renal function, byproducts of arachidonic acid thromboxan B_2 and $P6F_1\alpha$, soluble fibrine degradation products etc. These correlations between the degree of endocrine changes and multiple organ failure in patients with septic shock produced by peritonitis suggest that their effects upon peripheral vascular resistance and constriction of the splanchnic, splenic, renal and other organ vasculatures are not always with physiologic expediency and there are perhaps the possibilities of therapeutic influence.

RENAL RESCUE - EXPERIENCE WITH DOPEXAMINE

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Introduction : Dopexamine has previously been shown to control hyperkalaemia in patients with acute renal failure (ARF), however effects on the subsequent course of ARF are undocumented.

Objectives : To evaluate clinical progress in patients with acute renal failure (ARF) in an Intensive Care Unit (ICU) with regard to biochemical control, need for - and time to - dialysis, and outcome in patients receiving dopexamine.

Methods : 14 consecutive patients meeting standard criteria for diagnosis of ARF were included in the study. Full cardiovascular, biochemical and intervention/outcome details were recorded. Dopexamine was infused at a dose of 2 µg/kg/min in conjunction with a regimen of inotropic support and blood volume optimization.

Results : Following the introduction of dopexamine urine volumes increased slightly over the next 24 hrs from 516 ± 140 ml/24 hrs to 817 ± 229 ml/24 hrs (NS). Data expressed as Mean ± SEM. Three patients (21%) became polyuric with urine output >100 ml/hr within 3 days and did not need dialysis. In the remaining patients the time to dialysis (to correct acid-base deficits or volume overload) was 5.09 ± 0.84 days. Serum potassium levels were well controlled. Day 5 or immediate pre-dialysis levels were 4.48 ± 0.19 mmol/L compared with pre-treatment 4.67 ± 0.2 mmol/L. Overall mortality in this series was 4/14 (28%). Duration of acute dialysis in survivors with renal recovery was 16.8 ± 1.82 days. 2 patients (14%) progressed into chronic renal failure and needed continuing renal replacement therapy.

No adverse cardiovascular effects were seen at this low dopexamine dose although its competitive inhibition to adrenergic reuptake mechanisms meant that doses of pressor agents could often be reduced.

Conclusion : Dopexamine, used in conjunction with inotropic support and blood volume optimization, can safely postpone, or even avoid, the necessity for acute haemodialysis in ICU patients. No evidence of tachyphylaxis to the effect on serum potassium levels was seen over the duration of the study.

HAEMODINAMIC TOLERANCE OF VENO-VENOUS HEMOFILTRATION IN PATIENTS WITH SYSTEMIC INFLAMMATORY RESPONSE SYNDROME.

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Objective: To evaluate the haemodinamic tolerance to the veno-venous continuous hemofiltration (VVCHF) system in patients with Systemic Inflammatory Response Sindrome (SIRS), and the possible beneficial effect of this technique on the haemodinamics in these patients.

Material: 13 patient admitted to the ICU, with diagnosis of SIRS and monitored with a pulmonary artery catheter at the beginning of VVCHF. We performed a complete haemodinamic study to all these patients (Cardiac output, vascular resistances, pH and CO2 in arterial and mixed venous blood samples, saturation of pulmonary mixed venous blood, DO2 and VO2 calculations and temperature) and determined the respiratory mechanics (compliance and PaO2 /FiO2 relatioship) before starting the procedure, after 10 minutes operating with the ultrafiltrate branch closed (without filtered fluid production), after 30 and 60 minutes of zero fluid balance hemofiltration and after 120 minutes of filtration with negative balance adjusted to the patients conditions. For the statistical analisis we have performed the ANOVA test over the mentioned variables.

Results: We have not detected statisticaly significant differences of the analyzed variables before the beginning, after operating the pump for 10 minutes without filtered fluid production and after 60 minutes of zero fluid balance HF. Only temperature shows a meaningful decrease in time.

Concluding: 1) The HFVVC system does not suppose a haemodinamic load, beeing well tolerated by critically ill patients. 2) We have not detected improvement in haemodinamics of these patients when submitted to zero fluid balance HF. 3) We have not detected improvement in respiratory mechanics of these patients when submitted to zero fluid balance HF.

MULTIPLE ORGAN FAILURE IN A CRITICAL STATE DUE TO STATUS ASTHMATICUS

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Objectives. To closer definition of mechanisms of status asthmaticus (SA) formation and thanatogenesis of it clinical and morphologic investigations were carried out in 110 cases with severe asthma, complicated by SA (33 - in hypercapnic coma, 47 - with hypoxic encephalopathia, 30 were hospitalized in terminal state and died within 12 hours since admission.
Methods.The clinical signs,systemic and pulmonary circulation;blood biochemical,immunologic,asid-base balance data,PaO2, PaCO2 were studied.Morphologic examination of pulmonary, tracheal, cardiac, cerebral, splenic and hepatic tissue was carried out in 30 patients who died at the top of the SA.Contribution of the homeostasis parameters to the formation of the CS in SA and the relationships of these parameters between each others and with the patients' condition severity degree had been discovered on the basis of statistical analysis computing (IBM 386 PC AT) data massif from 130 indices of 110 cases. Correlation analysis, mathematical modelling had been applied.
Results.The severity of the patients' condition was found closely related to the degree of respiratory, circulatory and metabolic disturbances. Respiratory failure and circulatory disorders were the principal clinical manifestations of SA, though the disorders of the metabolic and immunologic homeostasis also much contributed to the formation of a critical state due to SA.Autopsy detected characteristic hystomorphologic changes of the viscera were the morphologic equivalents of these clinical symptoms.
Conclusion.The findings permit regarding SA as a critical state that is characterized by the development of MOSF.Formation of natural detoxication routes incompetence demands the urgent efferent correction by hemoperfusion (haemapheresis, hemoxenosplenoperfusion, electrochemical systemic detoxication, etc.).

EFFERENT METHODS IN PREVENTION OF INTERNAL IRREVERSIBLE CHANGES IN MOSF

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Objectives: Analysis of intensive care (IC) of 541 cases in critical state (CS) due to surgical sepsis (269), rhabdomyolysis (138), acute chemical trauma (134) had been done.
Methods: Complex clinico-biochemical , immunological , morphological ,systemic and internal circulatory investigations ; evaluation of application of different efferent methods (EM) - methods of «active» detoxication - plasmapheresis, hemocarboperfusion, hemodialysis, lymphocarbosorbtion, hemoxenosplenoperfusion, ultraviolet irradiation of blood, electrochemical systemic detoxication, gastroenterosorbtion had been done. Severe endogenous intoxication (EI) as a component of MOSF were indicative of incompetence of the natural ways of detoxication. That is why it is necessary to apply in complex IC of patients in CS with MOSF the EM.
Results: Application of efferent methods in CS needs individual approach. Bacterial component of EI was the main one in sepsis. That is why the priority technics in sepsis were hemoxenosplenoperfusion and ultraviolet irradiation of blood. These technics secured the effect of immunomodulation. The main sourses of EI in rhabdomyolysis are crushed muscles and subcutanous fatty tissue. Timely application of plasmapheresis and lymphogenous methods of detoxication at the early period of rhabdomyolysis like application of hemodialysis and hemocarboperfusion at the period of renohepatic insufficiency secure prevention of multiorgan failure.
Conclusions: Applying of active detoxication technics had been enabled to reduce the lethality level in cases with sepsis from 42,3% to 19,6%; in cases with rhabdomyolysis - from 28,4% to 12,8%; in cases with acute chemical trauma - from 46,2% to 24,1%. This is the evidence of vital importance of detoxicational potencial in MOSF outcome. So, the irreversible changes of internal in MOSF can be prevented by timely application of efferent methods - the methods of «active» detoxication.

POSTOPERATIVE ILEUS (PI): THE DYNAMICS OF RESTORATION OF DOG'S DISTAL COLON MOTILITY (DCM) BY SINGLE INFUSION OF THE NEW HYPEROSMOLAR SOLUTION "SORBILACT" ("SL")

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Objectives: Among many organs, playing the important role in pathogenesis of multiple organ failure, the particular place is taken by the intestine.
Methods: The study was carried out in 5 dogs in which PI was modelled by severe operative trauma (OT). The DCM was estimated by the indices values of work time (WT), contraction frequency (CF), mean amplitude of contractions (MAC) and motility index (MI) measured by method of tensography. "SL", created on the basis of sorbit and sodium lactate (1800 mOsm/L), was injected in the dose of 10.0 ml/kg into v. cephalica antebrachii after 24 hrs of OT.
Results: It is established that after 24 hrs of OT infusion of "SL" against the background of complete absence of DCM induced only isolated contractions. However, on the next day after the treatment the indices values of WT, CF, MAC and MI already made 12.3±2.8%, 0.15±0.02 per min, 3.24±0.97 mm Hg and 0.20±0.06, correspondently. Steady and complete recovery of DCM occured at the 5-6 day after treatment. In this the indices values of WT, CF, MAC and MI made 34.12±4.21%, 0.52±0.13 per min, 9.62±1.54 mm Hg and 1.64±0.33, respectively.
Conclusions: The results of the present study are the evidence of "SL" stimulative action on DCM and are experimental ground for "SL" using in complex therapy of PI in clinic.

GASTRIC PCO_2 DETERMINED BY TONOMETRY IS NOT CORRELATED WITH SPLANCHNIC VENOUS BLOOD PCO_2

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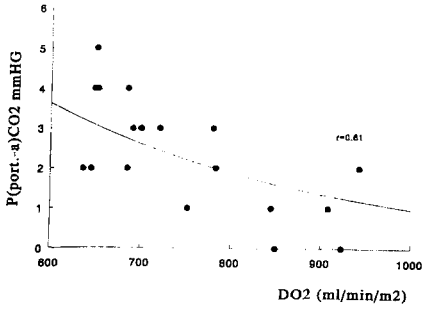
Determination of gastric intramucosal pH (pHi) by gastric tonometry using the Henderson-Hasselback equation is expected to allow the detection of splanchnic ischemia in critically ill patients. Because of bicarbonate concentration and acid-base balance influences on the calculation of pHi, it has been proposed to use arterio-gastric PCO_2 gradient [P(Gast-a)CO_2] to assess splanchnic perfusion.
Hypothesis : PCO_2 in the gastric mucosa is in equilibrium with intraluminal CO_2 and with CO_2 in the blood leaving the stomach (mesenteric and portal blood).
Objective: Mesure PCO_2 and pH in portal vein blood and compare its value with PCO_2 and pHi obtained simultaneously by gastric tonometry.
Material and method : In a patient (55 y.), a fiberoptic catheter (Baxter^R) was positionned in the portal vein after transhepatic stent shunt repermeabilisation. Hemodynamic parameters, DO_2 (Vigilance^R Baxter), gastric CO_2 and pHi (tonometrics Baxter) and portal blood gas were determined at regular intervals.
Results : 19 sets of data were obtained and are expressed in mean ± SD. Gastric PCO_2 was 46,5±18 compared to 40,4±3.5 mmHg for portal PCO_2. pHi was 7.32±0,17 VS 7.34±0,04 for portal pH. No correlation was found for these 2 parameters. P (Gast-a) CO_2 was 6.4±15 mm Hg VS 2±1.6 mm Hg for P (portal-a) CO_2 (no correlation). There was a good correlation between DO_2 and P (portal-a) CO_2 (r = 0,61) [Figure] but no correlation with P (Gast-a) CO2.



Conclusion : Gastric CO_2 and pHi obtained by gastric tonometry are not correlated with PCO_2 and pH directly determined in the splanchnic venous blood.

LUNGWATER AND CARDIAC OUTPUT ESTIMATIONS IN THE INTENSIVE CARE PATIENT USING ^2H_2O AND ICG

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Objectives: To estimate extravascular lung water (EVLW) and cardiac output (CO) in the intensive care patient for an extended period of time.
Methods: The protocol was approved by the local ethics committee. All 6 patients were initially on artificial ventilation. The densitometer system consists briefly of a light source, a chopper with 2 filters allowing light at the wavelengths of 800 nm (absorbency for ICG) and 4000 nm (absorbency for ^2H_2O) to pass through an optical cell. After analogue to digital conversion calculations are done by a PC and on-line values are presented on the video (1-2). The indicator solution was made of ^2H_2O 0.25 mL/mL and ICG 4.17 mg/mL. The solution was administrated as a bolus (5.0 mL) via a central venous line while blood was simultaneously withdrawn from the radial artery (30 mL/min) through the densitometer.
Results:

EVLW mL/kg x b.w., CO L/min

Day	I	II	III	IV	V	VI	VII	X	XII	XIV	XVI	XVIII	XX	Out
EVLW	5.6	3.5	6											*
CO	7.3	5.5	8											HF
EVLW	3.9	3.1	4.6	5	4.4	6								*
CO	10	8.6	8.1	10	10	11								HT
EVLW	2.4	1.8	3.7	5.1	3.9	3.2								*
CO	9.1	9.4	14	9.3	6.2	8.7								HT
EVLW	22	20	20	22	27	29	20	21	21	18				†
CO	13	10	11	10	11	8.7	9.2	11	7.6	9.5				MOF
EVLW	6.9	6	6.4	5.8	7	4.8	3.1	5.2	7.8	4.9	6	5.1	5.9	*
CO	4.9	4.9	5.4	8.3	7.9	9.1	7.6	6.6	7.1	9.4	8.6	8.8	6.6	MOF
EVLW	31	29	30	25	32	30	27	18	23					†
CO	10	7	8.9	12	9.6	11	13	8.9	8.1					MOF

*abbreviations: †, dead in the ICU, *survival in the ICU, heart failure (**HF**), head trauma (**HT**) multi organ failure (**MOF**), outcome (**Out**)*

Conclusions: Determination of EVLW is of great clinical interest. The routine long-term determination has been hampered by available equipment's high invasiveness. These results are the first in a pilot study where EVLW and CO were estimated daily, on-line, bedside using ^2H_2O and ICG for a duration, that to our knowledge has never been done before in clinical practice.

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2. Wallin C-J, Leksell LG. J Appl Physiol (1994) 76 (5): 1868-1875.

EXTRAVASCULAR LUNG WATER AND ARTERIAL OXYGEN TENSION DURING BICARBONATE HEMODIALYSIS

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Objectives: Desaturation is a common finding during haemodialysis (HD). Pulmonary oedema might be one cause for impaired gas exchange (1). The aim of this study was to quantitate the amount of extravascular lung water (EVLW) and gasexchange in chronic renal failure patients during and after a regular hemodialysis session.
Methods: 10 chronic renal failure patients without symptoms or diagnosis of cardiac or respiratory disease were studied at the start (I), at the end (II) and two hours after (III) a regular bicarbonate hemodialysis session. The double-indicator dilution method, with indocyanine green and the stable isotope ^2H_2O as tracers, was used to measure EVLW (2). Arterial bloodgases and endtidal CO_2 were registered. EVLW data was compared to a group of 18 renal healthy patients (0).

Results:

	DCP	n	EVLW, mL	PaO2, mmHg	H_3O^+, nmol/L
Control group	0	18	243 ± 61		
	I	10	332 ± 91**	13 ± 3	38 ± 4
CRF group	II	10	269 ± 84‡	11 ± 2 ns	34 ± 2 †
	III	10	283 ± 78†	11 ± 3 ns	34 ± 2 †

** p < 0.01 dcp I from dcp 0, † p < 0.01 dcp II or II from dcp I, ‡ p < 0.001 dcp II from dcp I

The EVLW at the start of dialysis was larger in the CRF group than in the control group. The EVLW decreased significantly to a level not different from the control group in response to the reduction in weight after HD. PaO_2 was normal at the start of HD and showed a non-signficant reduction after HD. $PaCO_2$ (5.3±0.6 kPa) and $EtCO_2$ (5.2±0.8 kPa) were unchanged while H_3O^+ decreased and bicarbonate increased significantly.
Conclusions: The elevated level of EVLW at the start of HD did not impair gasexchange. The decrease in EVLW did not inhibit the decrease in PaO_2. The reduction in H_3O^+ followed by a fall in alveolar vantilation is the most plausible cause for the decrease in PaO_2 in bicarbonate dialysis.

1. Prezant Lung 1990; 168: 1-14. 2. Wallin J Appl Physiol 1994; 76: 1868-75.

INTRAMUCOSAL GASTRIC PH HAS A PREDICTIVE VALUE IN MAJOR ABDOMINAL SURGERY

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Objectives: To verify if intraoperative modifications of intramucosal gastric ph (phi) below the normal lowest value 7.32, can be predictive for important complications, as perforation, sepsis, MOF or death.
Methods: We have considered 20 patients who underwent major abdominal surgery. All patients received the same drugs in pre-anaesthesia, the same type of anaesthesia (balanced anaesthesia) and the same treatment with H2-blockers. After the induction of anaesthesia a gastric tonometer was positioned and a catheter was positioned in the radial artery. During the operation, every 30 minutes, the following parameters were measured at the same time: phi, arterial ph (pha), blood lactate, mean arterial pressure. In follow up we considered death and complications happened during the hospital stay, in relation to intraoperative phi falls below 7.32.
Results: Among the 20 patients, 9 had a drop of phi below 7.32 during surgery. In three of them this fall was a single episode and happened within the first hour after the beginning of the operation. After that phi rose to normal values until the end of the operation. These patients had a normal post-operative period, without complications. The other 6 patients had a fall of phi during the demolitive manoeuvres. Two patients of them died . The first had a lowest phi=7.25 and the second 6.97. The first one was operated on for hepatic istiocitoma, suffered a complete dehiscence of the surgical wound on the 20th day after operation and died on the 25th day, the second one was operated on for a hepatic carcinoma had an intraoperative haemorrhage and died two hours after the end of the operation. The other 4 patients with a fall of phi had a lowest phi=7.24. 7.18. 7.26, 7.28 respectively. The first patient,operated on for sigmoid carcinoma, underwent on a second operation for a transmural necrosis of the colic segment on the 25th day; the second one, operated for carcinoma of the right colon, had a cardiac ischemia on the 5th post-operative day and a dehiscence of the surgical wound on the 8th day; the third one, operated on for a sigmoid carcinoma, had melena in 4th post-operative day and finally the fourth patient, operated on for carcinoma of the right colon, suffered a fistula of the surgical enteral anastomosis. All these 4 patients were discharged alive from the hospital. The other 11 patients, who had not reductions of phi during the operation, had a normal post-operative period, without complications.
Conclusion: Phi was able to predict the arising of some complications, probably due to intraoperative ischemic events. We can say that gastric tonometry, for its low invasivity, can be included among the intraoperative monitoring in patients that underwent on major abdominal surgery.

HEMODYNAMIC ALTERATIONS DURING HEMODIALYSIS IN PATIENTS WITH MULTIORGAN FAILURE

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Objectives: Evaluate the hemodynamic alterations during hemodialysis in patients with multiorgan failure.
Methods: 11 patients with multiorgan failure were studied during 22 hemodialysis (HD) treatments of 3 hours duration. All patients were mechanically ventilated in control mode and had a Swan-Ganz catheter, with optic fibers for continuous measurement of SvO_2 (Oximetrix®), in place. During each treatment 5 complete hemodynamic studies were performed, one before the beginning of HD, one 15 min after the beginning, one at the middle, one 15 min before the end and one 30 min after the end of HD. Paired t test was used for statistical evaluation.
Results: During HD there was a significant reduction ($p<0.01$) of: 1) Central Venous Pressure (CVP)from 9 to 7.5 mmg Hg, 2) Pulmonary Capillary Wedge Pressure (PCWP) from 13 to 11 mmg Hg, 3) PCO_2 from 33 to 30.5 mmg Hg. There was also a less pronounced but also statistically significant reduction ($p<0.05$) of: 1) SvO_2 from 67 to 62% and 2) Mean Pulmonary Arterial Pressure (MPAP) from 24 to 22.7 mmg Hg. There was also a reduction which was not statistically significant in: 1) Mean Arterial Pressure (MAP), 2) Cardiac Output (CO), 3) Cardiac Index (CI), 4) PO_2, 5) Oxygen Delivery (DO_2) and finally there was an increase, which was not statistically significant, in: 1) Systemic Vascular Resistances (SVR) and 2) Pulmonary Vascular Resistances (PVR). There was no change in: 1) pH and 2) Oxygen Consumption (VO_2). After HD all values returned to pretreatment levels except SVR which significantly fell from 1237 to 1085 dyne.sec/cm^5 ($p<0.05$) and MAP which remained lower than pretreatment levels but the difference was not statistically significant.
Conclusions: The main hemodynamic alteration during HD is the reduction of the filling pressures of the right and left ventricle. Although this reduction is significant, it does not seem to affect DO_2 which is of extreme importance to patients with multiorgan failure.

PREDICTIVE VALUE OF GASTRIC INTRAMUCOSAL pH IN ABDOMINAL AORTIC SURGERY

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Patients undergoing surgical reconstruction of the aorta due to aneurysms of its abdominal part may develop transient and sometimes sustained episodes of dysoxia despite the conventional appearances of being adequately resuscitated. Indirect masurement of gastric mucosal pH (pHi) is being widely evaluated as a minimally invasive and sensitive means of assessing the adequacy of tissue oxygenation in these circumstances. The duration and degree of gastric intramucosal acidosis are related to the risk developing injured gastrointestinal tract and its putative consequences, i.e. translocation, cytokine release, organ dysfunction and failure, sepsis and death. Measurement of pHi is obtained indirectly by measuring PCO_2 in the lumen of the stomach with a silicone balloon tonometer (*Tonometrics, Inc., Worcester, MA, USA*) and the bicarbonate concentration in arterial blood, and substituting these two values in the Henderson-Hasselbalch equation.
Objectives: To evaluate whether perioperative pHi changes are predictive of complications and outcome and how they compare to standard haemodynamic and oxygen transport parameters.
Methods: 16 patients (15 males and 1 female) underwent surgical replacement of abdominal aortic aneurysm with the aortic simple or bifurcated graft. 14 patients were operated on electively, 1 had an emergency surgery for ruptured aneurysm. Haemodynamic, arterial pH and bicarbonate concentration measurements were taken before and after induction of anaesthesia, after cross-clamping and declamping of the aorta and at admission to ITU. pHi calculations were done at the sime time except before induction, as tonometers were inserted after patient had been asleep. We used pulmonary artery catheter *Viggo Spectramed 7F* and *Spectramed Hemopro Hemodynamic Profile Computer SP1445*.
Results: 5 patients died following surgery. Cardiac index (CI) and oxygen delivery index (DO_2I) were significantly higher in survivors after the release of cross-clamp of the aorta (CI 3.44±0.95 and 2.43±0.36, DO_2I 545±176 and 324±47, respectively, $p<0.05$). pHa was significanly lower in non-survivors only after declamping of the aorta (7.27±0.05 vs. 7.37±0.07 in survivors, $p<0.05$). pHi was significantly lower in non-survivors already after induction of anaesthesia as well as following declamping of the aorta (7.47±0.17 vs. 7.68±0.12 in survivors after induction, and 7.28±0.09 vs. 7.51±0.15 in survivors after declamping of the aorta, $p<0.05$). Arterial bicarbonate concentration was not significantly different between groups.
Conclusion: The meaasurement of pHi seems to be an early sign and predictor of mortality following aortic surgery. However, more data need to be collected.

INFLUENCE OF DELAY BETWEEN INITIAL INSULT AND MAXIMAL RESUSCITATION ON OUTCOME FROM CRITICAL ILLNESS

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Objective: To relate the effect on outcome of time from the initial insult to maximal resuscitation in a heterogenous group of patients considered to be at high risk of developing vital organ failure.
Methods: A retrospective analysis of 100 patients entered into a study to compare supranormal oxygen delivery(DO_2) and consumption(VO_2) with normal haemodynamics as goals for treatment. If the survivor goals (cardiac index(CI) >4.5L/min/m2, DO_2>600mls/min/m2, VO_2>170 mls/min/m2) were not achieved with fluid administration alone, patients were randomised to either protocol or control groups. In the protocol group incremental doses of dobutamine were administered until all three goals were achieved simultaneously, unless tachydysrhythmias or evidence of myocardial ischaemia developed. In the control group dobutamine was only administered if CI<2.8. In both groups noradrenaline was infused to maintain mean arterial pressure at 80 mmHg. The estimated time from the initial insult to maximal resuscitation was recorded. (Maximal resuscitation was defined as the time when all three goals were achieved simultaneously or the time to maximal DO_2 if the consumption goal was not reached.) Control and protocol patients were divided into two groups dependent on time to maximal resuscitation (<or>24 hours). Hospital mortality and admission APACHE II scores were recorded (median and range).
Results:

	Control	(n=50)	Protocol	(n=50)
Delay	<24 hours	>24 hours	<24 hours	>24 hours
Mortality rate	9% (2/22)	43% (12/28) $	35% (9/26) *	67% (16/24) $
APACHE II	15 (5-34)	20 (5-34) +	15 (6-31)	21(13-35) ▲

Control vs protocol < 24 hours * $p<0.05$
Within groups <24 hours vs >24 hours $ $p<0.05$, + $p<0.01$, ▲ $p<0.001$
Conclusion: In both groups a delay of more than 24 hours to maximal resuscitation was associated with significantly greater APACHE II scores and higher mortality rates. Control patients had a significantly lower mortality than protocol patients in the subgroup who were maximally resuscitated within 24 hours. A similar trend was present in those patients where the delay to full resuscitation was longer than 24 hours. We conclude that following the onset of critical illness treatment aimed at boosting DO_2 and VO_2 is ineffective, irrespective of its timing.

ANALYSIS OF CRITICALLY ILL OBSTETRIC PATIENTS REQUIRING INVASIVE HEMODYNAMIC MONITORING OR TRANSFER TO MED/SURG ICU AT A 314 BED COMMUNITY HOSPITAL OVER A FIVE YEAR PERIOD

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Introduction:
University hospital data suggests Obstetric patients are transferred to the ICU at a rate of .29%[1]. Reasons include management of respiratory failure (60%) and hypertension (20%), with an overall rate of pulmonary edema/respiratory failure of 35%[2]. No data from a community hospital with Family Practice and Obstetric resident deliveries exists.

Methods:
Utilizing a computer billing survey as well as hospital service transfer data from a 67 month period (1/89 - 7/94), all obstetric patients that were transferred to the Med/Surg ICU were identified, as well as their diagnoses and procedures.

Results:
Twenty-eight obstetric patients were transferred to the Med/Surg ICU, compared to 12,489 deliveries occurring during that time period for a .22% rate. The following procedural indications for ICU transfer occured: 4 insertions of endotracheal tubes, 2 arterial catheterizations, 1 temporary tracheostomy, and 1 venous catheter. The following medical diagnoses were found: 5 hypertensive/eclamptic episodes, 2 hypotensive episodes, 1 pulmonary embolism, 1 mitral stenosis, and 1 coagulation deficiency. There were four episodes of respiratory failure (14%).

Conclusion:
The historical rates of respiratory failure from the medical literature seen at a university hospital are higher than those at our community hospital despite comparable ICU transfer rates for critically ill OB patients.

1. Collop & Sahn. CHEST '93;103:1548-52.
2. Collop NA. CHEST '94;105(6):1915-16.

CONTINOUS VENO-VENOUS HAEMODIAFILTRATION (CVVHD) USING HEPARIN / ALBUMIN PRECIRCULATION IN FULMINANT HEPATIC FAILURE .

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Background. Fulminant hepatic failure (FHF) is associated with renal failure in up to 55% of patients and CVVHD is the treatment of choice. Anticoagulation is achieved by the infusion of heparin or epoprostenol (PGI_2). Perfusion of extracorporeal circuits is associated with platelet consumption and both heparin and PGI_2 may exacerbate bleeding, commonly seen in FHF. In addition, PGI_2 causes vasodilatation which may worsen pre-existing hypotension.
Aim. To minimise side-effects associated with CVVHD, we have developed a method of priming the circuitry with human albumin solution and heparin to avoid the need for continous anticoagulation.
Method. 36 dialysis episodes were performed in 22 patients with FHF secondary to paracetamol toxicity in 19, anti TB Rx, hepatitis B, and ischaemia in 1 case respectively with a median age of 38 yrs. Patients were randomised to receive one of three modes of anticoagulation. 22 circuits were heparin/albumin bonded, 8 utilised a heparin infusion (activated clotting time maintained between 150-200 secs) and 6 PGI_2 infusion (5ng/kg/min). Heparin/albumin circuits were prepared by circulating for 4 hours 500ml of 4.5% albumin to which 5000IU Na heparin had been added. Haemodynamic measurements were performed at 10 minute intervals for 1 hour, and platelet counts were performed at 0, 30, 60 minutes, and daily thereafter.
Results. CVVHD circuits lasted for a mean time of 46 hr's in both the heparin/albumin and heparin infusion group compared to 41 hr's (PGI_2). Falls in mean arterial blood pressure during the first 30 minutes of treatment were significantly less in the heparin bonded group (2mmHg) vs. heparin [10mmHg ($p<0.0001$)] and PGI_2 [10mmHg($p<0.0002$)]. The platelet count fell by a median of 12 $x10^9$ in the heparin bonded group compared to heparin 31 $x10^9$ ($p=0.0014$) and PGI_2 24 $x10^9$ ($p=0.04$) in the first hour.
Conclusions. Precirculation with heparin/albumin leads to improved biocompatibility of CVVHD treatment in patients with FHF. The more costly usage of prostacycline can be avoided by this simple technique.

7. Outcome, Ethics

THERAPEUTIC INDEXES (ThI) IN A GREEK ICU: COMPARATIVE EVALUATION OF OMEGA, TISS and ITC.

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Objectives: To estimate therapeutic charge (ThCh) in our ICU by measuring three different ThI and to assess their agreement. **Design:** Prospective data collection for 4 months in a multi-disciplinary 8-bed ICU. **Methods:** Data from 60 consecutive patients admitted to the ICU from 1/1/1995 to 31/4/1995 were studied. A tick chart was designed in order to record demographic data, as well as all the information necessary for computation of three ThI: OMEGA, TISS and ITC. OMEGA was calculated as a total of points accumulated during hospitalisation, while TISS and ITC were calculated every day and were expressed either as total TISS and total ITC (TISStot and ITCtot) or as mean TISS and ITC (TISSm and ITCm). The significance of TI differences between survivors and non survivors was evaluated by Mann-Whitney analysis.

Results: Mean age of our patients was 54 years and mean time spent in the ICU was 12 days. Measured ThI (±SD) were:

Indexes\Pts	All	Survivors	Non survivors
OMEGA	164±132	144±126	200±136
TISStot	383±380	304±333	521±446
ITCtot	078±091	050±066	124±108
TISSm	033±011	027±008	042±011
ITCm	006±005	004±003	011±005

All three ThI differ significantly between survivors and non survivors. Correlation was good between OMEGA and TISStot (r=0.854) or ITCtot (r=0.888) as well as between TISSm and ITCm (r=0.860). However, such a correlation was not observed between OMEGA and TISSm (r=0.376) or ITCm (r=0.487) nor between TISStot and ITCtot (r=0.542).

Conclusions: We conclude that the ThCh in our ICU is the usual ThCh of a european ICU and that ThI differed significantly between survivors and non survivors. Comparative evaluation of the above three ThI seems to indicate that OMEGA, TISStot and ITCtot may be used to evaluate ThCh per patient, while TISSm and ITCm values are more usefull for the evaluation of every day ThCh in the ICU.

ILLNESS SEVERITY SCORING SYSTEMS (ISSS): COMPARATIVE EVALUATION AND USEFULNESS FOR OUTCOME PREDICTION.

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Objectives: To evaluate the usefulness of several ISSS used in order to predict risk of death (RD). **Design:** Prospective data collection for 7 months in a multidisciplinary 18-bed ICU. **Methods:** Data from 270 consecutive patients admitted to the ICU from 1/10/1994 to 1/5/1995 were studied. All the necessary informations were stored in a computer using special software for every day computation of three ISSS (SAPS, SAPS II, APACHE II) and of the RD predicted by SAPS II, MPM0, MPM24 and ODIN. Data from 2453 days of hospitalisation were used for comparative evaluation of ISSS and RD, while sensitivity and specificity in death prediction (cut off point of RD = 90%) were evaluated from data collected during the day of admission (SAPS II, RPM0, ODIN) or after 24 hrs (MPM24). Agreement between RD predictions was evaluated by Bland and Altman analysis. **Results:** Our results were the following:

TABLE 1	RD±SD	RD comparison	d	L of A
SAPS II	31±28	SAPS II/MPM0	7.6	-25 to 40
MPM0	26±25	SAPS II/MPM24	2.4	-35 to 39
MPM24	27±24	SAPS II/ODIN	6.2	-28 to 40
ODIN	23±21	ODIN/MPM0	1.4	-33 to 35
Observed mortality 35%		ODIN/MPM24	-3.7	-34 to 26

TABLE 2	SAPS II	MPM0	MPM24	ODIN
Sensitivity	13.8%	008.5%	06.8%	001.0%
Specificity	98.8%	100.0%	98.5%	100.0%
PPVal	90.9%	081.2%	76.9%	066.6%

SD=standard deviation, PPVal= positive predicted value, d=bias and LofA= 95% limits of agreement.

Conclusions: Observed mortality was similar to RD calculated according to SAPS II, MPM0, MPM24 and ODIN. The fact that the L of A between ISSS studied were too large, do not justify ISSS use for outcome prediction in the individual patient.

ILLNESS SEVERITY SCORES AND PREDICTED RISK OF DEATH (RD) IN A GREEK ICU.

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Objectives: a) to create and validate software specially designed for the collection of demographic data and estimation of illness severity and predicted RD and b) to provide data necessary for the evaluation of the effectiveness and the efficiency of our ICU. **Design:** Prospective data collection in a multidisciplinary 18-bed ICU. **Methods:** Prospective data on specific physiological variables, selected demographic characteristics, comorbidity and the reason for ICU admission were recorded every day for 270 consecutive patients admitted to the ICU from 1/10/1994 to 1/5/1995. Data were entered into a portable computer using specially designed software allowing the calculation of usual Illness Severity Scoring Systems (ISSS) and the corresponding predicted RD. **Results:** We studied 176 men and 94 women, with a mean age of 55 years. Mean time of intensive care was 9 days. Mean values of SAPS, SAPS II and APACHE II scores were 11.7±5.8, 38.4±21 and 19.6±9.4 respectively. There was no significant correlation between mortality and time spent in the ICU.

\RD%	Survivors		All pts	Type of admission*		
SSS	yes	no	(±SD)	MED	SS	UnSS
SAPS II	19	52	30±28	26	37	32
MPM0	17	42	26±25	22	31	28
MPM24	17	41	27±24	24	24	29
ODIN	38	15	23±21	20	24	24
observed mortality (%)			35	26	33	46

SD = standard deviation, *Type of admission: MED= medical, SS and UnSS= scheduled and unscheduled surgical.

Conclusions: We conclude that, although observed mortality was higher than predicted RD, this difference was not statistically significant. The fact that the SD of predicted RD was too large, limits the usefulness of ISSS predictions for a comparative evaluation of different ICUs.

INTERESTS OF A NON SPECIALISED SCORE LIKE THE SAPS II IN AN EMERGENCY DEPARTMENT.

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Objectives : The importance of objective evaluation of patients prognosis at their admission to an emergency department is clear. The aim of this study was to appreciate the prognosis of patients with the Simplified Acute Physiology Score II (SAPS II), and correlate this score to the prognosis and orientations of patients.

Methods : The score which is a reduced form of SAPS II was calculated from 6 clinical variables and 6 laboratory items for 200 patients. Sensibility (Se), Specificity (Sp) and Accuracy (Ac) were calculated to evaluate the performances of SAPS II. Thresholds were calculated with the Youden's test (Se+Sp-1).

Results : 23 patients were admitted in the intensive care unit (ICU) and 177 patients in medical units; 23 patients died. The SAPS II was higher in patients which died than the survivors (31,0±11,4 vs. 1,9±9,3, p<0,0001; respectively), the best threshold was 24, Se was de 86%, Sp was 92%, the Ac was 92%. Thus for patients admitted in ICU than in medical unit (27,0±13,5 vs. 12,5±9,9 , p<0,0001; respectively); the best threshold was 21, Se was 69%, the Sp was 78%, the AC was 77%.

Conclusions : These preliminary results suggest that SAPS II can be used to determine the short term prognosis and the destination of patients seen in an emergency department.

HIV STATUS DOES NOT INFLUENCE OUTCOME IN PATIENTS ADMITTED TO A SURGICAL INTENSIVE CARE UNIT

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Objective: The impact of HIV status on patients admitted to Intensive Care Units (ICU) for diseases unrelated to HIV has not been described. In view of limited resources, high costs and the excessive demand for ICU beds, a study was undertaken to examine the impact of HIV status (HIV negative, HIV positive, AIDS) on morbidity and mortality. This would determine if HIV positivity should be an exclusion criterion for ICU admission.
Design: Data was collected on all admissions over a six month period. All patients had a screening HIV ELISA test. Confirmatory IFA tests, Western Blot and flow cytometry were performed on HIV positive patients. The institutional Ethics Committee considered the major clinical impact of the study sufficient cause to waive the patient's right to informed consent. ICU staff and patients were blinded to HIV results. Following discharge patients were given the option of being advised of their HIV status.
Setting: The study was conducted in a 16 bedded surgical ICU at a tertiary care teaching hospital.
Patients, Participants: All patients admitted during the period in question were included.
Interventions: All patients were treated according to standard ICU protocols. There were no interventions.
Results: Most patients were admitted following trauma. There were no patients with AIDS, 52 HIV positive and 350 HIV negative patients. With respect to the latter two groups, the mean age and sex distribution was similar, there was a significant difference in organ failure (71% versus 49%, $p < 0.05$) and septic shock (39% versus 15%, p , 0.05) but no difference in ICU/hospital mortality or duration of ICU/hospital stay. Flow cytometry changes in HIV positive patients were consistent with the quiescent phase of HIV infection.
Conclusion: While morbidity is higher in HIV positive patients, there is no difference in mortality. HIV status should, therefore, not be an exclusion criterion for ICU admission in this patient population.

PERFORMANCE OF THE RELATIONSHIPS BETWEEN SEVERITY OF ILLNESS AND THERAPEUTIC EFFORT SCORING SYSTEMS.

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Objective: To compare the relationships between three severity of illness scoring systems -Simplified Acute Physiology Score II (SAPS II), Acute Physiology and Chronic Health Evaluation II (APACHE II), and Acute Physiology Score (APS) of APACHE III- and the therapeutic effort measured with the Therapeutic Intervention Scoring System (TISS) during the first 24 hours of ICU admission.
Design: Prospective cohort study.
Setting: Medical Intensive Care Unit in a Tertiary Hospital.
Patients: A total of 202 consecutive critically ill patients with non-coronary related disease admitted during a 12 months period.
Measurements: During the first 24 hours of ICU stay were collected from each patient the different variables required for calculations of TISS, SAPS II, APACHE II, and APACHE III-APS scores.
Results: The 202 patients were 122 male and 80 female, with mean±SD age 50.9±19.4. Severity of illness scoring systems mean values were: SAPS II= 43.93±19.90, APACHE II= 16.5±8.8, and APS of APACHE III= 52.3±29.0. Mean value of TISS score was 24.9±11.6 points. The three severity of illness scoring systems were significantly correlated with TISS, and linear regression analysis, with TISS as the dependent variable, yielded the following results:

Scores (= x)	r	p	TISS (= y)
SAPS II	0.62	<0.001	$y = 8.89+0.36x$
APACHE II	0.56	<0.001	$y = 12.70+0.73x$
APACHE III (APS)	0.61	<0.001	$y = 11.97+0.24x$

Conclusions: The correlation analysis between TISS and each one of the different severity of illness scoring systems SAPS II, APACHE II, and APS of APACHE III reflects a similar level of association in all of them. The relationships between severity of illness measured through SAPS II, APACHE II, and APS of APACHE III scores, and therapeutic effort measured through TISS score are linear in all the three cases during the first 24 hours of ICU stay.

A COMPARISON OF APACHE II, SAPS II, AND MPM II-24 AND 48 HOURS MODELS- TO PREDICT MORTALITY OF ICU PATIENTS.

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Objective: To compare the ability of three methods-Acute Physiology and Chronic Health Evaluation II (APACHE II), Simplified Acute Physiology Score II (SAPS II), and Mortality Probability Models II (MPM II_{24h} and MPM II_{48h}), measured at 24 and 48 hours of ICU admission-to predict ICU outcome.
Design: Prospective cohort study. **Setting:** Medical Intensive Care Unit in a Tertiary Hospital. **Patients:** A total of 202 consecutive critically ill patients with non-coronary related disease admitted during a 12 months period. **Measurements and Main Results:** Calculations of probabilities of ICU mortality were made in each patient from the logits of APACHE II, SAPS II, and MPM II values at 24h and 48h, through the original published formulae. Predicted risks of mortality were compared with the observed outcomes using the Lemeshow-Hosmer goodness of fit test. There were 16 deaths and 41 discharges from the 1st to the 2nd day. Overall mortality was 19.8% (40 patients):

ICU Day	Number of Patients	Lemeshow-Hosmer chi-square statistic values		
		APACHE II	SAPS II	MPM II
1	202	18.76	52.53	17.50
		7.97	37.79	6.07
2	145	6.90	24.42	29.66
		3.69	10.85	12.03

Low values of Lemeshow-Hosmer chi-square statistic indicates good agreement between observed and expected number of deaths, and consequently a better predicting model. On the first day, the 24 hours models APACHE II and MPM II_{24h} showed a very good and near similar degree of goodness of fit, wich was superior to SAPS II. However, on the second day the performance of APACHE II was better than MPM II_{48h} and SAPS 48 hours models, and even SAPS II was then slightly superior to MPM II_{48h}. **Conclusion:** In this study, prediction of mortality demonstrated a more continuous and relatively better accuracy when is calculated from APACHE II system in comparison to SAPS II and MPM II systems at 24 and 48 hours of ICU admission.

PROGNOSTIC VALUE OF THE FIRST DAY AND UPDATED APACHE III SCORES IN PATIENTS WITH SEPSIS

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OBJECTIVE: To evaluate the prognostic value of the APACHE III scoring system in patients with sepsis
METHODS: 48 patients admitted to the medical ICU of Asan Medical Center from July 1990 to May 1994 were retrospectively analyzed for their first, second and third day APACHE III scores (D1, D2, D3, respectively). Sepsis was defined by Bone's criteria (Ann Intern Med 1991; 115:457).
RESULTS:
1) The survivors (21/48, 43.5%) were younger (51.1±18.1 vs 62.7± 12.6yrs, $p<0.05$), presented with higher mean arterial pressure (67.7±14.2 vs 56.9±26.2 mmHg, $p<0.05$) and fewer number of multisystem organ failue (0.2±0.4 vs 1.2±0.8, $p<0.05$) than the nonsurvivors (27/48, 56.5%).
2) The D1 was lower in the survivors than in the nonsurvivors (44.1±14.6, 78.5±18.6, $p<0.05$). The APACHE III scores were progressively decreased compared to the score of the preceding day in the survivors (D1 vs D2[37.9±15.0], $p<0.05$; D2 vs D3[30.1±9.3], $p<0.05$), but they tended to be increased in the nonsurvivors (D1 vs D2[81.6±22.4], $p>0.05$; D2 vs D3[75.3±8.8], $p>0.05$).
3) Also in 12 of the survivors and 6 of the nonsurvivors with similar range of D1 (42 ~ 67) (mean D1, 53.8±10.0, 55.3±10.3, respectivley, $p>0.05$), the APACHE III scores were significantly decreased compared to the score of the preceding day in the survivors (D1 vs D2[41.1±14.6], $p<0.05$; D2 vs D3[30.5±10.6], $p<0.05$), but they tended to be increased in the nonsurvivors (D1 vs D2[66.7±13.9], $p<0.05$; D2 vs D3[74.3±18.6, $p>0.05$).
CONCLUSION: These results suggest that the first day and daily updated scores of the APACHE III scoring system could be useful in predicting the outcome of patients with sepsis.

QUALITY OF OUTCOME'S PROGNOSIS IN PROLONGED UNCONSCIOUS STATE

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Objectives: The aim of this report is to present the experimental study results for outcome's prognosis quality for patients with prolonged unconsious state . The outcome's prognosis is usually based on both the observation results got by intensiv care physician and based on the scale of patient's state alone .
Methods : The study was conducted on 35 patients with unconscious state caused by traumatic or anoxic brain unjury . The patients were followed up within first mounth, at mounth 3 and 5 , in 1 year of the onset of disease. The examination includes full medical and neurologic clinical and instrumental evaluations . The estimates of medical coma and an outcome's prognosis for those patients were based both on several classic and modern scale estimates and on expert questioning of physicians expierenced in intensiv care .
Results : It was established that negativ prognosis (death or vegetative existence) based on both the observation results got by intensiv care physicians and according to the scale of patient's state alone wasn't confirmed on 34 %, a good recovery in 14 % including . It was also found that recovery level under the prolonged unconscious state depends on dynamic pattern of neurological state in acute stage of disease .
Conclusion: If an unconscious state of some patient is prolonged then his outcome's prognosis should not be based on either the observation results got by intensiv care physician or the scale of patient's state , alone. The findings of the prolonged monitoring of such patients neurological status are necessary for making an adequate prognosis for such patients.

PATIENT OUTCOME FOLLOWING THE ADOPTION OF A CLOSED SYSTEM MEDICAL INTENSIVE CARE UNIT (MICU)

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Objectives: To evaluate the quality of patient care and procedure used in the MICU following reorganisation and staffing by an intensivist.
Design: Restrospective, cohort study.
Setting: Adult MICU in a University affiliated hospital.
Patients: Consecutive MICU admissions during two 3-month periods, August-October 1993 (Period 1, n=112) and January-March 1994 (Period 2, n=127) were studied.
Interventions: A resident MICU team led by a trained intensivist took over the medical care from the primary physicians when the patients were admitted to the MICU. The intensivist also vetted MICU admissions and decided on MICU discharge. In addition, there was a resident respiratory therapist to attend to ventilatory care during office hours. After office hours, the care of the MICU was delegated to the on-call team on a rotational basis among the medical departments.
Results: The patients in the two groups were similar with respect to age, sex, race, source of admission and APACHE II scores. The ICU and hospital mortalities decreased from 33.8% to 27.6% (p=NS) and 38.2% and 34.2% (p=NS) respectively in Period 2. The mean ICU and hospital stay was also decreased from 4.6 $\pm$ 7.1 to 3.6 $\pm$ 4.0 days (p=NS) and 19.3 $\pm$ 357 to 17.2 $\pm$ 22.2 days (p=NS) respectively. The improved MICU length of stay for survivors in Period 2 was statistically significant (4.2 $\pm$ 4.2 days vs 2.8 $\pm$ 2.8 days = 0.015). There was no significant differences in the use of peritoneal dialysis (5.4% vs 6.3%) and mechanical ventilation (55.4% vs 49.6%). However, utilisation of intra-arterial lines and pulmonary artery catheters increased from 0% in both to 23.6% and 5.5% respectively in Period 2.
Conclusion: The duration of critical illness was reduced in Period 2. Hence, we believe that the closed ICU which was staffed by an intensivist and had the services of a respiratory therapist was beneficial for the care of the critically ill. The intensivist, was also more likely to utilise invasive monitoring.

IDENTIFICATION OF RELATIVE FUTILITY OF INTENSIVE CARE IN PATIENTS WITH ALCOHOLIC LIVER DISEASE

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Objectives: In the absence of liver transplantation, intensive care for patients with acute hepatic decompensation arising from alcoholic liver disease (ALD) is indicated only for those who are likely to benefit from conventional means of organ support. We have attempted to elucidate potential risk factors and the efficacy of organ support in relation both to hospital outcome and ICU costs so as to allow the earlier identification of relatively futile intensive care in this group of patients. **Methods**: Over a period of one year, 59 ALD patients (37 males; 22 females; median age 46 years, median APACHE II score 19; hospital mortality 68%) with severe complications (30 [50%] with bleeding oesophageal varices, 16 [27%] with hepatorenal failure, 5 [9%] with respiratory failure, 3 [5%] with septic shock, and 5 [9%] others) were studied in our liver ICU. Organ system failure, daily therapeutic interventions and ICU costs were assessed using a patient management system (Riyadh Intensive Care Program). **Results**: Whilst survivors had a significantly lower admission APACHE II score compared with non survivors (Medians 12 and 20, p<0.0003), 2 or more organ systems in failure in the first 24 hours of ICU admission was associated with a 91% (21/23) mortality. Mortality was also related to Child's grading and the numbers of organs supported. Of the 29 patients who received more than one form of organ support only one survived.

Child's Grade	Mortality	Organs Supported	Mortality
A (n=2)	0%	None	3/13; 23%
B (n=6)	33.3%	One	8/17; 47%
C (n=51)	74.5%	Two or more	28/29; 97%

The ICU costs for the 59 patients were only £256 440 but £190 687 (75%, 216 patient days) was utilised by the 40 patients who died, giving an effective cost per survivor (ECPS) of £13 496. Although the cost of treating the 23 patients with 2 or more organ systems in failure on the day of admission was £91 510 (36% of the budget) the ECPS was £45 755. **Conclusion** Patients with ALD who have 2 or more organ systems in failure early in their ICU course have a poor prognosis and in the absence of liver transplantation, traditional strategies of organ support are ineffective. This begs the question whether such costly care is appropriate as although the ECPS in this sub group is comparable with other patient groups with multiple organ failure, their outcome is considerably worse.

Cost-effectiveness of dopexamine hydrochloride infusions in high-risk surgical patients to increase perioperative oxygen delivery

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Objectives: To evaluate the economic impact to the healthcare sector of using dopexamine hydrochloride infusions to deliberately increase perioperative oxygen delivery in high-risk patients.

Methods: Effectiveness data were obtained from a controlled clinical trial in which 107 surgical patients were randomly assigned to either a Control group (n = 549 to receive best standard optimal fluid resuscitation perioperatively, or a Protocol group (n = 53) to receive, in addition, an infusion of dopexamine hydrochloride to increase the perioperative oxygen delivery index to greater than 600 ml/min per square metre. Resources consumed by patients during treatment were recorded prospectively and costs of resources at 1993/94 prices were obtained retrospectively. Cost-effectiveness ratios were estimated by dividing the total cost for each treatment group by the total number of patients in each group and by the clinical outcome of mortality 28 days postoperatively.

Results: In the Protocol group, there was a 75 % reduction in mortality 28 days postoperatively ($p = 0.015$), a significant reduction in the number of complications ($p = 0.008$) and a reduction in length of stay in the ICU and surgical ward. The average cost per Protocol patient to achieve a 94.3 % survival rate 28 days postoperatively was £ 9,894, resulting in an average cost of £ 10,488 per surviving Protocol patient. The average cost of a Control patient was £ 11,331 to achieve a 77.8 % survival rate 28 days postoperatively, resulting in an average cost of £ 14,568 per surviving Control patient. The use of dopexamine to deliberately increase oxygen delivery perioperatively generated a cost saving to the NHS of £ 1,436 per patient together with a 75 % reduction in mortality at 28 days postoperatively. Hence, the cost per surviving Protocol patient was £ 4079.8 less than the cost of a surviving Control patient.

Conclusion: The additional cost of dopexamine in Protocol patients was offset by a lower incidence of complications and a shorter stay in the ICU and on the surgical ward. Hence, increasing oxygen delivery perioperatively in high-risk surgical patients saves both money and lives.

EARLY PREDICTION OF NONTRAUMATIC COMATOSE PATIENTS WITH NO BENEFIT OF INTENSIVE CARE TREATMENT

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Objective: Physicians are reluctant to withdraw ICU treatment even in patients with low probability of favourable outcome. Since costs of intensive care are increasing enormously and medical resources are limited there is worldwide effort to look for guidelines which support limitation of ICU treatment in critically ill patients with poor outlook. Such guidelines should be based on objective measures and large series of patients.
Methods: We studied 670 right and left median nerve stimulated sensory evoked potentials in 441 consecutive patients with nontraumatic coma (Glasgow coma score <7, aetiology: ischaemic-hypoxic [n=216], hepatic coma [n=45], MODS [n=43], complicated surgery [n=38], intracerebral bleeding [n=30], encephalitis [n=17], intoxication [n=13], uraemic coma [n=8], epileptic seizure [n=7], other neurological [n=6], diabetic coma [n=5], intracerebral tumor [n=3], unknown [n=10]) within 7 days after onset of coma. Patients with signs of brain death were excluded. Management and treatment of patients was not influenced by evoked potential findings.
Results: 86 patients (20%) had bilateral loss of the first cortical N20 peak. All these 86 patients died without awakening from coma (mortality 100 percent, 95 percent confidence interval 95 to 100). Mean time of ICU treatment after evoked potential study was 8.1 days (697 patient days). Overall costs of ICU treatment for these 86 patients accounted for approximately $ 1.324,300. Of the remaining 355 comatose patients with preserved cortical N20 peak, 148 (42%) survived and 207 (58%) died, respectively. Mean cervico-to-cortical transmission time (time interval from cervical N13 to cortical N20 peak) was prolonged in the nonsurvivors (6.7 ms, n=148) as compared to the survivors (6.4 ms, p<0.05, n=207) and healthy subjects (5.5 ms, p<0.01).
Conclusion: Recording of sensory evoked potentials is effective to predict a subgroup of patients (20%) out of a large series of 441 nontraumatic comatose patients with a mortality rate of 100 percent. Advanced treatment should be withdrawn in these particular patients to provide limited ICU resources for patients with a higher probability of favourable outcome.

INDICATION FOR LIVER TRANSPLANTATION IN ACUTE LIVER FAILURE BASED ON NONINVASIVE MEASUREMENTS

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Objective: Although King's College criteria are widely used, indication and timing for liver transplantation in acute liver failure is still far from certain. Long-latency sensory evoked potentials - a proven measure of metabolic brain dysfunction (Grimm et al. Lancet 1988; 2: 1392-94; Madl et al. Lancet 1993; 341: 855-58) - are markedly affected in patients with acute liver failure. Serial sensory evoked potential recording should provide very useful information for the management of patients with acute liver failure.
Methods: 90 recordings of standard bilateral sensory evoked potentials were performed in 25 patients with acute liver failure. Findings were focused on cortical N70 peak - a stable negative deflection occuring 70 ± 9 ms after median nerve stimulation in healthy subjects, which can be recorded by skull electrodes over the sensory cortex.
Results: Nine patients recovered spontaneously, 8 patients were referred to emergency liver transplantation, and 8 patients died. In all 9 patients who recovered spontaneously, N70 peak was detectable between 74 and 162 ms. All 8 patients who were referred to liver transplantation and 7 of 8 patients who died, developed a loss of a prior detectable N70 peak during the course of acute liver failure. In 4 of 15 patients who were selected for liver transplantation according to King's College criteria, N70 peak was detectable constantly. All these 4 transplant candidates recovered spontaneously and survived without liver transplantation. In contrast, 8 patients did never fulfil King's College criteria for liver transplantation. Five of these 8 patients with constantly detectable N70 peak recovered spontaneously. However, the remaining 3 patients - who developed loss of the N70 peak - died.
Conclusion: Serial evoked potential study is very helpful to indentify: 1.) a subgroup of patients selected for emergency liver transplantation by King's College criteria who may recover spontaneously without transplantation (N70 peak detectable constantly), and 2.) a subgroup of patients with severe, life-threatening brain dysfunction (loss of previous detectable N70 peak) who should undergo early liver transplantation even though they do not fulfill King's College criteria.

THE PREDICTIVE VALUE OF THREE SCORING SYSTEMS IN CRITICAL PATIENTS ADMITTED TO AN INFECTIOUS DISEASES (ID) INTENSIVE CARE UNIT (ICU)

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INTRODUCTION: Outcome prediction in critical patients admitted with infectious diseases have not been extensively studied worlwide. To evaluate the predictive performance of the APACHE and SAPS systems in these patients, we studied a population admitted to an ID-ICU in our University Hospital.
METHODS: We collected prospective data on 229 consecutive patients admitted over a period of 18 months. SAPS (SP), APACHE II (A2) and APACHE III (A3) scores were obtained over the first 24 hours of ICU admission; data also included age, sex, acute and chronic diseases, ICU and hospital length of stay (LOS), patient location prior to ICU admission and outcome. The relationship of hospital mortality with SP, A2 and A3 scores was analyzed using logistic regression, with the discriminatory power of these systems being assessed by the area under the ROC curve and percentage of correct classification.

PREDICTIVE PERFORMANCE OF SAPS, APACHE II AND APACHE III

Predictive indexes	ROC	Predictive power
SAPS	0.761	71.6%
APACHE II	0.804	76.9%
APACHE III	0.808	78.6%

RESULTS: patient's mean age was 44±21 years and 67% were male; 1.8% were postoperative patients; the most frequent diagnosis were: meningitis (27.1%), encephalitis (10.1%), pneumonia (7.4%), tetanus (6.2%) and hepatitis (2.6%); ICU mortality rate was 25.8% and in-hospital mortality rate (HMR) was 30.6%; mean ICU LOS was 12.5±15 days (survivors=12.9±15, dead=11.7±16 days p=NS) and mean hospital LOS was 25.3±24 days (survivors=29.9±24, dead=14.7±21 days p<0.01); mean scores were: SAPS=9±5 points, APACHE II=14±7 points and APACHE III=48±26 points. There was a significant relationship between ascending SP, A2 and A3 scores and HMR. Table shows the diagnostic performance of the 3 systems.
CONCLUSIONS: in a population admitted with infectious diseases to our ICU, all three scoring systems demonstrated a good outcome prediction, with the APACHE III showing the best predictive performance; these systems are useful tools for prognostic stratification in infectious critical patients.

LONG TIME OUTCOME AFTER MEDICAL INTENSIVE CARE — SUBGROUP ANALYSIS OF 1853 PATIENTS

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Objective: To determine high risk and low risk patient groups in a medical intensive care unit regarding short term and long term outcome.
Methods: Data on all admissions of the year 1993 were collected prospectively. According to their mode of admission patients were classified as admissions by the physician staffed ambulance service (AS), admissions through the emergency department (ED), referrals from non-intensive care wards (NI), and secondary referrals from other hospitals (OTH). Outcome was assessed in terms of in-unit mortality, in-hospital mortality, and long time mortality. Patient groups were compared using the χ^2-test. Life table analysis were performed by Kaplan-Meier method comparing patient groups by log-rank test. The software SPSS for Windows 6.0.1 was used for statistical calculations.
Results: In-unit mortality: 184/1853 patients (9.9%) —
OTH 20.0% > AS 10.6%> NI 9.1% > ED 6.8%; p = 0.01.
In-hospital mortality: 365/1853 patients (19.7%) —
OTH 30.9% > NI 20.4% > AS 19.6% > ED 16.2 %; p = 0.05.
Mean survival time in days after discharge: AS 620 < NI 682 < OTH 708 < ED 777; p = 0.66.
Conclusions: Despite an excess in-unit mortality of secondary referrals from other hospitals the longtime course of this special patient group is not different to others.

USEFULNESS OF A REGISTER OF COMPLICATIONS AS QUALITY CONTROL IN THE INTENSIVE CARE UNIT (ICU)

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Objective: To study the influence of modifiable variables (complications derived from therapeutic activities) on the prognosis of patients admitted to the ICU independently on the severity of illness.
Patients and Methods: Between January 1990 and May 1993 data from 1,425 patients over 14 years of age who remained in the ICU for more than 24 hours were prospectively registered. A cohort study with follow-up of patients during their stay in the hospital was designed. In all patients, reasons for admission, principal diagnosis and severity of illness measured by the SAPS score were recorded. Factors affecting patients' outcome that may be prevented or modified included technical complications, hospital-acquired infections and inappropriate therapeutic decisions. A logistic regression model was used to assess the relative risk (RR) for in-hospital mortality adjusted for each variable.
Results: ICU mortality was 17.2% and in-hospital mortality 22.7%. Patients who died showed a higher SPAS score than survivors (15.3 vs 10.1). After adjusting by severity of illness, complications that statistically increased the risk of in-hospital death were septic shock secondary to hospital-acquired infection (RR 7.18; 95% CI, 1.9 to 27.1), pneumothorax related to mechanical ventilation (RR 6.28; 95% CI, 1.7 to 22.3) and delay in the insertion of a flow-guided catheter (RR 5.49; 95% IC, 1.1 to 26.9).
Conclusion: Registration of complications derived from therapeutic activities is a valuable tool for quality control in the ICU.

SELF-EXTUBATION AND MORTALITY

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Objective: To determine the incidence of self-extubation and its effect on mortality.
Patients and Methods: Between January 1990 and April 1994, all patients in whom self-extubation was registered were included in a prospective study. Patients were divided into those who needed reintubation within 24 hours and those who did not. In all patients, demographic and clinical data were recorded as well as ICU mortality, in-hospital mortality and severity of illness according to SAPS score. Data were analyzed using the chi-square test for categorical variables, the analysis of variance (ANOVA) for continuous variables and a logistic regression analysis to estimate the relative risk (RR) for mortality as result of self-extubation after adjusting for severity of illness.
Results: A total of 815 intubated patients were studied. Self-extubation occurred in 54 (6.6%) patients and 25.6% required reintubation. When a comparison was made between patients who did not required reintubation and patients who did, statistically significant differences in age (52.1 vs 60.4 years, P = 0.002), severity of illness (11.4 vs 13.1 SPAS score, P = 0.02), diagnostic category (48.6% vs 66.7% of patients with respiratory conditions, P =0.002) and mean length of stay (10.9 vs 20.7 days, P = 0.05) were found. After adjusting for severity, patients with self-extubation who did not required reintubation showed a 0.4 RR for mortality (95% CI, 0.1 to 0.9) as compared with patients in whom self-extubation did not occur.
Conclusion: Self-extubation that does not require reintubation is associated with a lower in-hospital mortality probably due to a prolonged period of weaning.

MORTALITY AND DELAY IN ADMISSION TO THE INTENSIVE CARE UNIT (ICU)

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Patients' admissions to ICUs are often delayed due to the shortage of beds available. While awaiting ICU admission, these patients are treated in observation units of the emergency services which have neither the structure nor the trained personnel that are available in ICUs.
Objective: To determine the effect on the patient's prognosis of a delay in the admission to the ICU when criteria for ICU admission are fulfilled.
Materials and Methods: Between June and December 1993 all patients who fulfilled criteria to be admitted to the ICU who for whatever reason remained in the observation unit for more than 24 hours were included in a prospective study. In all patients, demographic and clinical data were recorded as well as severity of illness according to SAPS score. A case-control design was used with a total sample of 1,425 patients who suffered no delay in admission to ICU over a period of 3 years. Data were analyzed using the chi-square test (to assess the association between in-patienty mortality and categorical variables) and a multiple logistic regression model to estimate odds ratio (OR) for in-hospital mortality as result of delay in ICU admission as compared with early admission after adjusting for severity of illness and use of assisted mechanical ventilation.
Results: A total of 50 patients remained in the observation unit for more than 24 hours with a delay in ICU admission of 55.8 ± 25.1 hours. Assisted mechanical ventilation was required in 22% of patients and only monitorization in 46%. These patients were compared with 112 patients from the total sample matched by age, SPAS score and reasons of admission. In-hospital mortality for cases was 16% as compared with 17.5% for controls (P = NS). After adjusting for SPAS, age and mechanical ventilation, no statistically significant differences between both groups were found, although there was a tendency towards a higher mortality among patients with delay in ICU admission (OR = 0.779; 95% CI, 0.2 to 2.5).
Conclusion: These findings suggest that prognosis of critically-ill patients is no worse as a result of admission to the ICU being delayed for 24 hours.

APACHE II: VALIDATION AS AN AUDIT TOOL IN A CARDIAC SURGICAL ICU AND DEMONSTRATION OF SEVERE COMPROMISATION OF CARDIAC SURGICAL THROUGHPUT BY A FEW NON-SURVIVORS

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Aim: To validate APACHE II as an audit tool in a cardiac surgical ICU and to assess the number of bed days and surgical throughput compromised by non-survivors.
Methods: All adult patients who underwent open heart surgery and admitted to the Cardiac Surgical ICU from 1 April 1991 to 30 September 1991 were consequently entered into the study. All data appropriate for the calculation of the APACHE II score (APS) together with other specific cardiac details relevant to these patients were collected daily, verified and entered into a computer database.
Results: 150 patients were studied. Six patients died and five of these underwent cardiac surgery. The mean APS was 9 for survivors and 16 for non-survivors ($P<0.001$). The mortality ratio was 1.1 and the major markers of mortality were APACHE II score, presence of chronic ill health, mean duration of ventilation, mean length of ICU stay and need for emergency surgery. Sixteen percent (233) of ICU bed days were occupied by 4% of patients (non-survivors) which resulted in cancellation of 60 cardiac surgical sessions in 6 months.
Conclusions: This study concludes that APACHE II could be used as an audit tool in a cardiac surgical ICU and demonstrates the severe compromisation of cardiac surgical throughput by a few non-survivors.

ORGAN FAILURE FREE (OFF) DAYS IN SEPSIS SYNDROME: A VALID OUTCOME IN CLINICAL TRIALS?[§]

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Objectives: 1) To determine the number of organ failure free days (OFFD) in a cohort of survivors and non-survivors with sepsis syndrome followed over a 30 day period. 2) To determine sample size requirements for clinical trials utilizing a increase in the number of organ failure free days as the primary outcome as opposed to mortality.

Methods: Beginning December 1990 through to April 1992, patients who met inclusion criteria of the "Cardiopulmonary effects of Ibuprofen in Sepsis Syndrome" and who did not have HIV/AIDS, brain death or moribund state were prospectively identified. Presence or absence of failure of 7 organ systems (pulmonary, CVS, renal, hepatic, GI, hematologic, & CNS) was recorded daily until death or until 30 days. A score of one was assigned to each organ system free of organ failure in patients still alive, ie. maximum daily OFF score=7, maximum 30 day OFF score=210. Sample size estimations were performed for variable detectable differences in OFF scores (Delta). Alpha was set at 0.05 (Two-sided), with n/group = $2[(Z_a+Z_b)\,\sigma/d]^2$, and σ = 71.1 OFF Days.

Results: 135 patients were identified prospectively and were scored daily. At 30 days 45 patients had died (33%). The cohort OFF day score was 146.3 +/- 71.1 (mean± SD).. Survivors score was 192.6 +/- 18.8 Vs 53 +/- 38.8 for non-survivors ($p< 0.0001$).

Sample Size Requirements per Group for Detecting Differences in OFF Days (Delta OFF)

	Beta Error	
Delta OFF	0.1	0.2
12.5	677	506
25	169	126
50	42	32
60	29	22
100	11	8

Conclusions: A clinically relevant increase in OFF days may be detected with as small a sample size as 30 to 50 patients per group. This represents a significantly smaller sample size than needed to detect a change in mortality from 40% to 30% (25% relative risk reduction) where the n/group=356. Scoring patients in this manner prevents a lethal intervention from providing an improved organ failure score. In addition, an intervention that prolongs survival must also provide greater organ failure free days in order to be counted by this scoring method. Survival as an outcome provides no information about the quality of that survival. OFF days provides a measurement of burden of illness. Interventions which lessens this burden may be just as valuable as those that decrease mortality by providing a measure of the quality of survival and by decreasing costs of care. They may also prove to be an accurate surrogate marker of mortality. The advantage of this approach is that the event rate is much higher and sample size requirements are subsequently smaller. This would mean that clinical trials can be completed faster and at lower cost. Outcomes such as mortality could then be assessed at a later date utilizing meta-analysis. We suggest that the use of OFF days is a valid outcome measure that may be utilized in clinical trials of sepsis syndrome.

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ETHICAL BASIS OF DECISION MAKING AT INTENSIVE CARE UNITS

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Within the limits of health atmosphere, and especially at intensive care units, we face up to daily decision making. In most cases these are taken on the basis of personal opinion and the processing of a very limited amount of information.

Rising need to optimize the results of medical attendance becomes necessary to set structured system of decision making in which ethical basis have a special significance in view of next considerations:

- We live into a pluralist society in which the importance of values is different.
- Most persons consider health as the first value only in the event of illness.
- Medical resources available are limited, whereas medical attendance demand from population increases in a way many people consider it unlimited. In consequence, it becomes necessary to set up priorities in patients treatment.

Ehtical basis that rule decision making are essentially these ones:

1. Beneficence: To provide the patient that is being treated the highest profit.
2. Non maleficence: It is our first duty to avoid hurting or damaging the patient."Primum non nocere"
3. Autonomy: In every particular medical attendance, the patient has ability to decide by himself.
4. Justice: As equity: To provide the same treatment for those who have the same pathology, ignoring another factors such as age, sex or race.

Severe application of these principles can cause difficulty, which resolution requires a systematization of decision making.

REDUCING STRESS IN BOTH PATIENTS AND STAFF IN THE ICU

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The ICU is perceived by many as being a stressful environment for both patients and staff. Stress has been defined in three ways:

- a stimulus producing a particular response;
- the physiological and psychological response to a stimulus;
- an interaction between an individual and their environment.

Stress is currently thought to be a dynamic system of stimulus and response which takes into account the individual's perception of the stimulus and their ability to respond effectively. Stress may, therefore, be positive and allow personal development but an individual unable to respond effectively to a stimulus will experience negative effects or strain.

Critical illness is an intense stimulus to which the body needs to respond effectively. Physiological responses are vital and most of intensive care involves supporting these. Alternatively, blocking them, for instance with etomidate, increases mortality. Psychological responses are also vital but often poorly appreciated because of communication problems. Many of the problems patients experience in an ICU are evidence of psychological strain. This can be exhibited in various ways, for instance, anxiety, depression, passivity and confusion.

Dealing with critically ill patients is perceived as stressful. We recently studied occupational stress in our ICU. Most aspects of intensive care were not generally perceived as stressful indicating a self-selection of ICU staff. The most stressful aspects of ICU work for nursing staff were the structure of the organization and career opportunities. Medical and nursing staff had different stressors and different coping strategies. Support for occupational stress, therefore, should focus on the individual and concentrate on information and communication.

APACHE III SCORE IN THE INTENSIVE CARE UNIT AT INSTITUTO NACIONAL DE LA NUTRICIÓN SALVADOR ZUBIRÁN.

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Objetive: To evaluate in our population of criticall ill patients the APACHE III (AIII) score as a measure of predicting risk of death.

Methods: The AIII score was applied to 242 consecutive admissions from Agust ´93 to July ´94. Data collection was applied according to the original description. Patients should have stayed at the ICU for at least 4 hrs. We excluded patients under 16 years old and admissions with chest pain to discard AMI and burn patients. The data collection was made by the main investigator. The statistical analysis included t-Student, chi square, one way ANOVA and ROC curve.

Results: The demographic figures showed 138 (57%) females and 104 (43%) males. The average age was was 51.8 years (16-93) without statistical significance whether survivors or non survivors ($p=0.38$). The non operative addmisions were 64.7% whereas operative 35.3%, of which 11.6% as an emergency basis. The overall mortality at the ICU was 25.6%. The mean lenght of stay was 4.8 days (1-84). The lenght of stay between survivors and non survivors didn´t show statistical significance ($p=0.51$). The mean AIII score when considering all admissions was 59.9 (8-153). The initial score between survivors and non survivors showed ststistical difference (48.6 vs 92.5) respectively ($p< 0.0001$). Univariate logistic regresion analysis demostrated a 90% increment in death probability for every 10 points augmentation in the AIII score with a sensitibity of 94.9% and specificity of 62.7%. The ROC curve showed that the best cut off point for death prediction was 75 points with a sensitivity of 75.6% and specificity of 78.9%. If a patient is classified as high risk (>75) the Bayesian analysis showed a 52.8 probability of death and for one classifed as low risk (<75) a death probability < 10%.

Conclusions: The first day AIII score in this population showed to be a good discriminator between survivors and non survivors, and the risk of death augments as the AIII does. In this population an AIII score > 75 points is asociated with a greater risk of death. Using the AIII score in conjuntion with the clinical judgement will help clinicians reducing uncertainty in the every day decision making and better predict outcome. The results from this study should been taken with caution because the data were obtained from a small sample.

MEASURING PERCEIVED QUALITY OF LIFE (PQOL)

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Objective: the quality of life has been considered a "uniquely personal perception" resulting from a mixture of health related factors and social circumstances [T.M. Gill, JAMA 1994, 272: 619]. The aim of this study was to evaluate two measures of PQOL in Intensive Care Unit (ICU) admitted patients.
Patients and methods: during ICU stay and six-months after hospital discharge, 160 co-operative ICU admitted patients were directly interviewed about their PQOL. We administered firstly the Uniscale (PQOLU) [Sage et al Crit. Care Med. 1986, 14: 777-782] and then a 5 step verbal scale (PQOLV): best, good, fair, poor, worst. Of the 160 studied patients, at the first interview, 116 were able to use both scales, but 44 (27.5%) understood only the verbal one. At the second interview, 8 patients were not able to answer, 113 used both scales and 39 only PQOLV. Statistical analysis was performed using Wilcoxon signed ranks, Spearman rank correlation, Student's t and chi square tests.
Results: Neither PQOLU nor PQOLV changed significantly. PQOLU was 79.4 ± 24.1 at the first interview and 82.6 ± 19.2 at the second. PQOLU values related to PQOLV are reported in the following table. Spearman's correlation between PQOLU and PQOLV was -0.86.

PQOL	VERBAL SCALE				
UNISCALE	BEST	GOOD	FAIR	POOR	WORST
No. patients	30	38	37	7	4
mean ± SD	99.6±1.8	88.8 ±10.4	68.9 ±14.1	35±19.7	12.5±12.5
median	100	90	70	30	10
range	90-100	50-100	25-100	15-70	0-30

The 44 patients not able to give PQOLU were compared with the 116 PQOLU respondents. The results are reported in the following table.

PQOL	females	urgent admission	age	APS	APACHE II
U+V	26%	30%	67.7 ± 10.7	8.2 ±4.2	12.9 ±4.5
V	45%	54%	72.8 ± 8.8	8.4 ±4.3	14.4 ±5.3
p-value	< 0.05	< 0.01	<0.01	NS	<0.05

The ICU and hospital (after ICU) lengths of stay were not different.
Conclusions: PQOL is a qualitative character which does not appear suitable to be measured mathematically. Moreover, 27.5% of our ICU admitted patients did not understand the uniscale; in comparison with patients able to use both scales, this group seems to be constituted by more females, older people and frequently urgently ICU admitted patients. The Uniscale does not allow us to measure PQOL of all patients, at least in our country.

CAUSES OF DEATH IN A CARDIOTHORACIC ICU.

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Objectives: To determine cause(s) of death occurring in a Cardiothoracic ICU after open heart surgery.
Methods: From July 1993 through April 1995, 2617 consecutive adult-patients (pts) (2106 males and 511 females) undergoing open heart surgery, were prospectively studied. For each patient, demographics, preoperative EF, bypass time, blood transfusions, ICU stay, complications, outcome and cause of death were entered into a database program.
Results: Of all cardiac surgery pts, 42 pts (1.6%) died in ICU. They were 33 males (1.5%) and 9 females (1.6%). Their mean age was 66 (±7) years and mean EF was 0.38 (±0.1). Nineteen pts (45%) had low (<0.35) preoperative EF. Mortality was 0.9% in the Coronary Artery Bypass Grafting (CABG) group (N=2014) and 2.8% in the Valve Replacement (VR) group (N=359). In the CABG +VR group, mortality was 8.4% (N=95), and 3.3% in the remaining pts (N=149). Cardiogenic shock was the sole cause of death in 24 pts (57%), septic shock in 6 pts, whereas sepsis in combination with ARDS in 4 pts, sepsis and stroke in two pts. In addition, 6 pts died from cerebrovascular accidents, one from ARDS and one from pulmonary embolism. The pts who died in the ICU had a significantly longer bypass and aortic cross clamp time and received more blood transfusions ($p<0.001$) than a matched control group that survived to ICU discharge. The duration of mechanical ventilation and length of ICU stay were greater in the pts who died in the ICU than in the control group.
Conclusions: 1. Although cardiogenic shock is the main cause of death (57%) in cardiac surgery pts, sepsis and cerebrovascular accident are relatively frequent causes. 2. Patients who died in the ICU had longer bypass and aortic cross clamp time and received more transfusions, compared with the control group. 3. Although renal or hepatic failure contributed to death in some pts, they were not the primary cause of death in any patient.

ACUTE AND FOLLOW-UP OUTCOME OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION TREATED BY PRIMARY PTCA ≥ 12 HOURS AND ≤ 24 HOURS AFTER SYMPTOM ONSET

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Objectives: Evaluate the acute and follow-up outcome of 27 patients (pts) treated with primary PTCA (without prior thrombolysis) in acute myocardial infarction (AMI) after 12 and up to 24 hours after onset of typical thoracic pain ("late" primary-PTCA).
Methods and patients characteristics: From 12/89 to 4/95 364 consecutive pts with AMI were treated by primary PTCA in the Wuppertal Heart Center. 27 pts (7,4%) were admitted to our hospital ≥ 12 hours and ≤ 24 hours after symptom onset with ongoing chest pain and typical ECG-changes.Mean age was 62 years (49-78). 23 pts were male, four female. 37% had an anterior wall myocardial infarction, 63% suffered an inferior/postero-lateral wall myocardial infarction.Two pts were in cardiogenic shock at admission. Single-vessel-disease was documented in 70.4%, multi-vessel-disease in 29.6%. Average time of onset of pain to recanalisation was 929 min (720-1440). Angiography revealed TIMI-flow 0 in 85.2% of the pts, TIMI-flow I in 11.1%, TIMI-flow II in 3.7%. Average follow-up (FU) period was 12 months (4-28 months).
Results:

TIMI III flow p.i.*	LV-EF° acute/FU	30-day mortality	major bleeds	late re-infarction	late mortality
92.6%	58%/63%	7.4%	7.4%	3.7%	0%

Early mortality occured in the two pts, who were in cardiogenic shock at admission. No pt required emergency coronary artery bypass grafting.Restenosis >50% was seen in 37% of the pts.
Conclusions:
"Late" primary PTCA achieves a favourable high recanalisation rate of about 90% (TIMI III-flow) in our study group. Additionally, there seems to be a trend for LV-EF improvement in follow-up. Early high mortality is influenced by the patients admitted in cardiogenic shock. There might be a trend for increased major bleeding complications.
*p.i.= post intervention; ° LV-EF = left ventricular ejection fraction

COMPARISION OF SAPS AND SAPS II IN A COHORT OF PATIENTS ADMITTED IN 128 ITALIAN ICU'S.

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Objective: To assess the validity of SAPS II (New Simplified Acute Physiology Score), comparing it with the previous version, (SAPS), in a sample of patients recruited by GiViTI, a network of 128 ICU's representative of the Italian ICU system.
Methods: Measures of calibration (goodness-of-fit statistics) and discrimination (receiver operating characteristics curve and area under the curve) were adopted in the whole sample and across subgroups differing in relevant prognostic characteristics.
Of the 3004 patients recruited during one month period, a total of 1813 patients were included in this study. For the purpose of the comparison of the two scores, patients with less than 18 years, or having cardiac surgery or staying in the ICU less than 24 hours were excluded. Vital Status at ICU discharge in the whole sample and at hospital discharge in half cases wher adopted as outcome measure.
Results: SAPS II fits the data equally well compared to the older version (goodness-of-fit P=0.29 and 0.27 in the new and old versions, respectively) but its performance is somewhat better in terms of capability to distinguish patients who live from patients who die (areas under the curve 0.81 and 0.73, respectively). Furthermore, SAPS II is better in terms of uniformity of fit across relevant subgroups, although substantial over prediction of mortality was observed in trauma patients and in patients admitted without organ failure to be intensively monitored. SAPS II performed very well also in the subsample where hospital mortality was the dependent variable.Satisfactory measures of calibration (goodness-of-fit P=0.47) and discrimination (receiver operating characteristics area=0.80) were observed.
Conclusion: SAPS II, a multipurpose scoring system developed in an international study, retains its validity in this independent sample of patients recruited in a large network of Italian ICUs. Although it has shown a good performance when adopted to predict ICU and hospital mortality in the entire sample, further investigations are warranted. The observed over prediction of mortality in a few subgroups indeed call for a through assessment of the impact of confounders and biases on model performance when SAPS II is adopted in samples that do not reflect the "average" ICU patient.

USE OF MORTALITY PROBABILITY MODELS (MPM II) TO ASSESS EFFECTIVENESS AND EFFICIENCY IN CRITICAL CARE

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Objectives: 1) Assess the effectiveness in a group of Intensive Care Units by means of a quality performance index (QPI); 2) Assess the efficiency by means of a resource use index (RUI); 3) Evaluate the performance of individual ICUs with respect to both indices (clinical and economical) while controlling for severity of illness.

Methods: 1270 critical patients from 17 UCIs in Catalonia and the Balearic Islands have been included in the study. In-hospital mortality and weighted hospital lenght-of-stay (LOS) have been considered the outcome variables. Severity of illness has been measured with the MPM II at admission. In each ICU, expected mortality has been obtained adding the probabilities of dying for its patients. Expected LOS has been estimated adjusting a second order polynomial to the severity of illness. Performance indices have been obtained by dividing the observed by the expected outcomes.

Results: The overall QPI was 1.15 and it ranged from 0.58 to 2.05 in the 17 ICUs. The overall RUI was 1 and it ranged from 0.61 to 1.51. There was not a trade-off pattern between clinical performance and resource use.

Conclusions: Severity measures allow to compare the outcome in the ICUs and provide indicators of effectiveness and efficiency. High quality performance is compatible with an efficient use of resources.

IMPACT OF AGE ON THE ICU MORTALITY

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Background and method : We compared ICU mortality in different age groups presenting with the same severity of disease. We assessed severity of illness by the physiological day 1 - Apache$_{II}$ (physio-A$_{II}$) score (thus excluding the age related points). For each of the following physio-A$_{II}$ score intervals (0-5; 6-10; 11-15; 16-20; >20), we compared ICU mortality within 6 age intervals (< 40; 41-50; 51-60; 61-70; 71-80; > 80 years). We compared Predicted ICU Mortality (PM) and Observed ICU Mortality (OM), using the standardized mortality ratio (SMR : OM/PM) for each physio A$_{II}$/age interval. N = 2681 consecutive patients.
Results :

	PHYSIO-A$_{II}$				
AGE (years)	0-5 n = 515	6-10 n = 1256	11-15 n = 639	16-20 n = 193	> 20 n = 83
< 40 n	77	107	73	39	31
OM (%)	0	0	5	28	64
SMR	0	0	0.5	1.2	1.3
41-50 n	63	128	58	28	9
OM (%)	3	0	7	28	55
SMR	0.6	0	0.5	1.1	1.2
51-60 n	92	237	118	24	10
OM (%)	1	2	8	50	60
SMR	0.25	0.33	0.7	1.8	1.1
61-70 n	165	476	226	64	21
OM (%)	3	5	12	44	76
SMR	0.6	0.7	0.9	1.6	1.2
71-80 n	105	275	144	30	9
OM (%)	2	8	13	43	67
SMR	0.4	1.1	0.8	1.3	1.1
> 80 n	13	33	15	8	3
OM (%)	0	9	40	50	67
SMR	0	0.8	1.5	1.3	1.1

Discussion : Mortality increases with age only in the moderate risk groups (physio A$_{II}$: 6-10, 11-15, 16-20). In these groups mortality may be twice higher in the > 60 years patients than in the ≤ 60 years. Mortality does not vary with age in low (physio A$_{II}$ = 0-5) and high (physio A$_{II}$ = > 20) risk groups. In the low risk group, mortality is low in all the age intervals because of the begninity of illness. In the high risk group, extreme severity of disease probably blunts the impact of age and leads to high mortality rates in all age intervals.

AN EVALUATION OF ICU PERFORMANCE IN A UNIVERSITY HOSPITAL: THE IMPLICATIONS FOR MANAGEMENT

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Objectives: Teaching hospitals often provide ICU care across a variety of specialized services. Overall, this approach appears to result in the best risk adjusted survival rates, but at the highest cost (Critical Care Medicine 1993;21:1432-42)- Recently, there has been increasing focus on markers of overall hospital performance. However, in large teaching institutions, such markers may fail to detect intra-institutional variation at a large tertiary care medical center.
Methods: First intensive care unit (ICU) day, Acute Physiology and Chronic Health Evaluation III (APACHE III) and active Therapeutic Intervention Scoring System (TISS) data were collected on 1621 random admissions to 8 specialty ICUs with 90 beds (range 8-14) between February 1 and December 31, 1994. Post-operative solid organ transplant recipients were excluded. Units included 2 general medical, 2 general surgical, and trauma, neurosurgery, cardio-thoracic surgery, and coronary care units. Data were analyzed for risk adjusted outcomes: ICU and hospital mortality and length of stay (LOS); risk of requiring active ICU treatment; and ICU readmission using APACHE III risk prediction models.
Results: The study ICUs cared for a diverse group of patients. Mean APACHE III scores ranged from 36.9-55.5; predicted risk of hospital death ranged from 8.5-21.1%. Standardized mortality ratios ranged from 0.40 to 1.24 with 4 ICUs performing significantly better and 1 performing worse than predicted ($p<0.05$). LOS ratios and ICU readmission rates ranged from 0.95 to 1.09 (NS) and 2.1 to 13.2% respectively. Patients predicted at low risk of requiring active ICU treatment ranged from 6.6 to 45.8%
Conclusions: There was wide variation in the mean level of patient severity between ICUs. After controlling for this severity, outcomes also varied widely. No clear pattern of overall institutional performance was evident. These data suggest that efforts to assess performance, improve quality, and maximize efficiency must be focused within individual units. Programmatic evaluation of outcome allows for focused review of the processes of care contributing to good outcome (best practices) and where to focus ongoing quality improvement and cost reduction activities.

PRELIMINARY REVIEW OF THE FOLLOW-UP (FU) FINDINGS IN A INTENSIVE CARE UNIT.

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Introduction: To access the actual social/clinical outcome of the patients who underwent intensive care therapy (ICT) is rather difficult, quality of life is not easily defined and observer subjectivity is a prime factor in the evaluation. Mortality ratio after discharge must be established and its causes understood.
Objectives: The purpose of this study is to look into the mortality ratio that occurred on a series of patients that underwent ICT at our Unit from of the view point of severity of the original illness and the diagnostic groups.
Material and Methods: During the period of one year (1994), 216 patients were treated at the Unit, 45 of them died, and 16 were not matched in our series because of incomplete records. Thirteen patients died in hospital after their reference to other departments. Twelve patients were lost after discharge. Thus, at the end, only 142 patients were evaluated on the FU. They were classified into the following three groups: acute medical, elective surgery and acute and emergency postoperative. The patients were seen at 3, 6 and 12 months after discharge. They were evaluated in accordance to their ability to being self supported in their daily life and capacity to fully return and hold to their previous jobs. Apache II scores were evaluated for each of the three groups and correlated to the ICU dead, Hospital dead, and mortality after hospital discharge. SPSS package was used for statistical analysis.
Results/Conclusions: Data shows that 19/142 patients died after discharge from the hospital, of witch nine died in the first three months. Seventy-eight per cent of the patients were fully self supported in their daily life and 20% showed some kind of handicap. Forty-nine per cent of the patients were on retirement either due to age or some form of chronic disease, when admitted to our Unit. Thirty-two per cent had not been able to return to work, because they were incapacitated on discharge. Only 7% had return to their fully jobs but the period of the study is not enough for all of them to be fully physically recovered. Preliminary statistical analysis shows us significant differences among groups.

MEDICAL INTENSIVE CARE UNIT DISCHARGE CHARACTERISTIC AND ITS IMPACT ON PATIENT SURVIVAL

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Objective: To determine the discharge pattern of a medical intensive care unit and its impact on patient mortality after discharge.
Methods: Data on all admissions of the year 1993 were collected prospectively. For 1850 patients we determined the weekday and the time of discharge and the outcome of those patients. Times of discharge were attributed to morning shift (8.00h–15.59h), afternoon shift (16.00h–23.59h), and night shift (0.00h–7.59h), respectively. Patient groups were compared using the χ^2–test. The software SPSS for Windows 6.0.1 was used for statistical calculations.
Results: In–unit mortality: 186/1850 patients (10.0%);
45/1850 patients (2.4%) were transferred to other hospitals.
From the remaining 1619 patients 184 (11.4%) deceased after discharge from the intensive care unit.
1059 patients (65.4%) were discharged during morning shift, 381 (23.5%) during the afternoon shift, and 179 (11.1%) during the night shift. The mortality after discharge was 9.0%, 16.8%, and 14.0%, respectively (p=.0001, χ^2–test).
Discharge on sunday (11.3%) and saturday (11.4%) was significantly lower than on other days (77.3%) (p<.00001, χ^2–test). However, mortality differences on different weekdays were not statistical significant (p=.90, χ^2–test).
Conclusions: In our institution we had to state an unfavourable outcome of patients discharged during the afternoon and the night shifts, which might be attributed in part to a less optimal personnel supply than during the morning shift.

Determinants influencing the outcome and mortality rate of patients with acute inferior myocardial infarctions

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Objective of this prospective study was to determine clinical or laboratory variables which might negatively influence the outcome and mortality rate of patients (pts) with acute myocardial infarctions (AMI) of the inferior or posterior wall.
Method: From April 1993-February 1995 a total of 105 pts with AMI of the inferior or posterior wall were admitted to the Intensive Care Unit (ICU). Pts were categorized into inferior AMI with or without right ventricular involvement (RVI) depending on the presence of an ST-elevation > 0,1 mV in the right precordial lead V4R. Selected clinical (age, gender, TIMI flow) and laboratory variables (peak levels of CK and CKMB, baseline serum levels of C-reactive protein, fibrinogen, Mg, PO4, leucocyte count) were collected. These variables were related to the occurrence of major cardiac (major arrhythmias, need for antiarrhythmic intervention or temporary pacing, reinfarction, reischemia, schock or cardiac death) or noncardiac (pulmonary, renal, cerebral, bleeding) complications, to the duration of ICU stay, overall time of hospitalization (OTH) and to the mortality rate.
Statistical analysis was performed by multivariate ANOVA-test.
Results: Among the 105 pts (mean age 64,3 years, 66 male, 39 female), 48 were found to have RVI, 10 pts could not be categorized. Mean observation time at the ICU was 72,7 hrs, pts were discharged after a mean of 28 days. A total of 17 pts died (mortality rate 16,2 %) during early hospitalization. The mortality rate was significantly higher in women (p< 0,01), older patients (p< 0,0001) and in the presence of AV-block III° (p< 0,0001), atrial fibrillation (p< 0,0001) and SA-arrest (p<0,05). The only determinant for major arrhythmias (AV-block II°-III°, ventricular tachycardia and fibrillation, atrial fibrillation) or need for antiarrhythmic interventions was RVI (p<0,001).
The duration of the ICU stay was influenced by higher age (p<0,01), greater peak CK (p<0,005) and presence of RVI (p< 0,001), whereas no variable was found which influenced the OTH.
Conclusion: Although there were variables that influenced the clinical course of the patients, OTH was not affected by any variable.

DOES INTRAMUCOSAL pH (PHi) HAVE A BETTER PROGNOSTIC VALUE THAN APACHE II ?.

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Objectives: The aim of our study was to evaluate the significance of pHi as a prognostic factor for complications and mortality in I.C.U patients.
Methods: 28 consecutive patients (22 males and 6 females), with major trauma or major abdominal surgery, were studied. All patients were under mechanical ventilation. On admission, a nasogastric tube allowing the measurement of pHi was introduced in all patients, and pHi was measured routinely every eight hours during a 72- hour period. APACHE II score was calculated 24 hours after admission. All patients received medical treatment according to their disease. Patients were separated in two groups according to their pHi. **Group A** (14 patients) included patients with pHi continuously < 7.30 for more than 24 hours despite appropriate medical treatment. **Group B** (14 patients) included patients with pHi < 7.30 for less than 24 hours during the 72 hours of observation. Major complications (Acute Renal Failure, Sepsis or Septic shock, Gastrointestinal Bleeding) and outcome were compared between the two groups.
Statistics: Results are presented as means ± SD, unpaired t-test, chi square and Fisher exact test for significances between groups.
Results: APACHE II score was 21.35±6.1 for group A and 20.78±4.9 for group B (N.S) Despite identical APACHE II scores and consequently identical predicted mortality in both groups, observed mortality was significantly different between the two groups: 85% in group A and 21% in group B (p=0.001, Fisher exact test). This difference in mortality between the two groups was related to the higher number of the above mentioned complications in group A. All group A patients presented major complications ; six of them had one complication (sepsis), while the rest eight patients had two (sepsis and A.R.F/or G.I bleeding). On the contrary, in group B patients we observed no complications in eight patients, one in four patients (sepsis or G.I bleeding), and two in two patients (sepsis and A.R.F). Concerning the number of complications chi square test between the two groups was highly significant (p<0.01)
Conclusions: The presence of intramucosal pH constantly below 7.30 for 24 hours seems to be better than 24-hour APACHE II score for predicting not only mortality but also major complications.

OUTCOME OF VERY OLD PATIENTS ADMITTED IN ICU

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Objectives: To assess the in ICU- and one year outcome of patients aged 80 years or more admitted in ICU.
Methods: Prospective study, including all patients aged 80 years or more, admitted in ICU from 01/01/1992 to 04/30/1995.
Results: 357 patients (139 men, 218 women) were studied; age: 84.7 ± 3.8 years, SAPS: 16.1 ± 6.7. Reason for admission was respiratory (n=166), metabolic (n=77), circulatory (n=62) or neurologic (n=43) disorders. Mean length of stay was 8.6 ± 9.9 days. 167 (47%) patients were ventilated.
123 pts died in ICU (mortality rate (MR): 34.5%). MR was higher for pts ventilated (57% vs 14%, p=0.001), it was different according to reason of admission (circulatory: 63%, neurologic: 60%, respiratory: 26%, metabolic: 16%, p=0.001).
Among 187 pts surveyed 1 year or more, 45 were still alive 1 year after ICU discharge, achieving an overall MR of 70%. Among pts discharged alive of the ICU, there was no predicting factor of survival 1 year after, but age (dead:85.8 ± 5,0 vs 83.5 ± 2,4, p=0.01).
Conclusion: Pts aged 80 years or more have an high in ICU- and one year mortality rate. However, there was no good predicting factor of survival one year after ICU discharge.

ASSESSMENT OF PROGNOSIS OF CORONARY PATIENTS BY CUSTOMIZATION OF GENERIC SEVERITY INDICES

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Xavier Sarmiento, Montserrat Rué, Joan-Josep Guardiola, Josep-Maria Toboso, Antoni Artigas, and "Grup d´estudi dels Índexs de gravetat de la ACMI"

The aim of the present study is to compare the prognostic performance of five general severity indices on coronary patients and to find out if a proper statistical handling of these indices could provide better results in these patients.

Methods: SAPS II, MPM II (MPM II0 i MPMP II24), APACH II and GAPRIK were evaluated on 456 patients with acute myocardial infarction admitted to 17 intensive care units from Catalunya. Calibration and Discrimination were calculated for each index. Calibration was calculated by th Hosmer-Lemeshow test. Discrimination was evaluated by the area under the relative operating characteristic (ROC) - curve.

If a model did not show a good performance it was customized using multiple logistic regression. Finally, two reduced models were developed, one from the MPM series (MPM II24cor) and one from the group APACHE-SAPS (SAPSIIcor).Their performances were again evaluated.

Results: Discrimination was high enough for all models. Nevertheless, calibration of APACHE II, SAPS II and MPM was not satisfactory. Thus,MPM II24, SAPS II and GAPRIK were customized for coronary patients using the logits of both models, and obtaining good calibrations. MPM II24, and APACHE-SAPS were adapted and reduced to 5 (MPM II24cor) and to 4 variables (SAPSIIcor), respectively . Both models showed better calibrations and discriminations than the original models.

Conclusion: Models developed for multidisciplinary patients show a good discrimination when applied on coronar patients, but some needed customization in order to improve calibration. The number of variables of the principal model can be reduced (even to 5 or 4 variables) without loosing prognostic accuracy.

MORTALITY PREDICTION MODEL (MPM_{24}) II AND APACHE III (AP III) AS PREDICTORS OF OUTCOME FROM INTENSIVE THERAPY

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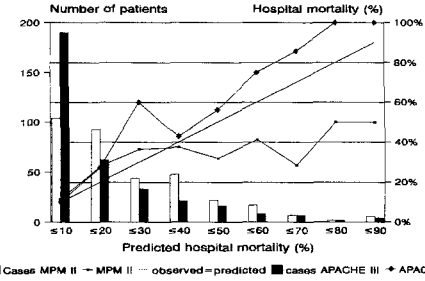
Objective: to compare the ability of two methods to predict outcome for intensive care patients.
Methods: We included 343 consecutive intensive therapy unit (ITU) admissions with an ITU stay>24 hrs in a 18 month prospective study (exclusion criteria: burn injury and age <16 yrs). Data were collected applying the criteria described by the developers [1,2]. The definition of coma (MPM_{24}II) was modified and the best assessment within 24 hrs, rather than the admission score, was used. Statistical analysis included classification tables and receiver operating characteristics (ROC) curves to assess discriminative power, and Lemeshaw-Hosmer statistics and calibration curves to test accuracy of prediction.
Results: Average age was 58 yrs (range:16-92) with a male:female ratio of 1.6:1. The actual hospital mortality was 26.8%, mean predicted death rates were 22.8% (MPM_{24}II) and 15.2% (AP III). Non-survivors had significantly higher predicted risks than survivors applying both methods ($p<0.0001$, t-test). The total correct classification rates (TCCR) for APACHE III were better for all decision criteria applied (TCCR, decision criterion 50%: APACHE III 77.1%, MPM_{24}II 71.4%). The area under the ROC curve was 0.75 (AP III) and 0.66 (MPM_{24}II) confirming the better discrimination of APACHE III. Accuracy of risk prediction was similar for both models (AP III χ^2=59, MPM_{24}II χ^2=52, Lemeshaw-Hosmer). Showing some fluctuation, calibration curves lay close to the ideal line for predicted risks ≤50% with increasing deviation for higher risk groups (s. figure). APACHE III underestimated the risks of hospital death for almost all risk groups (curve above diagonal), whereas considerable overestimation for predicted risks >40% occured with MPM_{24}II.



Conclusions: APACHE III demonstrated a higher degree of overall goodness-of-fit and may be superior to MPM_{24}II as a predictor of outcome from intensive therapy.

1. Knaus WA, Wagner DP, Draper EA et al. The APACHE III prognostic system: risk prediction of hospital mortality for critically ill hospitalized adults. *Chest* 1991;**100**:1619-39.
2. Lemeshow S, Teres D, Klar J et al. Mortality probability models (MPM II) based on an international cohort of intensive care patients. *JAMA* 1993; **270**:2478-86.

EVALUATION OF THE PREDICTIVE ABILITY OF THE APACHE III SYSTEM FOR A COHORT OF 715 INTENSIVE THERAPY (ITU) PATIENTS FROM ENGLAND

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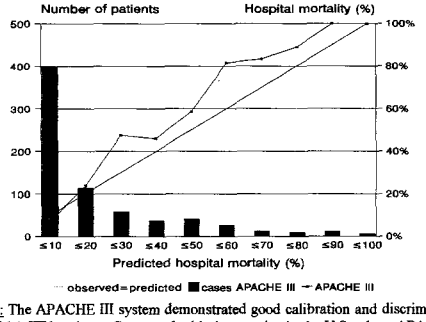
Objective: to assess the goodness-of-fit of the APACHE III model for British ITU patients.
Methods: We prospectively studied a cohort of 715 adult patients consecutively admitted to a medical-surgical ITU over a period of 18 months. Patients with burn injury, age < 16 yrs and ITU stay < 4 hrs were excluded. Using a computerised database, we routinely recorded 24 hrs APACHE III scores. Predicted risks of hospital death were computed by Critical Audit Ltd, London. Accuracy of risk prediction was assessed by Hosmer-Lemeshaw chi square (χ^2) statistics and calibration curves [1]. Discrimination was tested employing classification tables and receiver operating characteristics curves (ROC).
Results: The mean age of the 453 male and 262 female patients was 59 yrs (range: 16-92 yrs). Of these patients, 64% were medical admissions, 17% were admitted after emergency and 21% after elective surgery. The observed hospital mortality was 25.4%, the overall mean predicted death rate was 16.8%. Mean predicted risks were significantly greater for non-survivors (38.0 %) than for survivors (9.6%, $p<0.001$, t-test). APACHE III showed good calibration (χ^2=69, Lemeshaw-Hosmer). However, the calibration curve lay above the diagonal for almost all risk groups reflecting the tendency to underestimate actual mortality (s. figure). The best total correct classification rate (TCCR) was 89.3% (decision criterion: 50%). The area under the ROC curve was 87.6% confirming the good discriminative ability of the model.



Conclusions: The APACHE III system demonstrated good calibration and discrimination for a cohort of British ITU patients. Compared with the practice in the U.S. where APACHE III was validated [2], variations in patient selection and different admission policies in British ICUs may explain the observed discrepancies between predicted and actual mortality.

1. Lemeshow S, Hosmer DJ. A review of goodness-of-fit statistics for use in the development of logistic regression models. *American Journal of Epidemiology* 1982;**115**:92
2. Knaus WA, Wagner DP, Draper EA et al. The APACHE III prognostic system : risk prediction of hospital mortality for critically ill hospitalized adults. *Chest* 1991;**100**:1619-39.

VALIDATION OF APACHE III AND COMPARISON TO APACHE II IN MEDICAL INTENSIVE CARE MEDICINE

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Objectives: Scoring systems for standardization of severity of illness are important to assess quality of care, treatment efficacy, and efficiency of resource utilization in intensive care medicine. In 1991 *Knaus et al.* presented the APACHE III scoring system, which should provide better severity classification and mortality risk prediction than the former APACHE II System.

Methods: From September 1993 till August 1994 first-day-scores of APACHE III and APACHE II were calculated for 570 consecutive patients of our medical intensive care unit (ICU). Patients, who died within 4 hours of admission were excluded from the study (n=39). The relative risk of death was calculated and the scores were subdivided into categories (APACHE II = 7 cat., APACHE III = 11 cat.). Severity assessment and risk of death prediction of both scores were compared and the correlation with the observed outcome was examined.

Results: 531 patients (332 man, 199 women), aged 58,5 (16-90) years were included in the study. 2,6% were postoperative patients. Overall hospital mortality was 13,4 %, whereas ICU-mortality was 9,4%. The length of stay was 3,5 (±7,7) days for ICU and 18,2 (±20,5) days for overall hospital stay respectively. Concerning hospital mortality and ICU-mortality APACHE III and APACHE II both seperated survivors from non-survivors with highly statistical significance ($p<0,001$). Compared to the observed hospital mortality (13,4%) the risk of death prediction by APACHE III (13,2%) was extremely accurate and considerably better than by APACHE II (16,3%). Both scores allowed a sufficient severity assessment and risk stratification. (chi-square test: $p<0.001$ for correlation with ICU- and hospital mortality of both categorized scores; APACHE II χ^2=192,1/χ^2=152,6 and APACHE III χ^2=200,4/χ^2=164,5 for ICU-mortality and hospital mortality resp.).

Conclusions: Concerning medical intensive care medicine APACHE II as well as APACHE III can be used for severity classification and risk of death prediction. APACHE III seems to provide superior results compared to APACHE II (see χ^2-values) and predicts group-mortality of the ICU-population very exactly. However, it will have to be carefully evaluated, if the increase of information gained by using APACHE III instead of APACHE II really does justify the tremendous increase of workload necessary for calculating this score.

EVALUATION OF PATIENTS ADMITTED FOR INTENSIVE OBSERVATION IN ICU IN ITALY: COMPARISON BETWEEN A NATIONAL COHORT SHORT TERM STUDY AND REGIONAL CONTINUOS EPIDEMIOLOGICAL SURVEY

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Objectives: The aim of this study is to point out the discrepancies between needs and actual treatment of less severely ill patients admitted in Italian Intensive Care Units (ICUs) requiring only intensive monitoring, and verify the substantial likelihood of data comparing those collected from a national short term study with a regional long term one.
Methods: Less severely ill patients ("observed patients") were only monitored; they did not require intubation, even if for a short period (less than 24 hours) or major cardiocirculatory supports, and were neurologically normal.
Epidemiological national data were obtained from GiViTI group (Gruppo italiano Valutazione interventi in Terapia Intensiva); this cohort study, collected 5092 patients, in two months in summer in 1992 all over Italy. Regional data were achieved in a three years collection (1990-1992) in Lombardia' ICUs from ARCHIDIA group (Archivio Diagnostico), including 10065 patients. Mortality, severity score, diagnostic category and some typical intensive procedures were analysed and compared in both studies. Patients' diagnostic categories were defined as surgical, medical and trauma, according to the main diagnosis and the presence/absence of surgical procedures.
Results: Observed patients account for 23.2% and 22% of all ICU's patients respectively in national and regional data. Very low mortality rate was found in national data (2.3%) and extremely low mortality in regional data (0.6%). In both studies mortality, S.A.P.S. and length of stay were much lower in "observed patients" than in general ICU's population (mortality: 25.7% and 22.3%; S.A.P.S. score: 10.6 and 13; length of stay: 7.7 and 9). Homologous distribution of patients in the two studies was noted for what concern their diagnostic category, aside from a slight prevalence of traumatised patients in the GiViTI study. In the two groups the surgical patients were respectively 47% vs. 57%, medical patients were 34% vs. 31% and traumatised were 19% vs. 13%. 92% of "observed patients" in national study and 93% in the regional did not received any intensive procedure. Only a minority of these patients availed haemodynamic control with Swan-Ganz or renal haemofiltration.
Conclusions: These results underline that about one fourth patients admitted in Italian ICUs benefit an oversized structure in relation to the real needs of their pathology. In fact more than 90% did non received any advanced treatment and mortality and S.A.P.S. score were substantially lower respect to general population.
The results obtained from these two studies are similar, suggesting an uniform distribution of the case mix in Italy, even if a different recruitment period and a different geographical distribution were used. Some discrepancies in the two studies were found in the diagnostic categories moreover regarding the traumatised patients (19% vs. 13%); this can be explained from the seasonal (summer) characteristic of the national study. Mortality, yet very low, is different in the two groups, but these data do not allow any definite explanation.
Finally these epidemiological survey suggest need of further studies settling more strict criteria of admission in ICU.

AN ANALYSIS OF MORTALITY IN INTENSIVE CARE

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This study aims to evaluate patients outcome, quality of care and effectivity of therapy in our Intensive care unit. The main goal was to indentify factors that the most influence that outcome.

During 1994. the authors collected data of patients outcome and predictor variables. Overall mortality rate was 39,3%. The most common causes of death were infection. The diagnosis of Sistemic Inflammatory Response Syndrome (SIRS) and Multiple Organ Dysfunction Syndrome (MODS) significantly correlate with death (90%).

Average length of stay was 6.6 days. 55% patients died in the first ten hosiptal days and only 18% after 30 days. Age was directly correlated with death 50% of dead were older then sixty years. An analysis of physiological variables showed that serum levels of glucose (55%) and natrium (71%) were in optimal physiological values. Serum proteins (72%) and Haemoglobin (50%) levels were inversely related to death. Multivariate showed that alveolo-arterio difference in O2 content was the most informative of all mortality predictors (Mean value 22,4 mmHg in 90% patients 10>mmHg).

Factor that most influence the patients outcome was infection (sepsis) and MODS.

COMPARISON OF SEPSIS SCORE AND APACHE II SCORE IN PREDICTING SURVIVAL IN CRITICALLY ILL PATIENTS

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Use of predictive indicators of outcome in critically ill patients may help to assess treatment regimens and to compare patient groups. Acute physiology and Chronic Health Evaluation (APACHE II) score (Crit. Care Med. 1985; 13: 818-29) and the sepsis score of Elebute and Stoner (Br. H Surg. 1983; 70: 29-31) have been used.
Objectives: To compare sepsis score and APACHE II score in predicting outcome of critically ill patients.
Methods: Overall survival during the past 8 years for patients in our ICU was calculated = 62% (prior probability). The outcome of 230 patients who were admitted to our ICU for > 72 hours was observed. APACHE II score on admission, patient predicted risk of death (APACHE II risk) and the sepsis score on the first day of antibiotic course were prospectively recorded. Discriminant function analysis of the scores in relation to outcome was performed.
Results: APACHE II and sepsis scores in the survivors were significantly lower than in those who died (21.6 ± 7.2 v's 25.6 ± 6.5 and 10.9 ± 5 v's 15.2 ± 5.9 respectively $P < 0.001$). Correct prediction of outcome by each score is shown in table below.

Score	Survival	Death	Total accurate
Sepsis	128/181 (70.7)	35/49 (71.4)	163 (70.9)
APACHE II	122/187 (65.2)	23/43 (53.5)	145 (63.0)
APACHE II & Sepsis	120/168 (71.4)	40/62 (64.5)	160 (69.5)
APACHE II Risk	117/177 (66.1)	28/53 (52.8)	145 (63.0)

Table 1. Actual/Predicted number of patients (%).

Discussion and Conclusions: Although both scores have been previously evaluated in predicting outcome of ICU patients, studies of the sepsis score were conducted in small numbers of patients or involved additional measurements not routinely available. This study demonstrates that the sepsis score alone or in combination with APACHE II score is more effective than APACHE II score in predicting outcome.

pHi GUIDED RESUSCITATION - PRELIMINARY REPORT

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Objective To test the hypothesis that resuscitation titrated against gastric intramucosal pH (pHi) improves survival in critically ill patients as suggested by Gutierrez et al[1].
Method Emergency admissions to the Intensive Care Unit were randomized into control and intervention groups. In the control group pHi was measured at 0, 12 and 24 h while in the intervention group pHi measurements were made 4 hourly for 24 h. Both groups were managed according to the same guidelines to achieve the following targets: mean arterial pressure >70 mmHg, systolic arterial pressure >90 mmHg, urine output >0.5/ml/kg, haemoglobin >8 g/dl, blood glucose < 12 mmol/l, arterial oxygen saturation >94% and correction of uncompensated respiratory acidosis. If the pHi was < 7.35 after achieving these targets, or after maximal therapy to achieve the targets, patients in the intervention group were given fluid to ensure an adequate cardiac preload and then dobutamine at 5 then 10 mcg/kg/h, titrated against pHi. This additional therapy was continued until 24 h after entry into the study. Predicted survival was calculated from APACHE II scores[2].
Results Preliminary results of this on-going study:

	pHi			pHa-pHi gradient			Predicted survival[2]	Hospital/30 day survival
	0 hr	12 hr	24 hr	0 hr	12 hr	24 hr		
Control	7.2	7.26	7.28	0.10	0.09	0.08	52%	40%
Intervention	7.2	7.23	7.25	0.03	0.08	0.09	50%	74%
p	0.7	0.69	0.63	0.10	0.88	0.83	0.89	<0.05

Patients who died within 24 hours (2 in each group) were excluded from analysis, leaving 15 patients in the control and 19 in the intervention group.
Conclusions Additional treatment with a view to increasing pHi improved survival amongst emergency admissions to the Intensive Care Unit but did not actually increase pHi or decrease the pHa-pHi gradient suggesting that the improvement was independent of any effect on pHi.
References 1. Gutierrez G, Palizas F, Doglio G et al. Gastric intramucosal pH as a therapeutic index of tissue oxygenation in critically ill patients. Lancet, 1992; 339:195-99. 2. Knaus WA, Draper EA, Wagner DP, Zimmerman JE. APACHE II: a severity disease classification system. Crit Care Med, 1985; 13:818-29.

PREDICTIVE MODEL AT 4 DIFFERENT DAYS FOR INTENSIVE CARE PATIENTS

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Objectives: The aim of this study was to create a mathematical model to predict the outcome of intensive care patients, at different times, in particular at the 1st, 5th, 10th and 15th day from admission in ICU.
Methods: We made a retrospective study on 995 patients, admitted in our ICU from the 2nd of April 1990 to the 31st of December 1994. In each year patients were subdivided in two series with random selection, so that the 1st series contained about 2/3 and the 2nd 1/3 of the patients. The 1st series of all the years constituted the developing data set and the 2nd series the validation data set. With data of the 1st series (642 patients), we created the predictive model, using stepwise logistic regression (BMDP, USA). Each patient has been evaluated in the 1st, 5th, 10th and 15th day, calculating for each time the Apache II score (for a total of 1444 records). Independent variables were, besides time and Apache II of the time (actual Ap.), the equation: actual Ap. - Apache of the previous time/actual Ap. (in the 1st day actual Ap. = Apache of the previous time) and the diagnosis at the admission, following Knaus' definitions, assembled in 6 groups: respiratory failures, cardiocirculatory failures, head traumas and politraumas, neurologic pathologies, post-operative patients, other medical pathologies. In the developed model calibration was assessed using the Hosmer-Lemeshow Goodness-of-fit statistic, and discrimination was assessed using the area under the ROC curve. Model was validated using data collected from the second series (353 patients, 761 records). Finally on all the patients (2205 records) the model discrimination was compared to the Apache II discrimination in each of the 4 times.
Results: The predictive model created from the developing data set was: Pr (death) = $e^{logit}/1 + e^{logit}$, with 'logit'= -3.713 + 0.1742* actual Ap. + (actual Ap. - Apache of the previous time/ actual Ap.)*0.2202 + B_g + B_{K_o}, were these last coefficients are linked to the time and to the diagnosis at the admission. Goodness-of-fit test showed a good calibration: χ^2 = 8.589, D.F.= 8, p=0.378. The area under the ROC curve was 0.791. The model used in the validation data set showed also a good calibration and discrimination (Goodness-of-fit test: χ^2 =8.4024, D.F. = 10, p=0.590; area under the curve 0.783). Finally discrimination of the model has increased with time, being area under the ROC curve: 0.756 in the 1st day, 0.801 in the 5th and 10th day, and 0.835 in the 15th day. The model discrimination was better than the Apache II discrimination: area in the 1st day was 0.758, in the 5th day 0.784, in the 10 day 0.755 and in the 15 day 0.773.
Conclusions: These results show that the model we created has a good predictive capability, better than the models in use. Moreover the model demonstrated, unlike others, an even greater predictive capability at different times of stay in ICU.

ETHICS IN INTENSIVE CARE UNITS IN GREECE

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Objectives: To determine the medical staff's attitude towards various ethical issues
Methods : Between January 1994 and February 1995,185 anonymous questionnaires were sent to 20 Intensive Care Units, all over Greece.
Results : 107 questionnaires (57,7%) were replied and returned back. Of them 58,9% were answered by male and 41,1% by female. The doctors replied in the following rate :81,2% aged up to 34,80% aged between 35-44 and 94,4% aged over 45.

36 questions were answered and were divided into 3 main topics, as following:
1. Admission Criteria: Limited bed availability was the main cause for refusing admission in 64,5% of ICU's. 54,5% evaluated each case's viability and only 10,3% used some prognostic score system. 21,5% of ICU's accepted all cases and a significant percentage (64%) gave in to pressure coming from their colleagues (72,7% female and 58,7% male).
2. Informing the Patient/Relatives: Only 6,5% was willing to tell the whole truth, while 39,2% had given selective information.. In the case of iatrogenic incident, 58,9% withheld it, because either they feared legal implications (34,6%), or lost of trust (46,7%). Doctors are asking consent from the patient and/or his family, in order to include him/her in research protocols, in a rate of 82,3%, while only 55,1% found informed consent necessary for the proposed treatment procedure.
3. Withdrawal of Therapy /DNR orders /Organ Donation: 80,4% were willing to withdraw complex treatment in patients with short life expectancy, except of administrating intravenous fluids, feeding and analgesics. In 34,6% such a decision was unanimous, while the percentage of those carrying it out was 69,1% (72,2% female, 63,9% male). In case of brain stem death 87,8% (67,3% female, 85,7% male) withdrew any life support. 67,3% would like therapy withdrawal to be legally established, while only 12,1% would perform euthanasia , if there was substantial legal cover. For these cases, relatives' consent was considered to be necessary from a percentage of only 11,2%. 83,2% considered organ donation to be a necessary proposal, while 10,3% refused to ask the patients' relatives for an organ donation, either because they didn't have the psychological strength for it (3,7%), or because they doubted the procedures' objectivity (4,7%).
Note: In Greece, ICU beds are less than 1% from the total number of hospital beds available. Only a percentage of 35-50% of these admissions comes from the same hospital, with a potentially direct evaluation. Usually an ICU doctor has to be informed through the telephone. Finally, employment conditions in Greece are such that any changes of the medical and nursing staff are limited.

PREDICTION OF OUTCOME IN INTENSIVE CARE PATIENTS USING HEMODYNAMIC AND OXYPHORETIC PARAMETERS

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Objective: The aim of this study was to find a predictive model for short time mortality and survive of haemodinamically instable patients, admitted in ICU.
Methods: We realized a prospective study on two consecutive series of 83 (47 survivors and 38 non survivors after 20 days from admission) and 32 patients (19 survivors and 13 non survivors), respectively. All these patients were monitorized with a Swan-Ganz catheter (Abbott Labs., USA). Haemodinamic and oxyphoretic parameters were measured at 7 different times (T): T0 (start), T1 (after 12 hours from T0, T2 (24 h.), T3 (48 h.), T4 (72 h.), T5 (96 h.) and T6 (120 h.). A total number of 401 recorded values of the first patients' series were used to create the predictive model for outcome (0 non survivors, 1 survivors). The independent variables were: 18 haemodynamic and oxyphoretic parameters, time and the type of pathology: medical, surgical or politrauma. Stepwise logistic regression (BMDP, USA) was used to create the model. Model calibration was assessed using the Hosmer-Lemeshow Goodness-of-fit statistic, and discrimination was assessed using the area under the ROC curve. Model was validated using data collected from the second series. Finally we evaluated discrimination of all the data of 113 patients in two different periods: from 0 to 24 hours and from 48 to 120 hours.
Results: The probability of survive after 20 days was Pr (survive) = $e^{logit}/1 + e^{logit}$, with "logit" = -5,106 + (-6.58E-02 SVI) + (-2,76E-03 SVR) + (0,1379 LVSWI) + (0,8933 Hb) +(-3,25E-02 VO_2I) + (9,09E-02 O_2ER) + (-7,89E-02 SHUNT) + PAT. For medical patients PAT=-0.568; for surgical patients PAT=-1.0525 and for politrauma PAT=1.593. Goodness-of-fit test showed a good calibration: χ^2 = 4.267, p=0.832. The area under the ROC curve was 0.831. The model used in the validation data set, with 199 recorded values, showed also a good calibration and discrimination (Goodness-of-fit test: χ^2 =15.65, p=0.111; area under the curve 0.863). Finally area under ROC curve was 0.803 in the first 3 times and 0.863 in the last 4 times.
Conclusions: The mathematical model we found has been validated also in the second series and the discrimination capability increases with time. Using this model we can evaluate the probability of survive at every time. Its application at different times permits a better evaluation of haemodinamically instable patient trend.

CRITICALLY ILL OBSTETRIC PATIENTS: OUTCOME AND PREDICTABILITY UTILIZING THE NEW SIMPLIFIED ACUTE PHYSIOLOGY SCORE (SAPS II) IN A 314 BED COMMUNITY HOSPITAL

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Introduction:
Critically ill obstetric patients have neither been actively excluded or included in the development or validation of ICU scoring systems. Initial reports indicated APACHE II scores underestimated actual mortality in University hospital critically ill obstetric patients[1]. Yet recent literature with a larger data set indicates that APACHE II can overestimate the predicted mortality rate of these patients[2]. No data exists regarding the SAPS II score in the critically ill obstetric population, nor in the community hospital setting.
Methods:
Utilizing multiple computer billing surveys as well as hospital service transfer records, all 31 critically ill obstetric patients were identified during the period 10/89-10/94. All available charts were pulled and reviewed for appropriateness of inclusion into the data set (N=16). A new simplified acute physiology score (SAPS II) was calculated on all (aged 15-39, average age 27) and compared to 19 nonpregnant female controls (aged 15-49, average age 38.4) seen 12/94 - 2/95 and 4/95, as well as an all age, non-pregnant female control (average age 57). Mortality data were collected.
Results:
Average SAPS II score on the 16 obstetric critical care patients was 18 corresponding to a mortality risk of 3%; actual mortality was 0%. An all age nonpregnant female patient control of 33 patients had an average SAPS II score of 27 corresponding to a mortality risk of 9%, actual mortality = 3.1%. A 15-49 year old nonpregnant female control of 19 patients had an average SAPS II score of 20.4 corresponding to a mortality risk of 4%, actual mortality was 0%.
Conclusions:
Obstetrical patients requiring intensive care in our community hospital Med/Surg ICU had a better outcome than predicted by the SAPS II score. This overestimate of the SAPS II score was similar to same age non-pregnant female controls and to the published data on APACHE II in the same population at University hospitals.

1. Koch KA et al. Abstr. Crit Care Med 1988; 16:409.
2. Lewinsohn et al: Crit Care Med 1994;22:1412-1414.

8. Heart/Lung Interaction

DERIVED PULMONARY CAPILLARY PRESSURE AND THE LONGITUDINAL DISTRIBUTION OF PULMONARY VASCULAR RESISTANCE IN CARDIAC SURGERY PATIENTS

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Introduction: The feasibility to assess pulmonary capillary pressure (pcap) offers the opportunity to determine the longitudinal distribution of pulmonary vascular resistance (PVR). The purpose of this study was to measure P_{cap} and to calculate PVR to determine whether relevant shifts in the distribution of PVR could be expected after routine cardiac surgery.

Methods: The study population consisted of 25 consecutively admitted patients after cardiac surgery. Surgical procedures included coronary artery bypass graft (CABG) (n=14) and mitral valve replacement (MVR) (n=11). pcap was estimated by analysis of the pressure decay tracing after pulmonary artery occlusion. After estimation of pcap precapillary (Ra) and postcapillary resistance (Rv) was calculated. A complete set of hemodynamic variables was obtained at 1 hour and at 6 hours after operation.

Results: There were no significant hemodynamic changes during the first 6 hours after surgery. The MVR group maintained pulmonary hypertension and higher levels of Pcap. Ra/Rv, reflecting the longitudinal distribution of resistances, remained unchanged. However, Rv predominated Ra during the postoperative period in both groups.
Table:

	PAMP	Pcap	PVR	Ra	Rv	Ra/Rv
CABG						
1 h	22.6±1.7	17.7±1.4	1.8±0.11	0.8±0.06	0.9±0.06	0.92
6h	21.3±0.8	17.4±0.8	1.5±0.10	0.6±0.06	0.8±0.11	1.04
MVR						
1h	28.5±1.8	22.4±1.1	2.7±0.24	1.2±0.13	1.5±0.18	0.93
6h	28.9±1.7	22.4±1.3	2.7±0.40	1.3±0.22	1.3±0.19	1.00

Conclusion: In our patients the measurement of Pcap demonstrated a distribution of PVR to the venous segment after cardiac surgery independent of pulmonary hypertension. Thus, effective capillary pressure may be more affected in these patients than predicted by PAMP and PCWP. The role of vasodilators in cardiac surgery remains to be determined.

INFLUENCE OF THE ACE-INHIBITOR ENALAPRILAT ON REGULATORS OF CIRCULATION IN THE CRITICALLY ILL

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Objectives: Evaluation of the influence of long-term continuous I.V. administration of the ACE-inhibitor enalaprilat on regulators of circulatory homeostasis.
Methods: 19 trauma and 26 sepsis patients randomly received either 0.25 mg/h (group 1, n=15) or 0.5 mg/h (group 2, n=15) of enalaprilat I.V. or saline solution (control, n=15) as placebo for 5 days. Plasma levels of endothelin-1 (ET), atrial natriuretic peptide (ANP), renin, vasopressin, angiotensin-II, and catecholamines were measured before injection of enalaprilat (='baseline' values) and during the next 5 days.
Results: Except for ET, plasma levels of all vasoactive substances exceeded normal range at baseline. Angiotensin-II significantly decreased during enalaprilat infusion (0.25mg/h: from 53.1±11.3 to 22.1±9.3 pg/ml; 0.50mg/h: 62.1±14.4 to 17.9±7.9pg/ml), whereas it remained significantly elevated in the untreated control patients. Vasopressin increased only in the control group ($p<0.01$) and decreased after 0.50mg/h of enalaprilat. ET remained almost unchanged in group 2, whereas ET increased significantly in the control patients (from 4.9±0.9 to 10.1±1.9pg/ml on the 5th day). Catecholamine plasma levels (epinephrine, norepinephrine) markedly increased in the control group ($p<0.01$), but they did not change significantly throughout the study period in both enalaprilat groups.
Conclusions: Continuous I.V. administration of the angiotensin-converting enzyme inhibitor enalaprilat beneficially influenced systemic and local vasoactive regulators of the circulation, which are normally increased in the critically ill. Thus patients at risk of (micro-) circulatory abnormalities may profit from enalaprilat infusion.

CARDIORESPIRATORY EFFECTS OF A CHANGE FROM SUPINE TO TRENDELENBURG POSITION: TIME TAKEN TO REACH A STEADY-STATE.

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Objectives: To determine the time taken for hemodynamic and gas exchange variables to a reach stady-state after a change from supine to Trendelenburg position (TrP).
Methods: We prospectively studied 8 adult patients with severe sepsis or septic shock requiring hemodynamic monitoring. Usual cardiorespiratory parameters were measured at baseline, 15 min after the patient was placed in a TrP and again 15 min after the return to a supine position. A fiberoptic pulmonary artery catheter (SvO_2 Oximetrix, Abbott) allowing continuous SvO_2 monitoring was used. During the protocol we also continuously measured SaO_2 by pulse oximetry and VCO_2 and VO_2 by monitoring partial concentration of O_2 and CO_2 in inspiratory and expiratory gases (DELTATRAC metabolic monitor, DATEX). Therefore, we were able to monitor cardiac output variations by dividing VO_2 with arteriovenous difference according to the Fick equation (CO-Fick).
Results: No significant difference in hemodynamic status was observed 15 min after the patients were placed in TrP. Despite the fact that no significant change was observed in CO and VO_2 estimated by thermodilution, CO-Fick had a tendency to decrease continuously in TrP and then to return to its initial value when patients regained supine position. Respiratory gas analysis showed a small but persistent continuous increase in VCO_2 without a similar trend in VO_2 values.
Conclusions: We conclude that no significant hemodynamic effect was detected in our patients after 15 min in TrP. Evaluation of VO_2 from respiratory gases analysis after a change in body's position should be interpreted with caution, since the patient may not yet have reached a stady-state after 15 min. Since VO_2 did not change, VCO_2 increase was probably due to position related changes in pulmonary gas exchange and not to a change in patient's metabolic status.

USEFULNESS OF SvO_2 MONITORING DURING WEANING TRIALS.

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Objectives: To determine whether changes in SvO_2 and/or other hemodynamic parameters during weaning trials could be used to predict successful weaning. **Methods:** We prospectively studied 10 adult patients with a history or clinical evidence of cardiovascular dysfunction, who were unable to tolerate spontaneous breathing (SB) for 3 hours. For all these patients right heart catheterisation was considered necessary in order to detect hemodynamic alterations during weaning. A fiberoptic pulmonary artery catheter (SvO_2 Oximetrix, Abbott) allowing continuous SvO_2 monitoring was used. Hemodynamic status was evaluated at baseline and after one hour of spontaneous breathing through a T-piece. Patients were assigned to one of two groups depending on whether they tolerated SB for 3 hours. Data were analysed by analysis of variance and unpaired Student's t-test. We also used multiple linear regression analysis to determine which hemodynamic variables were correlated with the magnitude of SvO_2 change and multiple discriminant analysis to determine if any of the above variables were associated with toleration of SB for 3 hours and/or successful weaning (S-W).
Results: There was a statistically significant change in SvO_2 and PAOP only in patients unable to tolerate SB for 3 hours.

SB for 3 hrs	SvO_2 change	S-W	SvO_2 change
YES	67.8=> 69.4	YES	65.3=> 64.0
NO	65.0=> 51.2 ($p<0.05$)	NO	68.0=> 54.7

Multiple discriminant analysis revealed that only the change in SvO_2 was a significant discriminator between patients who tolerated SB for 3 hours and those who did not.
Conclusions: We conlude that in contrast to other hemodynamic variables, SvO_2 change during weaning could be useful in predicting which patients could be successfully weaned.

LACK OF INTERDEPENDENCE OF RESPIRATORY AND CARDIOVASCULAR CHANGES INDUCED BY DEAD SPACE LOADING AND 3% CO_2 INHALATION DURING EXERCISE

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Objectives: The ventilatory and the cardiovascular responses due to systemic hypercapnia and hypoxia are interdependent (J Physiol 1995; 78: 696-701). We tested the hypothesis that the ventilatory stimulation by dead space (VD) loading and 3% CO_2 inhalation is accompanied by a proportionate cardiovascular change.

Methods: Six healthy subjects, mean age, 25 year, performed three incremental exercise tests in a randomized order: 1) inspiring air without VD (air control, AC); 2) inspiring air with VD of 920 ml (AVD); 3) inspiring 3% CO_2; 21% oxygen, balance nitrogen. The ventilatory responses were examined at matched heart rate (HR) equivalent to 90% peak HR.

Results: Ventilation ($\dot{V}I$) was significantly greater ($p<0.0001$) during the AVD and CO_2 tests than during the AC test at the same work rates. End-tidal CO_2 ($PETCO_2$) and estimated arterial CO_2 ($PaCO_2$) were significantly greater ($p<0.01$) at 150 W and 200 W. Oxygen saturation was significantly lower ($p<0.05$) during the AVD test than during the AC and 3% CO_2 exercise. At matched HR equivalent to 90% peak HR, $\dot{V}I$ was significantly greater ($p<0.01$) during the AVD and 3% CO_2 tests than during the AC exercise (123 *l*, 121 *l*, and 91 *l*).

Conclusion: We conclude that the increase in $\dot{V}I$ and $PETCO_2$ due to VD loading and 3% CO_2 inhalation is not associated with an acceleration in HR.

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EFFECTIVENESS OF THROMBOLYSIS IS ASSOCIATED WITH AN INCREASE OF THIO BARBITURIC ACID REACTIVE SUBSTANCES (TBARS) IN PERIPHERAL BLOOD OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION (AMI).

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Objective: The production of large amounts of oxygen radicals from the onset of reperfusion may be responsible, at least in part, for peroxidative damage to myocardial tissue. The aim of this study was to evaluate the time dependence of plasma TBARS in patients with AMI receiving Thrombolytic Therapy (TT).

Patients and Methods: Fifty eight patients admitted in ICU (46 men and 12 women; mean age 50.6 ± 16.02 years) receiving systemic TT for possible AMI were studied. All patients received recombinant human Tissue-type plasminogen Activator (r-tPA). The mean time from the onset of symptoms and the beginning of TT was 3.01 ± 2.13 hours. Peripheral venous blood samples were obtained from each patient before and serially after TT (0, 3, 6 and 9 hours). TBARS levels were determined by using a spectrophotometric technique. Reperfusion was identified by the timing of creatine phosphate kinase (CPK) peak (<15 hours).

Results: AMI was confirmed in 46 patients, 29 reperfused (Group A) and 17 nonreperfused (Group B). 12 patients were Angor (Group C).

	A	B	C
t(0)	1.81±1.19	1.8±0.83	0.99±0.51
t(3h)	1.66±1.1	1.23±0.56	0.96±0.66
t(6h)	1.7±1.07	1.46±0.52	1.08±0.95
t(9h)	1.8±1.08	1.37±0.52	1.08±0.95

Table I list the variation of plasma concentrations of TBARS (mean ± sd) in groups (A,B, and C) as a function of time from the beginning of TT. Comparison of the 0 time concentrations reveal a difference $p<0.01$ between group AMI (A and B) versus group C. The between-groups (A-C) comparison showed significant differences ($p<0.05$) at 3,6 and 9 hours from de beginning of TT. Comparison of the 3,6 and 9 hours concentrations did not reveal any difference between nonreperfused (group B) and angor (group C).

Conclusion: We have observed a maintenance of high level of TBARS in reperfused patients only. These results suggest that the increase of TBARS levels may be due to phospholipid derangement of reperfused myocytes.

THIO BARBITURIC ACID REACTIVE SUBSTANCES (TBARS) VALUE IN PERIPHERAL BLOOD OF PATIENS WITH ACUTE MYOCARDIAL INFARCTION (AMI) AT THE TIME OF THE ICU ADMISSION.

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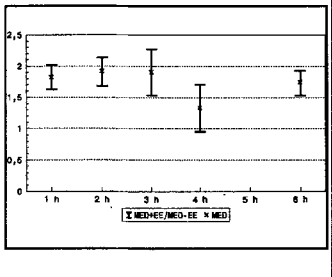
Objective: To determine if TBARS levels may be an early index reflecting peroxidative damage in AMI patients.

Patients and Methods: By using a spectrophotometric technique, based on a modification of the BUEGE and AUST method, TBARS levels were determined in 51 healthy subjects (group I) , 43 patients with several risk factors of ischaemic cardiopathy (group II) and 99 ICU patients with possible AIM (87 were confirmed AMI (group IIIA) and 12 were Angor (group IIIB)). Peripheral blood was obtained at the time of the ICU admission in the group III. Electrocardiographic data and echocardiographic wall motion were used to identify AMI location (anterior, inferoposterior and indeterminate). Statistical analysis was made with a standard statistical package (RSIGMA, Horus Hardware).

Results: Age (mean ± sd) in I, II, IIIA and IIIB groups were 28.5 ± 9.69, 64.76 ± 9.64, 64.48 ± 10.68, 60.25 ± 9.75 years respectively. AMI location were 41 anterior, 42 inferoposterior and 4 indeterminate. Time (mean ± sd) passed from the onset of AIM's symptoms to ICU admission was 4.16± 3.5 hours. TBARS (mean ± sd) in I, II, IIIA and IIIB groups were 0.88 ± 0.28, 0.8 ± 0.4 , 1.77 ± 0.92 , 0.99 ± 0.51 nmol/liter of plasma, respectively. We found a statistically significative increase of TBARS levels (**p< 0.001**) only in patients with confirmed AMI (group IIIA) . No differences were found between the rest of the groups.



The figure shows the relationship between the TBARS values and the time from the onset of the AIM's symptoms.

Conclusion: We have found that in AMI patients the TBARS levels can be used as an early index reflecting peroxidative damage occurring to ischemic tissues.

Perioperative risk in patients with ischemic heart disease. The protective role of diltiazem.

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Perioperative morbidity and mortality are mainly of cardiac origin, particularly among elderly patients (Pts) with ischemic heart disease. We performed a randomized trial, in order to investigate the possible protective activity of diltiazem (D).

Methods: 58 Pts (aged 70±9) with a history of coronary insufficiency were subjected to major urological operations. They were randomized to two groups: Group I (29 Pts) - without D and Group II (29 Pts) - D was administered 0.15 mg/kg IV bolus 12 hours prior to anesthesia and 0.15 mg/kg/h upon the end of operation and for at least 12 hours post-operatively. IV was substituted by oral administration of 2x120 mg starting the next day and for the rest of hospital stay. All Pts underwent daily clinical, electro-cardiographic and laboratory (CK-MB) control.

Results: Are shown in the following table:

Group	Angina	New Q-wave	ST-segment depression	T-wave inversion	CK-MB>30 U/100 ml
I	4	0	5	3	2
II	2	0	1	1	1

Totally, ischemic manifestations were registered in 14 Group I (48.3%) vs 5 Group II (17.2%) Pts [p<0.05].

Conclusions: In major urological surgery, myocardial ischemia frequently worsens. Use of diltiazem seems to exert a protective effect during the time of operation and the post-operative period among elderly patients with coronary insufficiency.

Heart-lung interactions and cardiac assist device performance

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Interactions between the heart-lung unit and a cardiac assist device are the crucial issues for successful outcome of patients under mechanical circulatory support. Several factors have been indicated and we can diffrentiate between anatomical and hemodynamic interactions. Especially right heart failure and pulmonary hypertension have been proven to limit left ventricular assist device (LVAD) performance.

In order to study the effects of right heart failure (RHF) and pulmonary hypertension (PHT) on mechanical circulatory support, we designed an experimental study in dogs and combined in six groups left heart failure (LHF) and RHF and PHT, respectively. In the control group we induced LHF with subsequent occlusions of LAD and CX followed by reperfusion: In the next group we supported with an LVAD during 90 minutes starting 5 minutes after CX occlusion (group II). In the next group we added right ventricular ischemia by occluding the RCA simultaneously to the CX (group III). These both groups we repeated only with pre-existing acute PHT induced by the injection of 100 µm glass beads (groups VI and V). A last group was similar to group V (LHF and RHF and PHT), but instead of a LVAD, we used BVAD support.

In I and V no animal survived the second perfusion period (4 hours). In II and III (no PHT), all dogs survived in stable conditions. In IV (LVF, PHT), 60 % survived, the remainder died of incomplete recovery. In VI with BVAD, only 40 % survived. In III and V, during occlusion of the RCA, the right ventricle stopped contracting and right atrial pressure and mean pulmonary pressure equalized. This lead to a significant drop in inflow on the left heart side, which still provided sufficient LVAD performance in case of absent PHT (III) and lead to death due to "low LVAD output" syndrome in V. This "low LVAD output" snydrome could be partly overcome by BVAD support.

We conclude that heart-lung interactions play a major role in LVAD performance. By optimizing the perioperative management, they all can be overcome, except the occurrence of alveolar leakage syndrome.

SIMPLIFIED ASSESSMENT OF TRANSMURAL PULMONARY ARTERY OCCLUSION PRESSURE DURING PEEP VENTILATION.

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Objectives : We propose a new approach of transmural pulmonary artery occlusion pressure (PAOPtm), in presence of PEEP, from the following hypothesis : if respiratory swings of PAOP are compared to those of alveolar pressure (ΔPalv = plateau pressure - total PEEP), an index of transmission of airway pressures to pulmonary vessels is obtained (I_T = ΔPAOP/ΔPalv). The value of the product of I_T by PEEP can be substracted from end-expiratory PAOP (PAOPee) to obtain a calculated PAOPtm (PAOPtmc).
Thus PAOPtmc = PAOPee - (ΔPAOP/ΔPalv x PEEP).
Methods : We tested this hypothesis in 67 patients by comparing PAOPee, PAOPtmc, and PAOPnadir obtained within the first 3 seconds after disconnection from the ventilator, value of reference of PAOPtm in absence of intrinsic PEEP (PEEPi).
At ZEEP, PEEPi was absent in 38 patients (group A) but present in 29 others (group B). Patients were studied under the PEEP level chosen by the attending physician (Gr A : 11 ± 2 ; Gr B : 11 ± 3 cmH_2O).
Results :
1. Gr A : PAOPee (12 ± 6 mmHg) differed ($p < 10^{-3}$) from PAOPnadir (8 ± 6 mmHg) and PAOPtmc (8 ± 6 mmHg). Gr B : PAOPee, PAOPnadir, PAOPtmc differed between themselves (14 ± 6, 12 ± 6, 10 ± 6 mmHg respectively).
2. Good correlation (r = 0.99) and agreement between PAOPnadir and PAOPtm were found in Gr A, while there was no agreement in Gr B (Bland and Altman analysis).
3. Lung compliance (V_T /ΔPalv) correlated well with I_T in both groups (r = 0.92), suggesting that our hypothesis was strong even in patients with PEEPi.
Conclusions : PAOPtm under PEEP ventilation can be obtained, even in patients with PEEPi, from parameters easily measured at the bedside.

THE TOTAL ANTIOXIDANT STATUS AND LIPOFUCSIN IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFTING (CABG)

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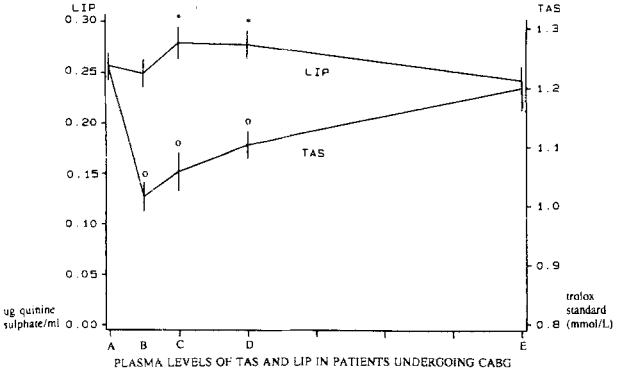
Introduction: Cardiopulmonary Bypass (CPB) may cause ischemia in several organ systems like the heart, brain and kidneys. Reactive oxygen species (ROS) are formed by subsequent reperfusion and stimulation of neutrophils by CPB. ROS are harmful to biological systems e.g. cellular membranes, enzymes, DNA. Many natural antioxidant systems protect against the effect of ROS. In patients undergoing CABG we evaluated the production of ROS by total plasma antioxidant status (TAS) and lipid peroxidation measured by lipofuscin (LIP).

Methods: TAS (RANDOX, UK) and concentrations of LIP (Tsuchida et al.) were measured in 16 consecutive patients undergoing CABG. All the patients had a normal serum creatinine clearance (> 50 ml/min). Serum samples were obtained A) before operation, B) after removal of the aortic crossclamp, C) at admission to the ICU, D) 4 hours after operation, E) 22 hours after operation.

Results: TAS was significantly decreased after removal of the aortic crossclamp (B, C and D lower than A), followed by a subsequent significant increase of LIP (C and D higher than B).
The levels of TAS and LIP returned to baseline 22 hours after operation.



PLASMA LEVELS OF TAS AND LIP IN PATIENTS UNDERGOING CABG
* p>0.007, o p>0.0006 (Sgn. Rank test)

Conclusion: TAS and LIP showed significant changes, indicating the production of ROS in patients undergoing CABG. Further studies need to elucidate the relation between the observed ROS and postoperative morbidity in patients undergoing cardiac surgery.

INTRATHORACIC FLUIDS VOLUMES AND HEMODYNAMIC EFFECTS DURING PRESSURE CONTROLLED INVERSE RATIO VENTILATION IN PATIENTS WITH POOR LEFT VENTRICULAR FUNCTION

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Objectives: Evaluate the influence of pressure controlled inverse ratio ventilation (PCIRV) on intrathoracic fluids volumes and hemodynamic parameters in cardiac surgery patients with poor left ventricle function.
Methods: 10 patients with preoperative LVEF<40% undergoing coronary artery bypass grafting were studied. After surgery, a 3F femoral artery catheter was inserted and conneted to a fiberoptic monitoring system (COLD Z-021; Pulsion Medizintechnik, Germany); this allows, with a double-indicator dilution technique, the calculation of cardiac index (CI,L/min/m2), intrathoracic bood volume (ITBV,ml/m2), pulmonary blood volume (PBV,ml/m2) and extravascular lung water (EVLW,ml/Kg). With a 7F pulmonary artery catheter, wedge (W,mmHg) and central venous pressure (CVP,mmHg) were measured, while O2 extraction ratio (O2ExR,%) and oxygen delivery (DO2,mL/min/M2) was calculed. Peak inspiratory pressure (Pawp,cmH2O) and mean airway pressure (Mawp,cmH2O) were measured with a Varflex flow transducer (Bicore,Sensormedics,US). The patients were studied after 60 minutes (T0) of volume controlled standard ratio ventilation (VC), and after 60 minutes (T1) of stabilisation period of PCIRV (67% inspiratory time, 0% pause). Vt,Ve and total PEEP were held constant in every mode of ventilation.

	CI	ITBV	PBV	EVLW	DO2
T0	2.2±0.1	792±52	159±17	6.4±07	346±20
T1	2.0±0.1	754±49	152±12	5.7±0.7	330±19
	O2ExR	W	CVP	Pawp	Mawp
T0	32±2	6.4±0.7	5.6±0.7	22.9±0.9	9.8±0.5
T1	35±1	9.0±0.6*	7.6±0.6*	17.9±0.6*	14.1±0.4*

*p<0,05 versus T0

Conclusions: These data show that PCIRV 2:1 is a safe ventilatory support also in cardiac patients with impaired ventricular function, and monitoring of ITBV is more reliable to measure and optimise circulatory volume status, than W and CVP.

CENTRAL AND MIXED VENOUS OXYGEN SATURATION (ScvO2 ,SvO2) CORRELATION IS NOT AFFECTED BY THE LEFT VENTRICULAR STROKE WORK INDEX (LVSWI)

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Objectives: To evaluate the influence of LVSWI on the well known correlation of ScvO2 and SvO2.
Patients-Methods: Twenty eight patients (12 males and 16 females) were included in this study regardless of the ICU admission cause.
All patients were catheteriazed with a fiberoptic pulmonary artery catheter connected with an Oxymetric (R)3 SO2/CO Abbot computer.For any pulmonary artery catheter insertion, two pairs of ScvO2 and SvO2 were obtained, one during insertion and one during taking the catheter out. For any pair obtained, we also collected the data concernig with the patient's hemodynamics and oxygenation and we calculated the LVSWI.
Results: Separating the patients into three groups (group I: patients with low LVSWI value [<30 gm.m/m^2/B], group II : patients with intermidiate LVSWI value [≥ 30 and ≤ 50 gm.m/m^2/B] and group III: patients with high LVSWI value [> 50 gm.m/m^2/B]) ,we studied the ScvO2 and SvO2 correlation.
Group I,II and III ScvO2 and SvO2 correlation equations and coefficients were I: SvO2=19.162+0.687 · ScvO2 r=0.92 (p<0.001), II: SvO2=1.933+0.950 · ScvO2 r=0.94 (p<0.001) , III: SvO2=-9.019+1.117 · ScvO2 r=0.87 (p<0.001). The slope of the group I regression line was significantly lower compared with the group II and III.
Conclusion: These results suggest that the influence of LVSWI on the ScvO2 and SvO2 correlation is negligible.

INHALED NITRIC OXIDE (NO) REDUCES PULMONARY ARTERY PRESSURE AFTER PULMONARY MICROEMBOLISM IN PIGLETS

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Objectives: Acute massive pulmonary embolism (PE) increases pulmonary artery pressure (PAP) and right ventricular afterload, which may lead to right ventricular failure. Inhaled nitric oxide (NO) selectively dilates pulmonary vessels. Thus, inhaled NO may be of potential therapeutic value in the management of the acute phase of PE.
Methods: Following institutional approval, ten piglets (body weight 17±2 kg) were anaesthetised (midazolam/piritramide) and ventilated using a modified Servo ventilator (Siemens Elema, Sweden; FiO_2 0.3). The following variables were obtained: systolic PAP (SPAP), mean PAP (MPAP), diastolic PAP (DPAP), mean arterial pressure (MAP), central venous pressure (CVP), pulmonary capillary wedge pressure (PCWP), cardiac output (CO), and arterial (PaO_2) and mixed venous (PvO_2) oxygen saturation. Pulmonary vascular resistance (PVR) was calculated. To induce PE, 300 µm microspheres (Sephadex G50 coarse, Pharmacia Biotech, Freiburg, Germany) were injected in an amount sufficient to increase MPAP to 45 mmHg initially. 45 min after embolisation when haemodynamics were in a steady state (Control 1), inhaled NO was administered. Further measurements were taken 5 min after 40 ppm NO (NO 40), 5 min after 80 ppm NO (NO 80), and 10 min after discontinuation of NO administration (Control 2).
Results: The administration of inhaled NO resulted in a significant decrease in SPAP, MPAP, and PVR. The cessation of NO inhalation led to a complete return to pretreatment control values (Table). CO, MAP, CVP, PCWP, PaO_2, and PvO_2 remained unchanged during NO administration.

Table	Control 1	NO 40	NO 80	Control 2
SPAP [mmHg]	44.5±2.2	39.9±2.4*	38.9±1.9*	43.7±2.3
MPAP [mmHg]	32.9±1.3	29.8±1.3*	29.0±1.4*	32.7±1.2
DPAP [mmHg]	23.6±1.7	21.9±0.9	21.4±1.2	24.7±1.5
PVR [dyn*sec/cm^5]	603±59	521±44	486±52*	584±48

*p<0.05 vs. Control 1/Control 2 (ANOVA and t-test) Data are mean±SEM
Conclusion: Inhaled nitric oxide selectively decreases SPAP, MPAP, and PVR without influencing systemic haemodynamics after experimentally induced PE in piglets. The beneficial effects of inhaled NO might be clinically relevant in patients suffering from acute life-threatening PE.

EFFECTS OF OXYGEN THERAPY ON OXYGEN DELIVERY IN PATIENS WITH SEVERE CHRONIC OBSTRUCTIVE LUNG DISEASE (COPD)

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Objectives: In 12 COPD patients the effects of O_2 treatment (31% O_2 for 1 h) on oxygen delivery (DO_2) were investigated with a right heart catheterization (thermodilusion Swan Ganz catheter) and measurements of pulmonary hemodynamics.
Results: In the 6 (Group I) most severely hypoxemic (PaO_2 38.8±5.2, PvO_2 26.1±4.3 mm Hg) cardiac index (CI) did not change during O_2 treatment and DO_2 increased (from 660±214 to 897±254 ml/min, p<0.05). In 6 (Group II) less hypoxemic patients (PaO_2 51.2±9.3, PvO_2 37.2±5.9 mm Hg) the DO_2 did not change, because the CI was decreased (from 5±1.1 to 3.6±1 l/min/m^2, p<0.05). Breathing room air CI and mPAP were not significant different between groups, but DO_2 was lower and catecholamines (norepinephrine-NE, epinephrine-E) were significantly (p<0.05) higher in Group I.
Conclusion: Breathing room air, the less hypoxemic patients had a rather satisfactory DO_2 and tissue oxygenation (PvO_2) because they had properly adapted their CI. The absence of this mechanism (right heart impairement ?) in the hypoxemic patients, in spite of higher blood NE and E, was responsible for the poor DO_2 and PvO_2.

CLINICAL EXPERIENCE WITH ACTILYSE IN PATIENTS WITH TRAUMA COMPLICATED BY PULMONARY EMBOLISM.

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Objectives:Evaluate the yield of recombinant tissue plasminogen activator(rt-PA,Actilyse,Boehringer Ingelheim) as a thrombolytic agent in pulmonary embolism in trauma patients.
Methods: In 1994 five patients with diagnosed pulmonary embolism(blood gases,chest X-ray,echocardiography,perfosion lung scans) were given 100mg of Actilyse as a 2hrs infusion, followed by heparin(single 5000j. injection and infusion in doses 500-400j./kg/day).The effectiveness of rt-PA thrombolytic action was evaluated in 3,24 · hrs(blood gases) and on the third dayafter treatment(echocardiography and lung scan).
Results: Three hrs after Actilyse was given we observed significant clinical improvement,confirmed by elevation of PaO_2 and SaO_2 in blood.Echocardiogram on the third day showed regression of pulmonary hypertension and lung scans showed 45% improvement in total lung perfusion. Except slight bleeding from the site of injection no more thrombolytic complications were observed.
Conclusions: Actilyse used in five trauma patients with pulmonary embolism was a very effective and safe thrombolytic agent, inducing rapid and evident clinical improvement.

EFFICACY AND SAFETY OF ENOXAPARIN VERSUS DALTEPARIN IN THE PREVENTION OF THROMBOEMBOLISM (TE) IN INTENSIVE CARE UNIT (ICU) PATIENTS

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Objectives: Determine the incidence of TE in ICU patients (pts) and to find out, if there are differencies in the antithrombotic efficacy, tolerability and bleeding between two low molecular weight (LMW) heparins, dalteparin and enoxaparin. Methods: 66 adult pts were randomized to receive either dalteparin 5000 IU sc. (32 pts) or enoxaparin 40 mg sc. (34 pts) once a day. Pts were examined daily for TE for seven days clinically, by chest X-ray and by above-knee ultra sound assessment using vein compression. Activated clotting time (ACT), anti-Xa-activity, and local tolerance of sc. medication were examined daily. Results: The groups were comparable according to demographic data, indication for ICU admittance and risk factors for TE. ACT- and anti-Xa-levels, thrombo-plastin time, activated prothrombin time and platelet count were comparable before TE-prophylaxis. Two positive ultra sonography findings were made, one in each group. Findings were confirmed with phlebography. No signs of pulmonary embolism were found. The incidence of TE was 3 % in both groups. Comparable ACT- and anti-Xa-levels were achieved with the doses of enoxaparin and dalteparin used. Few minor haematomas at the sc. injection site were found, two of them occured in dalteparin pts and four in enoxaparin pts (NS). Liver enzymes did not differ between the groups. Conclusions: Both LMW sc. heparins, enoxaparin and dalteparin caused similar increases in ACT- and anti-Xa-levels, and were as efficient to prevent TE in ICU pts. The occurence of haematomas at injection site and effect on liver enzymes were similar with both drugs.

HEMODYNAMIC EFFECTS OF HIGH FREQUENCY JET VENTILATION SYNCHRONIZED WITH ECG (SyncHFJV) IN POST-OPERATIVE CARDIAC PATIENTS.

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Intermittent positive pressure ventilation (IPPV) by increasing pleural pressure, decreases the pressure gradients for systemic venous return and left ventricular (LV) ejection. We have previously shown that when inspiration is synchronized with systole using SyncHFJV in patients with severe cardiomyopathy, that cardiac output (CO) was increased relative to both IPPV and non-synchronized HFJV (1). However, it is not known if similar effects could be realized in ventilator-dependent patients with lesser degrees of LV dysfunction and fluid overload. We thus compared syncHFJV to IPPV in stable patients following coronary artery bypas grafting. ***Methods***: 13 normothermic who were stable (< 20 % variance/h.) were studied following admission to the SICU. Heart rate (HR), mean arterial (Pa), pulmonary artery occlusion pressure(Ppao), CO by continuous thermodilution (Vigilance, Baxter, USA), mixed venous saturation (SVO_2) and arterial blood gases (ABG) were measured after 30 min. of each step. IPPV was SIMV adjusted for a rate, tidal volume and FiO_2 to insure both normal ABG and a peak airway pressure < 35 cm H_2O. SyncHFJV was delivered by a HFJV ventilator (Acutronic) during systole with ventilator parameters adjusted to optimize ABG. **Protocol**: patients received three IPPV runs ($IPPV_{1,3,5}$) with SyncHFJV runs interposed ($HFJV_{2,4}$). **Statistics**: ANOVA for repeat measures and paired T-test were used to compareruns and demonstrate variability. **Results**:No significant difference in any of the measured hemodynamic variables were seen among the IPPV and SyncHFJV runs (Table). *Post hoc* separation of patients by pre-operative ejection fraction (EF; EF > 40% ; n=10 and < 40%; n=4) did not alter these results.

RUNS	*HR*	*mean Pa*	*Ppao*	*CO*	*pH*	*PaO_2*	*SVO_2*
	min^{-1}	mm Hg	mm Hg	L/min		kPa	%
$IPPV_1$	91±16	79±12	9.7±3.8	5.0±1.3	7.38±0.06	17±4	65±7
$HFJV_2$	89±16	77±12	10.2±4.2	4.9±1.5	7.41±0.06	14±5	62±8
$IPPV_3$	87±16	70±11	10.7±4.2	4.7±1.4	7.38±0.06	15±3	61±7
$HFJV_4$	86±16	73±14	10.8±2.9	5.0±1.5	7.41±0.07	15±5	61±7
$IPPV_5$	85±14	68±10*	10.6±3.5	5.0±1.4	7.37±0.02	12±1	62±6

*P<0.05 compared to other runs

Conclusions: In hemodynamically stable post-operative cardiac surgery patients without severe heart failure SyncHFJV offers no hemodynamic benefits above conventional IPPV.

1. Pinsky et al.Chest 1987

NIPPV AND CARDIAC FAILURE: TREATMENT OF ACUTE RESPIRATORY DYSFUNCTION

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OBJECTIVES: To evaluate if PSV is able to reduce respiratory failure in patients wit heart failure.

METHODS: From January to September 1994, we studied 88 patients, 64 men and 2 women (men age 71 +/- 6 years), 76 with cardiomyopathy (EF < 35%), 12 with dilatic cardiomyopathy and COPD. 74 patients presented severe bromchospasm, exte jugular vein distension, grunting, tachypnea, rapid shallow breathing, peripheral ede All patients presented ipercapnia and metabolic acidosis (Pa CO_2 = 85 +/- 15 mmHg pH < 7.30, HCO_3 < 18 mEq/L) with X-ray chest cardiomegaly, interstizial pulmonary ed and pleural effusion (8 patients); 22 patients had pulmunary infiltrates. All patients wa domiciliary therapy with digitalis, diuretics, percutaneous nytroglicerin an bronchodilatators. 26 patients had LTO. We used initially PSV with mask (PSV 10 ml/kg and PEEP and tested on patient's comfort, never more than 7 cmH2O. For patients we used propofol 0.25 mg/kg initially to adjust ventilation, without an respiratory depression.

RESULTS: We observed a reduction of 38% of $PaCO_2$ during first 30 minutes of ventilation, due changes of ITP, obtained by PSV. That allowed to reduce value of PS and PEEP: after 30 minutes of PSV we started inotropic therapy with digitalis dobutamine, vasodilatators and diuretics and, if they presented arrhithmias antiarrhitmic drugs.

CONCLUSIONS: The Authors think that patients with chronic heart failure presentin acute respiratory failure benefit by PSV with mask and adeguate PEEP, because th increases in ITP, obtained by PSV, decreasing transmural LV systolic pressure ?? reducing pressure gradients, thereby decreasing intrathoracic blood volum identification of these patients improves their treatment by supportive ventilatory rath than only cardiovascular therapy.

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MEASUREMENT OF ENALAPRILAT (E) - INDUCED INHIBITION OF CORONARY ENDOTHELIUM-BOUND ANGIOTENSIN CONVERTING ENZYME (ACE) ACTIVITY IN PATIENTS UNDERGOING CORONARY ARTERIAL BYPASS GRAFT (CABG) SURGERY.

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Background: In man, vascular endothelium-bound ACE is expressed in concentrations greater than 50x that in serum and is believed to be the site of synthesis of circulating angiotensin II. It is unclear whether ACE inhibitors interact similarly with ACE in different vascular beds. Coronary vessels possess all the components of the renin-angiotensin system, including ACE which may be involved in normal cardiac homeostasis, as well as in the pathogenesis of various cardiomyopathies.

Objective: To develop a method for assaying the interaction of ACE inhibitors with coronary endothelium-bound ACE in man.

Methods: ACE activity was measured in five patients undergoing CABG surgery, from the transcoronary hydrolysis of the synthetic ACE substrate ^{3}H-BPAP. Trace amounts of ^{3}H-BPAP (4μCi) were injected as a bolus in the root of the aorta and simultaneously blood was withdrawn from a coronary sinus catheter into a syringe containing protease inhibitors which prevented the conversion of unreacted ^{3}H-BPAP by blood ACE. The sample was later centrifuged to separate cells from plasma and the radioactivities due to formed product (^{3}H-BPhe) and total ^{3}H were estimated in a β-counter. Two additional such determinations of ACE activity were performed, the second in the presence of 1.5μg/kg E (co-injected with ^{3}H-BPAP) and the third ten minutes after E.

Results: All subjects were hemodynamically stable throughout the course of the study; there were no noticeable hemodynamic effects of E. Control transcoronary metabolism of ^{3}H-BPAP averaged 80±3%, in agreement with previously reported data. In the presence of E, % metabolism of ^{3}H-BPAP was reduced to 21±3%; reflecting a 85±5% inhibition of normal ACE activity. Ten minutes after E, ^{3}H-BPAP metabolism had partially recovered to 52±10%, representing a 50±15% inhibition of control ACE activity. From this data, the dissociation constant of E for coronary ACE in vivo was estimated as 6.8×10^{-4} sec^{-1}.

Conclusions: We have demonstrated the feasibility of repeated, reproducible measures of coronary endothelium-bound ACE activity and of its inhibition by E. This procedure is safe and can be used to study the role of ACE in normal cardiac function and in card pathologies.

PULMONARY VASODILATOR TREATMENT OF PRIMARY PULMONARY HYPERTENSION BY AEROSOLISED PROSTACYCLIN AND ILOPROST

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Objectives. Primary pulmonary hypertension (PPH) is a progressive fatal disease of unknown origin, with median life expectancy of less than three years after diagnosis. The responsiveness of pulmonary hypertension to a variety of vasodilator agents led to the speculation that, concomitant with vascular remodelling processes, persistent vasoconstriction is an important feature of the disease. Long term use of Ca-channel blockers and intravenous PGI_2 may improve mortality in certain populations of PPH patients, but both of these treatments lack selectivity for the lung vasculature. The aim of this study was to test the efficacy of aerosolised prostacyclin and its stable analogue, Iloprost for selective pulmonary vasodilatation in PPH.
Methods: In three patients with PPH, we compared aerosolisation of prostaglandin I_2 (PGI_2) and Iloprost to a battery of vasodilatory agents (Diltiazem, Nifedipin, inhaled nitric oxide, intravenous PGI_2).
Results: Nebulisation of PGI2 and Iloprost turned out to be most favourable for achieving effective and selective pulmonary vasodilatation. Pulmonary vascular resistance decreased from 1664 ± 75 to $1054 \pm 93 dyn*s*cm^{-5}$ ($p<0.001$) and pulmonary artery pressure from 63.3 ± 3.1 to 52.8 ± 3.4 mmHg ($p < 0.05$), cardiac output increased from 2.66 ± 0.11 to 3.57 ± 0.16 l/min ($p < 0.001$), mixed venous oxygen saturation from 49.6 ± 2.2 to 63.3 ± 2.8 % ($p < 0.001$) and arterial oxygen saturation from 87.9 ± 2.6 to 93.6 ± 2.2 % (mean ± SEM of 7 trials in 3 patients). 5-month Iloprost nebulisation in one patient (100 µg/day in six aerosol doses) demonstrated sustained efficacy of the vasodilator regimen.
Conclusion: Aerosolation of PGI_2 or its stable analogue may offer as new strategy for selective pulmonary vasodilatation in PPH.

PLASMA SOLUBLE ADHESION MOLECULES ICAM-1 AND VCAM-1 IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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Endothelial adhesion molecules may play an important role in the pathogenesis of myocardial cell damage, and may contribute to the progression of heart failure. We measured the plasma soluble intercellular adhesion molecule-1 (sICAM-1), vascular cell adhesion molecule-1 (sVCAM-1), and E-selectin (sELAM-1) levels in 27 patients with acute myocardial infarction admitted within 6 hours after onset. Peripheral venous plasma samples were collected at the time of admission, 12, 24, 36, 48, and 72 hours after onset. Plasma soluble adhesion molecule concentrations were determined by ELISA. Patients were divided into 3 groups as follows: group 1; Killip's class (K) 1 and 2 without thrombolytic therapy, group 2; K 1 and 2 with thrombolytic therapy and group 3; K 3 and 4. Both plasma sICAM-1 and sVCAM-1 concentrations in group 2 and 3 were elevated rapidly and significantly and maintained at a high level during the first 3 days. Plasma sELAM-1 level did not change in any of the groups.
These results suggest that the adhesion molecules ICAM-1 and VCAM-1 may play a role in the pathogenesis of myocardial reperfusion injury and may indicate its severity in myocardial infarction.

THROMBOLYTIC THERAPY WITH RT-PA IN PATIENTS WITH MASSIVE PULMONARY EMBOLISM AND AN INCREASED RISK OF BLEEDING COMPLICATIONS

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Objectives: Malignant disorders and the postoperative state predispose for the development of deep venous thrombosis and consecutive pulmonary embolism (PE). In these patients thrombolytic therapy (TT) bears an increased risk of bleeding and is often assumed to be contraindicated.
Methods: 8 consecutively treated patients with PE and progredient haemodynamic and respiratory instability received rt-PA (75-100 mg) that was infused over 2-7 h [#) age/sex; diagnosis; complications]: 1) 56/m; nephrogenic carcinoma (CA); massive haematuria. 2) 72/f; endometrium CA; inguinal haematoma. 3) 73/m; prostata CA; none. 4) 37/m; cerebral and spinal ependymoma; decrease of RBC. 5) 56/m; Guillain-Barree-Syndrome, myelitis; cervical haemotoma 6) 54/m; sigma CA, day 4 post op; decrease of RBC. 7) 39/f; Caesarean sectio, day 2 post op; haematoma of abdominal wall. 8) 78/f; malignant melanoma, day 6 post op; haematoma of left forearm. PE was confirmed by pulmonary angiography in 6 patients prior to and in all patients after thrombolytic therapy.
Results: Although reperfusion of the pulmonary arteries was only partial, haemodynamic and respiratory parameters improved in all patients, no fatal complications were observed. In 4 patients blood supply was required (1-8 units), in patients # 7 and # 8 surgical revision was necessary.
Conclusions: TT of massive (and thus often fatal) PE can be beneficial even in patients with increased risk of bleeding. The choice of the thrombolytic agent, dose and duration of application are discussed.

PLASMA NITRIC OXIDE LEVELS IN THE EARLY PHASE OF ACUTE MYOCARDIAL INFARCTION

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Objectives: Nitric oxide (NO) is known to exert cytotoxic and negative inotropic effects on cardiomyocytes. NO synthase activity has been reported to be increased in infarcted area in animal model of myocardial infarction. These findings suggest that NO may be an important regulator for myocardial damage and cardiac function after myocardial infarction. We measured plasma NO_2^-/NO_3^-(NOx) levels and estimated serial changes in acute phase of myocardial infarction.
Methods: Subjects were 15 patients admitted within 3 hours after onset. Venous blood samples were collected at 3-hour intervals on the first day, 6-hour intervals on the 2nd day and 12-hour intervals on the 3rd day and 4 th days after onset. Plasma NOx concentrations were determined by Griess method.
Results: The time course of the plasma NOx levels (mean±SEM) displayed a tendency to gradually increase and to make a biphasic pattern with two peaks about 24 hours and 2-3 days after onset (basal level; 32.8±4.9, first peak; 42.0±7.0, second peak;47.0±7.6 mM/l). Plasma NOx concentration was not influenced by the thrombolytic therapy, and NOx values at the time of 60 hours after onset were significantly correlated with maximal plasma creatine kinase level ($r=0.83$, $p<0.01$). The levels of plasma NOx in the early stage of myocardial infarction (from admission to the 4th day after onset) did not correlate significantly with the hemodynamic parameters(left ventricular ejection fraction, pulmonary capillary wedge pressure).
Conclusion: The early and late increase in NO production after myocardial infarction may be implicated in the deterioration of myocardial contractility and induction of myocardial damage in the early phase of myocardial infarction.

INTRAOPERATIVE RISK FACTORS IN ACUTE RENAL FAILURE AFTER OPEN HEART SURGERY

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OBJECTIVE:The aim of the present study was to analyze the incidence of acute renal failure (ARF) after open heart surgery and to identify possible intraoperative risk factors.
METHODS: 200 patients who underwent cardiac operation with total cardiopulmonary bypass (CPB). Normal renal function was assesed berfore the intervention. General patient management:The general standard anesthesia for cardiac surgery was used.CPB was maneged with nonpulsatil perfusion. Systemic flow was targeted at 2-2.5 l/m/m2 or 1.6-1.8 l/m/m2. (normothermia/hypothermia) to mantein a mean arterial pressure of about 70 mmHg/30-70 mmHg (normothermia/hypothermia).Data collection and analysis:Intraoperative control:hemodynamic, clinical and CPB information. Statiscal analysis:Student's t, chi-square and logistic regression analysis. Patient classification: Class I:patients with acute renal failure (serum creatinine >2 mg/dl), Class II:patients with normal renal function.
RESULTS:Twenty-six patients developed ARF (13%). The duration of CPB (P<0.05), the total duration of the operation (P<0.05) and the mean blood pressure during CPB correlated well with postoperative renal failure. The degree of hypothermia, the mean flow rates during perfusion, the volume of urine during CPB and the time of aortic cross-clamping did not correlate with the incidence of postoperative ARF. Systolic (P<0.01) and mean arterial (P<0.001) pressure were lower in the ARF group in comparison with the control group. Similarly, the pulmonary arterial pressures (P<0.05) were higher in the ARF group. The requeriments of intra-aortic balloon (IABP) or cardiac pressors agents were significantly greater in patients in Class I (P<0.001). The low-output syndrome (LOS) was the most frequent complication after CPB. The ocurrence of ARF was significantly predicted by logistic regression analysis by the following variables:systolic arterial pressure, pulmonary capilar wedge pressure, and LOS.
CONCLUSIONS: 1.In the present study the incidence of ARF was low.2.The intraoperative hemodynamic factors play a prominent role in the development of ARF, whereas CPB is of lesser importance.

HEMODYNAMICS AND OXYGEN TRANSPORT BEFORE ELECTIVE MAJOR ABDOMINAL SURGERY

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Objective: To evaluate the preoperative hemodynamic status and oxygen transport of high risk patients scheduled for major elective abdominal surgery.
Design: Prospective study in a university hospital intensive care unit (ICU).
Subjects: 33 major abdominal surgery patients, mean age 67 years (SD 14, range 36-85) fullfilling the high risk criteria of Shoemaker (colectomy 13, gastrectomy 10, pancreaticoduodenectomy 4, others 6).
Interventions and measurements: Patients were admitted to the ICU preoperatively. Arterial and pulmonary artery catheters were inserted and hemodynamics and oxygen transport were measured at admission and after stabilization to predetermined physiological end points. Patients were considered stable when CI $\geq$2.5 l/min/m^2, PCWP $\geq$10 mmHg, Hb $\geq$100 g/l, $SaO_2 \geq .94$.
Results: Eight patients fullfilled all the criteria for stability at admission. To achieve the criteria for stable hemodynamics 23/33 patients received cristalloids 474±509 ml (100-2000), 16/33 colloids 334±149 ml (100-500) and 10/33 were given blood 1.4 ±.70 units (1-3). 10 patients were hypoxemic (SaO_2 .94±.02; .90-.97).

	At admission	After stabilization	n of abnormal at admission	Normal values
	X±SD(range)	X±SD(range)		
Cardiac index (l/min/m^2)	3.2±.5 (2.0-4.1)	3.4±.5 (2.5-4.5)	2/33	≥2.5
PCWP (mmHg)	8±3 (1-14)	12±2 (10-18)	18/33	≥11
CVP (mmHg)	4±2 (0-8)	6±3 (3-12)	18/33	>6
O_2-extraction	.28±.06 (.15-.39)	27±.04 (.19-.35)	10/33	<30
DO_2 I (ml/min/m^2)	468±87 (330-795)	504±85 (395-721)	7/33	>430

Conclusions: Hypovolemia and marginal hemodynamics and oxygen transport are common in patients undergoing major abdominal surgery. The effect of preoperative stabilization on outcome in elective high risk patients warrants prospective evaluation.

ABNORMALITIES OF PULMONARY FUNCTION IN PATIENTS WITH CONGESTIVE HEART FAILURE AND REVERSAL WITH IPRATROPIUM BROMIDE AND FENOTEROL

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Objectives: Evaluate the acute effects of 0,08 mg ipratropium bromide and 0,2 mg fenoterol (IBF) inhaled dose on pulmonary function in 17 nonsmocers (NSm) and 14 smocers (S) with sever (New York Heart Association class II-III), stabile congestive heart failure(CHF) and 12 healthy subjects.
Methods: Pulmonary function tests were performed < 3h postprandial. The tests consisted of arterial blood gas aspiration followed by routine spirometry and pletismography, and single-breath gas analysis. After performance of these maneuvers, the patients was administred 4 puffs-ipratropium bromide (0,08mg) and fenoterol (0,2 mg). For 0,5 h, spirometry was repeated.
Results: In resting, pulmonary abnormalities observer in the S group were more severe then abnormalities observere in the NSm group. After treatment with IBF the improvement in pulmonary function was even more marked in patients who had smoked. The mean changes by forced expiratory volume in 1 second(FEV_1) was 8,1% (p<0,001) improvement and 3,9% (p<0,05), forced expiratory flow betwen 25% and 75% of the forced vital capacity (FEF_{25-75}) was 30,8% (p<0,001) and 23,6% (p<0,001) and maximal voluntary ventilation (MVV) was 21,7% (p<0,05) and 16,2% (p<0,05) improvement. The mean changes in normal subjects were mild (FEV_1 increased by 3,4%,FEF_{25-75} by 14,5% and MVV by 6,3%). We observed no adverse heamodinamic consecvence and no arrthytmogenicity.
Conclusion: In patients with CHF the airway response to IBF is highly significant. Further study is needed to determine whether therapy with IBF will load to improvement quality of life in patients with CHF with clearly documented ventilatory defects.

POSTOPERATIVE RESPIRATORY COMPLICATIONS FOLLOWING CORONARY ARTERY BYPASS GRAFTING (CABG) WITH UNILATERAL OR BILATERAL INTERNAL MAMMARY ARTERY (IMA) GRAFTS.

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Compared with unilateral IMA grafts, usage of bilateral IMA grafts in CABG patients causes greater thoracic trauma and further reduces blood supply to the sternum and intercostal muscles. These effects may be associated with increased postoperative respiratory complications
Objectives: To study the effects of bilateral IMA grafts on postoperative respiratory morbidity in CABG patients.
Methods: Two groups of patients undergoing CABG were prospectively studied: Group 1 (n=13) received both IMAs as grafts and group 2 (n=12) received only the left IMA. The two groups were matched for age, smoking habits, total number of grafts and preoperative ejection fraction. PaO2/FiO2 ratio was measured in all patients in the ICU, at 30,120,240 minutes on mechanical ventilation (MV), at 30, 120, 240 minutes after extubation (EX) and on postoperative day (POD) 5. In addition, radiografic scores of atelectasis and pleural effusion were assessed postoperatively.
Results: Group 1 had significantly longer bypass (101±23 vs 70±15, p<0,001) and aortic cross clamp time (45±19 vs 28±7, p=0,009). PaO2/FiO2 ratio was significantly higher in group 1 only at 30 minutes after extubation (table). There was no difference in the incidence or severity of atelectasis or pleural effusion between the two groups. The duration of MV was longer in group 2 (13±3 vs 9±2, p=0,004), but the length of ICU stay and hospitalization were similar. There was one case of pneumothorax in group 2 and one case of pulmonary infection in each group.

	Mechanical Ventilation			After Extubation			
	30 min	120 min	240min	30min*	120min	240min	POD 5
1	342±87	302±92	369±87	278±67	266±79	294±102	376±76
2	319±105	324±89	320±76	223±52	257±94	249±82	400±43

*Mean±SD, *p=0,003*

Conclusions: Compared with unilateral IMA grafts, the usage of bilateral IMA grafts in CABG patients is not associated with increased postoperative respiratory morbidity.

ECHOGRAPHIC EVALUATION OF THE INDEXED INFERIOR VENA CAVA AREA: CORRELATION WITH THE CENTRAL VENOUS PRESSURE IN THE VENTILATED PATIENTS.

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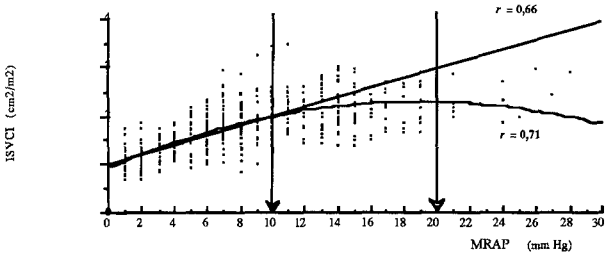
Objectives The appreciation of the central venous pressure, reflect of volemia, requires an access to the central circulation via a venous catheterism. We evaluate the relation between various echographic measures of IVC area and mean right atrial pressure (MRAP).
Methods: 596 IVC two-dimensional echographic evaluations were performed in 31 mechanically ventilated critically ill patients (15 of them after a laparotomy). The small, large diameters (SD, LD), and IVC surface (SVCI) were collected at the end of expiration on a subxiphoidal cross section. All data were compared to the MRAP obtained via a subclavian catheter.
Results There is a significant positive corelation between MRAP and SD (r = 0,41, $p<10^{-4}$), LD (r = 0,45, $p<10^{-4}$) and SIVC (r = 0,46, $p<10^{-4}$). The best linear correlation was obtained between ISVCI (IVCA/body surface area) and MRAP (r = 0,66, $p<10^{-4}$). Using a binomial regression test, r was 0,71 ($p<10^{-4}$). An ISVCI$\leq$2 cm^2/m^2 is predictive of a MRAP$\leq$10 mm hg. The sensibility is 0,8, specificity 0,63, positive and negative predictive values are 0,81 and 0,62.



Conclusion The value of SVCI/body surface index allows to predict the MRAP in the ventilated critically ill patients. The maximal reliabilaty remains to be for the lowest values of MRAP. The echography of the IVC is relevant to track down hypovolemia in such patients.

RIGHT VENTRICULAR (RV) ISCHAEMIA: A NEW EVALUATION TECHNIQUE

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The diagnosis of RV ischaemia is difficult in the critical care setting. The purpose of this study was to determine the ability of RV endomyocardial and interstitial pH electrodes to detect RV ischaemia in an animal model of RV infarction produced by right coronary artery ligation. We hypothesized that changes in transmural and interstitial pH would accompany the induced tissue hypoperfusion. RV interstitial (pHint) and transmural endomyocardial pH (pHendo) were measured in 10 adult anaesthetized pigs before and serially after coronary ligation. pHendo and pHint fell progressively and significantly following coronary occlusion. This was accompanied by ischaemic EKG changes. The absolute and relative rates of change were greater for pHendo compared to pHint, particularly after 4 minutes of ischaemia. pH was unchanged in control experiments when the electrode was placed within the right atrial or ventricular chambers, as well as when coronary ligation was not performed. These data suggest that RV myocardial pH measurements reflect coronary ligation induced RV ischaemia. pH recorded from an electrode placed against the RV endomyocardial wall via a central vein was as useful as an interstitial measurement that required a thoracotomy. This newly described technique may be helpful in clinical settings where differentiation between ischaemic and non-ischaemic causes of RV dysfunction is important.

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EFFECTS OF CARDIO-PULMONARY BYPASS ON RESPIRATORY MECHANICS

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Lung injury secondary to cardiopulmonary bypass (CPB) is well recognized. Nevertheless, mechanical respiratory changes after CPB have been poorly investigated. Aim of the study was to evaluate the effects of CPB on respiratory mechanics. Elastance of the lung (Est_L), chest wall (Est_{CW}), and total respiratory system (Est_{rs}) were measured in 8 patients without previous pulmonary disease undergoing elective cardiac surgery. There were 6 males and 2 females; no pleurotomy was done. CPB was carried out with membrane oxygenator. Mean CPB and cross clamping times were 69±27 and 39±27 min. Flow (pneumothacograph), airway opening and esophageal pressures (pressure transducers and esophageal balloon) were measured on patients sedated and paralysed. Measurements were obtained before sternotomy, at the end of CPB after chest closure, four and seven hours later. Est_{rs}, Est_L and Est_{CW}, were measured by occluding the airways and the end of a tidal breath.

	before sternotomy	end CPB-closed chest	4 h after CPB	7 h after CPB
Est_{rs} (cmH_2O/L)	17.7±4.9	19.9±5.6*	22.5±5.8*	22.6±4.3*
Est_{CW} "	6.7±4.1	6.3±4.4	6.61±4.09	6.5±4.1
Est_L "	10.9±4.3	13.5±5.4*	15.9±4.9*	16.1±5.1*

$\bar{x}$ ± *SD.* * $p < 0.05$: *ANOVA vs "before sternotomy".*

Our data show that CPB induces increase in Est_L, whereas Est_{CW} remains unchanged despite sternotomy. Impairment in Est_L after CPB evolves within the first 4 hours and stabilizes 7 hours later.

Dilated Cardiomyopathy Associated With Left Ventricular Faillure Secondary to Human Imuno Deficiency Virus Infection: A Clinical and Echocardiographic / Follow-up Prospective Study.

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During the clinical course of Human Imunodeficiency Virus infection (HIV), patients (pts) can develop congestive and dilated cardiomyopathy syndrome (DCM). The aim of our study was to analyze the prevalence of DCM among an HIV population, its clinical and echocardiographic changes under a long term follow-up and therapy with an ACE-inhibitor agent (Captopril). We prospectively studied 220 pts, 23% (50/220) developed DCM during the follow-up study. Among this group 26% (13/50 pts) were in class I and II and 64% (37/50 pts) in class III and IV of the NYHA classification. We divided this population in a ACEI+ (22 pts) and ACEI- (28 pts), according to the administration of captopril. We analyzed the following parameters: age, gender, race, IVDA, type of HIV, CDC classification, number of T4 and T8 type cell population and its T4/T8 ratio, therapeutic with ACEI, type and number of opportunist infections, Mycobacteriosis and neoplasm's. We analyzed several echocardiographic parameters, which included the initial (I), final (F) and variation (Δ) of the LV internal diastolic (LVDD/mm) and systolic (LVSD/mm) diameters, LV % of fractional shortening (LV%FS/%), IVS and posterior wall thickness and LV mass (LVM/g). The two groups differed significantly in the following parameters:

	T4	ΔLVDS	ΔLVDD	ΔLVM	Time HIV
ACEI+	141±154	-2.2±.8	-1.3±.4	23±115	24±14
ACEI-	241±226	-0.6±.5	0.2±.5	57±121	29±22
p Val	.002	.01	<.01	<.01	ns

Dilated cardiomyopathy occur in early stages of HIV diseasea. Clinical evolution of HIV cardiomyopathy seems to be more favorable under ACE Inhibitor therapy and the presence of dilated cardiomyopathy is not related with any type of infection.

Three-Dimensional Reconstruction of the Left Ventricular Cavity Using a Transesophageal Echocardiographic Approach in Patients With the Diagnosis of Ischemic Dilated Cardiomyopathy. Methodology, Applicability, Calculation of Global and Regional Function Indices.

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Left ventricular functional indices of patients (pts) with Iscjhemic Dilated Cardiomyopathy (IDCM) have a critical value in terms of clinical prognosis of this disease. Three-Dimensional Echocardiography (3-DE) is a recently developed method that gives a better evaluation of LV morphology and function. The purpose of our prospective study was to assess the clinical applicability of this new 3-DE method in a population with ischemic DCM diagnosis and calculate its LV indices of global and regional function. We studied a group of 16 IDCM pts, mean age 58±11 yrs, 70% male gender, using a combined 3-DE TEE approach. All pts were in class III/IV of the NYHA classification. First, EKG gated images were acquired through a mechanical pullback of the TEE probe, and each set of data was transferred to a conventional IBM-PC system using a dedicated 3-DE software. Computer processing and analysis of the TEE images led to a 3-De reconstruction matrix and off-line calculation of several LV global and regional indices. In all IDCM pts the LV cavity was clearly reconstructed and end-systole and diastole in several orthogonal projections, cut in multiple planes and its function quantitated using 3-DE derived indices. Mean values of 3-DE LVESV=149±20 ml, LVEDV=197±32 ml, LVStV=48±25 ml and LVEF=24±5% were obtained. For all these 3-DE parameters, good correlations were observed with 2-DE LV measurements obtained through biplane TEE analysis of the LV cavity ($r>.70$; $p<.01$) as well as regional analysis of sequential 3-DE cut planes. Conclusion: In our group of patients with the diagnosis of ischemic dilated cardiomyopathy, this new 3-DE method could be applied. Our results show that this method allows a better assessment of the LV morphology and spatial geometry, with the calculation of global and regional indices with critical clinical and prognostic value in this particular cardiovascular pathology.

EFFECTS OF FLUID LOADING IN ACUTE CIRCULATORY FAILURE DUE TO MASSIVE PULMONARY EMBOLISM (MPE)

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Objectives : To assess the hemodynamic effects of fluid loading (FL) in acute circulatory failure (ACF) due to acute massive pulmonary embolism.
Methods : Hemodynamic measurements (fast-response thermistor pulmonary artery catheter) were performed at baseline (Baseline) and after a rapid fluid loading with 250 (FL250) and 500 (FL 500) ml of Dextran 40 (Rhemacrodex®) in 12 patients free of previous cardiopulmonary disease (66 ± 3 yrs) with ACF (CI < 2.5 l/min/m2) due to angiographically proven MPE (Miller score ≥ 21).
Results : are expressed as mean ± SEM and compared by ANOVA.

	Baseline*	FL250	FL500
RAP (mmHg)	9 ± 1	13 ± 1#	17 ± 2#$
PAP (mmHg)	30 ± 2	33 ± 2#	35 ± 2#$
MAP (mmHg)	99 ± 4	100 ± 4	101 ± 4
HR (bpm)	92 ± 5	93 ± 5	92 ± 5
CI ($l/min/m^2$)	1.6 ± 0.1	1.7 ± 0.1	2.1 ± 0.1#$
SVI (ml/m^2)	19 ± 2	19 ± 2	23 ± 2#$
TPR ($mmHg/l/min/m^2$)	20 ± 2	21 ± 3	18 ± 2
RVEDVI (ml/m^2) (n = 7)	116 ± 14	128 ± 13#	148 ± 12#$
RVEF (%) (n = 7)	15 ± 3	15 ± 3	17 ± 3
Hb (g/dl)	13.6 ± 0.3	12.2 ± 0.3#	11.4 ± 0.3#$
SpO_2 (%)	96 ± 1	97 ± 1	97 ± 1
SvO_2 (%)	60 ± 2	60 ± 2	58 ± 3
DO_2 ($ml/min/m^2$)	272 ± 26	257 ± 25	304 ± 24
VO_2 ($ml/min/m^2$)	100 ± 8	95 ± 6	116 ± 5
EO_2 (%)	38 ± 2	38 ± 2	40 ± 3

*** mean of baseline 1 and baseline 2** **# different from baseline ($p < 0.05$)**
$ different from FL 250 ($p < 0.05$)

A significant negative correlation ($r = 0.83$) was observed between baseline RVEDVI and the effects of FL on CI. Such correlation was not observed between baseline RAP and the FL induced increased in CI.
Conclusion : FL significantly increases CI in ACF due to MPE. However, the simultaneous decrease of arterial O_2 content due to hemodilution, limits the benefits expected from improved CI on peripheral oxygenation.

Transesophageal Echocardiographic Analysis of Pulsed Doppler Pulmonary Venous vs Transmitral Flow and Its Relation With Left Ventricular Volume Changes Assessed by Dynamic Three-Dimensional Echocardiography in Patients With Dilated Cardiomyopathy.

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Simultaneous left atrial (LA) and left ventricle (LV) inflow analysis assessed by pulsed Doppler TEE illustrate the loading conditions and reflect the hemodynamics of the left heart. We performed a prospective TEE pulsed Doppler study with recordings of the transmitral LV filling and pulmonary venous (PV) flow drainage in a group of patients with Dilated Cardiomyopathy (DCM). A group of 23 DCM patients, mean age 57±11 yrs, 74% male were studied. This population was divided according to TEE severe LV dysfunction (Group SLVD+ 62% pts; Group SLVD- 38% pts) In each pt we measured the peak velocities (Vel/m/sec) and time velocity integrals (VTI/m) of the transmitral early (E) and late (A) filing waves, the Vel and VTI of the PV systolic (S), diastolic (D) and atrial contraction (C) reversal flows. 3-DE TEE evaluation of the LVED, LVES, LVSt Volumes and LVEF were obtained. We calculated other parameters, such as E/A, S/D and A/C ratios and the sum of C+A Vel, that refelect LA systolic function and LV compliance.

	SLVD+	SLVD-	p Value
VelE/A	1.24±0.11	0.73±0.11	0.01
VelS/D	2.1±0.15	1.31±0.15	0.001
VelA(m/sec)	0.83±0.10	0.70±0.09	0.01
VelC(m/sec)	0.48±0.10	0.30±0.11	0.01
LVEDV(ml)	213±114	177±89	0.01
LVESV(ml)	172±73	123±66	0.01
LVStV (ml)	41±22	54±31	0.03
LVEF(%)	19±5	30±8	0.02

Simultaneous and quantitative analytical approach of the pulmonary venous and transmitral flows and ventricular volumes improve the non invasive assessment and understanding of left ventricular diastolic function and cardiac performance in dilated cardiomyopathy patients.

RIGHT VENTRICULAR FUNCTION IN ARF PATIENTS: PEEP AS A STRESS TEST FOR THE RIGHT HEART

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Objective: To examine the hemodynamic effects of external positive end-expiratory pressure (PEEP) on right ventricular (RV) function in acute respiratory failure (ARF) patients.
Methods: Incremental levels of PEEP (0-5-10-15 cmH2O) were applied and RV hemodynamics were studied by a Swan-Ganz catheter with a fast response thermistor for right ventricular ejection fraction (RVEF) measurement in 20 mechanically ventilated ARF patients (LIS = 2.6 ± 0.45 SD). According to the response to PEEP 15, two groups of patients were defined: group A (9 pts.) with unchanged or increased RV end diastolic volume index (RVEDVI) and group B (11 pts) with decreased RVEDVI.
Results: In the whole sample cardiac index (CI) and stroke index (SI) decreased at all levels of PEEP, while RVEDVI, RV end systolic volume index (RVESVI) and RVEF remained unchanged. At ZEEP the hemodynamic parameters of the two groups did not differ. In group A, CI decreased at PEEP5, RVEF decreased at PEEP10 (-10.8%), RVESVI increased only at PEEP15 (+21.5%) and RVEDVI remained unchanged. In group B, CI and RVEDVI started to decrease at PEEP5, RVESVI decreased only at PEEP15 (-21.4%), anf RVEF was unchanged. Individual behaviors of the hemodynamic parameters at the 4 levels of PEEP were studied. RVEDVI and CI were significantly correlated in 10 out of 11 patients in group B, and in no patient of group A. On the contrary, mPAP and RVESVI were significantly correlated in 5 out of 9 patients in group A, and in no patient of group B. The slope of the relationship between RVEDVI and RV stroke work index (RVSWI) expresses RV myocardial performance. This relationship was significant (no change in RV contractitity) in 8 patients of group B and in 2 patients of group A. In some patients of group A, increments of PEEP shifted the RVSWI/RVEDVI ratio rightward in the plot (RV function decrease).
Conclusions: In ARF patients PEEP causes more often a preload decrease with unchanged RV conctractility. On the contrary, the finding of increased RV volumes during the application of PEEP is related to a decrease in RV myocardial performance. Thus, these data suggest that application of PEEP might be considered as a stress test to assess RV function.

RIGHT VENTRICULAR FAILURE AND PERICARDIAL IN HEART TRANSPLANT. EXPERIMENTAL MODEL OF THE PULMONARY HIPERTENSION.

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INTRODUCTION: After heart transplant (HT), the right ventricle can be subject to an acute pressure overload, especially in cases where there is a pre-existing severe pulmonary hypertension. This provokes right ventricular failure and, occasionally, circulatory collapse in Intensive Care Unit.

Desite the advances that have been made in systems for preserving the donor heart and in post-surgical management, we have failed in our attempts to totally avoid this problem. The right ventricular function, although it usually remains within tolerable limits in these patients during the post-surgery period, represents a factor which limits the results achievable in clinical transplant programmes.

OBJECTIVES: To determine the Maximum Tolerance of the Right Ventricle (MxTRV) when faced with acute pressure overload. To study the function of both ventricles of the healthy heart (donor) when faced with different degrees of pulmonary hypertension. To detect possible interactions between the ventricles in the absence of the pericardium to approximate the experimental model to the clinical model of HT.

MATERIALS AND METHODS: The pulmonary artery is progressively constrained in an experimental model until biventricular failure is detected. This experiment is performed in two diffferent situations: with and without pericardial integrity.

RESULTS: When pericardial integrity is maintained the MxTRV faced with a pressure overload is 73.2 $\pm$ 8.56 mm Hg. When this pressure is exceeded there is a circulatory collapse with a sharp fall in the Cardiac Output and in the Aortic Pressure. However, when pericardectomy is performed (model similar to HT), only 52 $\pm$ 6.71 mm Hg is tolerated ($p < 0.01$).

CONCLUSIONS: With the pericardium open, as in Heart Transplant, the maximum pressure that the right ventricle can support is significantly less than with the pericardium closed. The pericardium has a positive effect in protecting the systolic ventricular interaction. It is, therefore, advisable to close the pericardium after Heart Transplant.

REVASCULARIZATION OF THE ISCHEMIC MYOCARDIUM BY CARDIOMYOPLASTY. ITS STUDY USING THE CASTING METHOD.

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INTRODUCTION: Nowadays cardiomyoplasty is used in cases of cardiac insufficiency as an alternative to cardiac transplant. After surgery the patients show a noteable improvement with the aid of this "biological circulatory assistance".

Some researchers suspect that the improvement could also be due to the formation of new blood vessels from the muscle that wraps the heart, nourishing the ischemic myocardium.

OBJECTIVES: Our Cardiovascular Research Group has proposed as an objective, the detection of any possible myocardial neovascularization through the muscle used for cardiomyoplasty. In the case that there are new blood vessels to the diseased myocardium through the wide dorsal muscle in which it is wrapped and which aids it mechanically, it would be possible to confirm the working hypothesis that cardiomyoplasty not only improves the cardiocirculatory function mechanically but also by facilitating a better blood flow to the ischemic myocardium.

MATERIALS AND METHODS: the cardiomyoplasty technique is described using an experimental model of myocardial ischemia. The vascular cast is achieved by injecting methacrylate simulataneously into both the coronary tree and the wide dorsal muscle. In five experiments the connections between the coronary vascular system and the vascular structure of the wide dorsal muscle are demonstrated.

CONCLUSIONS: We have demonstrated that Cardiomyoplasty, as well as improving ventricular function, favours the revascularization of the myocardium.

Cardiomyoplasty could be indicated for cases of ischemic cardiopathy in patients in whom it is not possible to perform direct revacularization using conventional methods.

ISCHEMIC SYNDROME AND REPERFUSION IN POSTOPERATIVE OF THE CARDIAC SURGERY. A EXPERIMENTAL AND CLINICAL STUDY OF FREE OXYGEN RADICALS.

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The therapeutic cardiological manouevres necessary in cases of ischemia reperfusion have increased considerably: fibrinolysis, transluminal angioplasty, coronary revascularization surgery and cardiac transplant.
The appearance of a specific pathology in acute reperfusion has been related to Free Oxygen Radicals (FOR) generated by oxidative damage.

OBJECTIVES: To evaluate the appearance of FOR during a controlled process of ischemia-reperfusion in an experimental biological model and compare it with that in clinical cases.

MATERIALS AND METHODS: Transitory cardiac ischemia was performed in five rabbits by reversible surgical ligation of the Descending Anterior Coronary Artery. After 15 minutes coronary reperfusion was performed. Blood samples were taken in the basal situation, at the end of ischemia and at 5, 10 and 15 minutes after the start of reperfusion. Malondialdehyde (MDA) was measured to evaluate the degree of lipid peroxidation (oxidative damage to the membrane). In ten patients undergoing conventional cardiac surgery the production of FOR was measured after aortic clamping.

RESULTS: We observed that after 5 minutes of reperfusion there was a highly significant increase ($p < 0.001$) in the MDA values (mean =2.00 μmols/L). These returned to basal levels after 10 and 15 minutes of reperfusion.

CONCLUSIONS: An "explosion" of oxygen free radicals was detected very quickly, just a few minutes after post-ischemia reperfusion. Thus, if antioxidant agents are to be used to reduce the toxic effects of the FOR, these will only have a therapeutic effect if they are administered in the early phases of reperfusion.

EXTERNAL AORTIC COUNTERPULSATION BY AORTOMYOPLASTY: A BIOLOGICAL VENTRICULAR ASSISTANCE.

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INTRODUCTION: Aortic counterpulsation is a ventricular assistance widely used in Intensive Care Units in patients with cardiogenic shock as a provisional ventricular assistance.
Paraaortic or external aortic counterpulsation is been investigated as a definitive ventricular assistance in those cases of terminal congestive heart failure and when heart transplantation is counterindicated.

AIMS: To assess the haemodynamic effects of an aortomyoplasty in a biological model of congestive heart failure.

MATERIAL AND METHOD: As specimens, we used 10 "Large White" pigs. Mean weight was 22 Kg. After the administration of conventional anaesthesia, dissection of the latissimus dorsi muscle was performed on the samples at the Laboratory of Experimental Surgery of our Hospital. Then we performed a thoracotomy at the level of the fourth intercostal space to reach the thoracic aorta. The aorta is dissecated 7 centimetres from the exit of the subclavia and it is wrapped by the dissecated muscle. A cardiomyostimulator is provided in order to allow the synchronization between the diastole and the muscle contraction. The model of heart failure was provoked using Verapamil plus Propanolol i.v..

RESULTS: A significant increase of the aortic diastolic pressures and a significant decrease of the left ventricle telediastolic pressures were observed. This improvement in the parameters (DPTI/TTI) implies an increase of the coronary perfusion in a model of heart failure.

CONCLUSIONS: Using the external aortic counterpulsation, the aortomyoplasty improves the coronary perfusion and the heart efficiency in patients with heart failure in whom no conventional therapeutic action is possible . The permanent character of the paraaortic counterpulsation is it main advantage.

EFFICIENCY OF THE ANTIOXIDANT TREATMENT IN THE DECREASE OF OXYGEN DERIVED FREE RADICALS DURING HEART SURGERY.

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INTRODUCTION: The appearance of specific pathologies as a result of myocardial reperfusion has been related to the oxidative damage secondary to the release of oxygen derived free radicals (OFR). During the myocardial ischemia induced during heart surgery with extracorporeal circulation, several subproducts of the oxygen are produced that shall cause toxic effects after the reperfusion which could be counteracted by the physiological antioxidant systems and/or provided by the medication.

AIMS: To asses the OFR during heart surgery. To check whether an antioxidant treatment administered in the preoperative period make decrease the levels of OFR before and after the myocardial reperfusion and to verify whether its administration have any beneficial effect on the intra and extraoperative management.

MATERIAL AND METHOD: The study comprehends 20 patients studied as two groups of 10 individuals each (A and B). All patients underwent conventional heart surgery of valvular substitution or myocardial revascularization.
Group A patients were administered 400 mg/8 hours of vitamin E (Tocopherol acetate) 72 hours prior to the intervention as antioxidant treatment. Group B patient were not administered vitamin E.
We assessed the quantity of malondialdehido (MDA) to assess the degree of lipidic peroxidation or oxidative damage of the membrane during the myocardial ischemia and 15 mn after the reperfusion.

RESULTS: Group A levels of MDA were 1.275 $\pm$ -0.46 during ischemia and 1.742 $\pm$ 0.47 after reperfusion. Group B levels of MDA were 2.206 $\pm$ 0.367 during ischemia and 2.874 $\pm$ 0.56 after reperfusion ($p < 0.001$).

CONCLUSION: Patients who underwent heart surgery and were treated with tocopherol acetate in the preoperative period presented levels of RLO significantly lower than those who were not administered the drug, both during the intraoperative period and after myocardial reperfusion. We detected in these patients a need for antiarrhythmicals and pharmacological support with catecholamines, although not significant, both in the introaperative period and the immediate postoperative period.

Combination thrombolysis with urokinase and rt-PA for the treatment of recurrent pulmonary embolism in the presence of a right atrial thrombus - a case report.

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Recommendations for the treatment of pulmonary embolism (PE) in the presence of right atrial thrombus (AT) are conflicting. Because of a significantly higher mortality rate due to fulminant or recurrent PE, there is a necessity to treat patients (pts) with mobile type A thrombi compared to pts with adherent Type B thrombi. Therapeutic strategies include anticoagulation, thrombolysis (T) or surgical thrombembolectomy. Combination thrombolysis (COT), predominantly used for the treatment of acute myocardial infarction proved to prevent reocclusion of the infarct related artery at a comparable rate of hemorrhagia. Benefit has been related to the alteration of hemostatic proteins by non-fibrinspecific thrombolytics.
Administration of COT in PE has been performed sporadically.
In the present case, a 55-year old male with no history of prior cardiovascular disease developed acute dyspnea which was related to PE in the presence of deep vein thrombosis of the left femoral vein. Therapeutic anticoagulation was installed for a couple of days until there were several bouts of deterioration. Biplane transesophageal echocardiography (TEE) was performed and revealed a large, wormlike, hypermobile thrombus within the right atrium. Computer tomography (CT) of the chest detected a saddle embolus in the bifurcation of the pulmonary trunk almost occluding the entire left pulmonary artery (PA) and parts of the right PA. T consisted of 100 mg front-loaded rt-PA and the subsequent continuous administration of urokinase in a dosis of 200.000 U/hr for 24 hrs followed by therapeutic anticoagulation. Symptoms, blood gases and ECG improved steadily during infusion, no adverse effects, i.e. minor or major hemorragia were registered. Follow-up CT promptly after termination of T showed almost complete resolution of the saddle embolus, whereas TEE showed complete dissolution of the AT. Finally, the patient was switched to oral anticoagulants and had an uneventful clinical course until he was discharged.
Conclusion: In the present case, COT was effective for the treatment of a complicated PE without any adverse effect.

CARDIOMYOPLASTY :BIOLOGICAL VENTRICULAR ASSISTANCE IN TREATMENT OF MYOCARDIAL DYSFUNCTION.

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INTRODUCTION: Nowadays we can assist hearts with problems of insufficiency by techniques other than transplant. Many researchers believe that the best way of assisting insufficient heart muscle is with another muscle from the patient. This technique of ventricular assistance is known as **CARDIOMYOPLASTY.**

MATERIALS AND METHODS: We describe the surgical technique of cardiomyoplasty using a biological model. The transformed skeletal muscle is transferred to the thoracic cavity where it wraps the heart and assists it.

The choice and preparation of this muscle is currently under investigation.

Our group has focussed on the development of protocols for electrical stimulation to transform a skeletal muscle into a muscle which resists fatigue and which is functionally similar to the myocardium. We detect the optimum time at which this muscle has been transformed, by studying the transmembrane action potentials using intracellular electrodes. When the action potential of the trained muscle behaves like cardiac muscle we consider it ready for cardiomyoplasty.

CONCLUSIONS: Cardiomyoplasty is an alternative surgical technique to cardiac transplant, which has a great future in the treatment of patients with advanced cardiac insufficiency. We describe methodology which, by intracellular techniques, allows selection of the optimum moment of transformation of a skeletal muscle trained to perform,like cardiac muscle, without suffering fatigue.

INTRAPERICARDIAL FIBRINOLYSIS : A POSSIBLE TREATMENT OF PURULENT PERICARDITIS

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Purulent pericarditis is a rare disease. Its treatment associate systemic antibiotics and drainage of the pericardium. We report a case of purulent constrictive pericarditis in which intrapericardial fibrinolysis was use.

A 38 years old patient admitted in our ICU for a constrictive pericarditis as a complication of a purulent pericarditis diagnosed seventeen days before.

He had also an achalasia and the oesogastric endoscopy had found an oesophageal neoplasm. A fistula was not seen, indeed pericardial of flora was the same that oropharyngeal. Hemodynamic and echographic study had confirmed a constrictive pericarditis. Because of the poor state of the patient an intrapericardial fibrinolysis was prescribed (250.000 UI of streptokinase on days 23, 25, 27, 29).

Fluid drainage was improved and cardiac output was also improved (day 23 : 2.53 $l.min^{-1}$, day 27 : 3.58 $l.min^{-1}$). No change of hemostasis was noted.

A pericardectomy and an oesophagectomy were performed after 37 days of evolution. Eighteen months latter the patient was still alive.

Intrapericardial fibrinolysis seems an interesting therapeutic way if rapidly prescribed in the purulent pericarditis course.

PRELOAD ASSESSMENT BY THE RESPONSE OF THE SYSTOLIC PRESSURE TO GRADED INCREASE IN TIDAL VOLUME - THE RESPIRATORY SYSTOLIC VARIATION TEST

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The decrease in the systolic pressure following a mechanical breath, termed dDown (delta down), has been shown to be a sensitive indicator of preload(1,2). However, the clinical use of this method necessitates the introduction of a short apnea. We have therefore developed a Respiratory Systolic Variation Test (RSVT) which obviates the need for apnea. The test is based on the delivery of 4 successive breaths of increasing magnitude (5, 10, 15, and 20 ml/kg). A line of best fit is drawn between the 4 minimal systolic values (one after each breath) and the downslope calculated as the decrease in blood pressure for each increase in airway pressure (mmHg / cmH2O).

In 14 mechanically ventilated patients the RSVT was performed during controlled mechanical ventilation under sedation. The test was repeated after the administration of 7 ml/kg of plasma expander.

The initial mean downslope of the RSVT was -.40 ± .40 mmHg/cmH2O. Following volume loading the downslope decreased to -.23 ± .44 (ns). At the same time, cardiac output (CO) increased by .96 ± 1.2 L/min ($p<.02$), end-diastolic area (determined by TEE) increased from 18.5 ± 6.9 to 20.3 ± 7.1 cm2 (ns), and PAOP increased from 12 ± 8 to 17 ± 9 mmHg ($p < .001$). The preinfusion downslope value of the RSVT correlated significantly with the increase in the CO ($r = .81$) and the EDa ($r = .70$). The correlation coefficients (r) of the preinfusion values of the EDa and PAOP to the response of the CO to volume loading were .3367 and .6788 respectively.

The RSVT causes a steep downslope during hypovolemia due to the decrease in the venous return . During hyper-volemia and/or heart failure, the relative independence of LV output from the decreasing venous return causes a very flat downslope in response to the RSVT. The data derived from the RSVT are unique in that they reflect the fluid responsiveness of the LV.

References:

1. Perel A et al, Anesthesiology 1987;67:498.
2. Coriat P et al, Anesth Analg 1994;78:46.

An expert system for all aspects of P.A. catheterisation

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Objectives: The production of a computerised Expert System for (a) training of junior staff in the insertion and usage of a Pulmonary Artery Catheter (PAC) and (b) guiding all clinicians through a Protocol for treating patients with abnormal parameter values as determined by the PAC.

Methods: An Expert System has been constructed running on a multimedia computer with the two objectives in mind, viz training of inexperienced staff, and protocol guidance with treatment regimes for all staff. The System is based on experience gained from two previous systems, the one for dealing with acid-base and electrolyte problems in ICU patients; the second for stabilisation of patients with Heart Rate and Blood Pressure abnormalities.

The Training Section takes the form of a stage-by-stage account of the insertion of the PAC and displays of correct waveforms, coupled with indications of possible incorrect placements, and guidance when failing to achieve the perfect positioning.

The Treatment Protocol Section extends an existing protocol for correcting abnormalities in Heart-Rate and Blood-Pressure, and now takes account of all the indices as measured by the PAC. The system will suggest treatment to correct such things as abnormal Wedge Pressures concomitant with parameter values throughout the rest of the cardiovascular system. The type of patient eg post-operative cardiothoracic or I.C.U. trauma, will be taken into account when recognising abnormal parameter values and when prescribing treatment.

Results: A working system which will be improved by the finetuning being carried out. The results and lessons learnt will be presented at the Conference.

Conclusions: A sensible use of a computer as a Decision Support System to aid the doctor.

A METHOD FOR MEASUREMENT OF MEAN SYSTEMIC FILLING PRESSURE IN PATIENTS

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Mean systemic filling pressure (Psf) is defined as the equilibrium pressure in the systemic circulation when blood flow is zero. Psf might be an index of the effective filling of the circulation. Aim of this study was to test a simple method to measure Psf in humans, under conditions of intact circulation and during mechanical ventilation (MV) (1,2). Modeling the systemic circulation as a pipe constant resistance, we've assumed the venous return ($\dot{Q}V$) to be proportional to the difference between arterial pressure (Pa) and central venous pressure (Pcv). To induce changes in $\dot{Q}V$, 5 end inspiratory pauses (IP) were performed after inflation of 5 different tidal volumes (Vt), randomly applied. In 7 critical care patients, sedated, paralized, in MV and hemodynamically stable, we measured the fall in Pa and the increase in Pcv caused by IP. According to Guyton's venous return equation: $\dot{Q}v=(Psf-Pcv)/Rsf,d$. Rsf,d is the resistance downstream to the site in the circulation where blood pressure equals Psf. For the systemic flow, $\dot{Q}s=(Pa-Psf)/Rsf,u$ (where Rsf,u is the resistance upstream). During the IP, $\dot{Q}v=\dot{Q}s$. Then $Pa=Psf(1+Rsf,u/Rsf,d)-(Rsf,u/Rsf,d)*Pcv$. If Rsf,u, Rsf,d, and Psf are constant (2), then Pa is linearly related to Pcv and Psf can be computed from the regression line Pa vs Pcv, by equaling Pa to Pcv. Pcv, Pa, and airway pressure traces were simultaneously measured and recordered through an eight channels chart recorder (Gould Inc.Cleveland,Ohio-U.S.A.). The applied Vt ranged from 507±167 ml to 1571±261 ml. Airway plateau pressure was not >40 cmH2O. At each step Pcv and Pa were measured during the IP, when the fall in Pa reached a plateau, i.e. after a mean time of 13.1±7.1 s. **RESULTS:** 1)the average baseline (Pa-Pcv) was 70±5 mmHg, at the maximum TV (Pa-Pcv) was 41±13 mmHg. 2) In each patient we found a linear relation between Pcv and mean Pa (r ranging: from 0.89 to 0.97) 3) Average Psf was 21±8.6 mmHg and was significantly related to mean Pcv (Psf=2.53*CVP+2.85,with the r=0.89). **CONCLUSIONS:** The relationship between Pa and Pcv in patients during inspiratory pause procedures is linear in humans, and it is in animals studies (2). Therefore, we conclude that this method is a reliable technique to estimate mean systemic filling pressure in patients.

(1) Versprille A.,Jansen JRC. Psf as a characteristic pressure for venous return. Plfug Archiv 405:226-33 1985
(2) Den Hartog EA.,Versprille A., Jansen JRC.Aortic vs central venous pressure. Clin Int Care S5:4 F62, 1994

The cardiopulmonary effects of 546C88 in human septic shock

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Objective: To evaluate the cardiopulmonary effects of the nitric oxide synthase inhibitor L-N^G-Methylarginine HCl (546C88) in patients with septic shock.

Method: Septic shock was defined as severe sepsis with either persistent hypotension (mean arterial pressure; MAP < 70 mmHg) or the requirement for a noradrenaline (NA) infusion ≥ 0.1 μg/kg/min with a MAP ≤ 90 mmHg. Cardiovascular support was limited to NA ± dobutamine (DB). 546C88 was given for up to 8 h at a fixed dose-rate of either 1, 2.5, 5, 10 or 20 mg/kg/h iv. During 546C88 infusion, NA was to be reduced and if possible withdrawn, whilst maintaining MAP above 70 mmHg and the cardiac index (CI) as clinically appropriate. Assessments were made at baseline (t = 0); at 1 h from the start of treatment (t = 1); and at the end of treatment (t = 8) with 546C88.

Results: median values (* assessment made at 8 h or when 546C88 discontinued).

5465C88 mg/kg/h	Time h	NA/DB rate μg/kg/min	CVP mmHg	MPAP mmHg	PAOP mmHg	CI L/min/m²	RVSWI g · m/m²	Q_s/Q_t %	PaO_2/FiO_2 kPa
1.0	0	0.78/11	12	24	14	4.34	7.1	32	24
(n = 6)	1	0.78/11	11	24	14	4.55	7.9	26	26
	8*	0.43/11	13	28	17	4.68	7.8	25	26
2.5	0	0.46/0	13	29	14	4.20	6.9	38	16
(n = 6)	1	0.32/0	13	30	16	3.56	7.7	23	28
	8*	0.12/3	13	34	14	3.66	8.4	26	23
5.0	0	0.23/5	13	25	15	4.76	6.2	34	33
(n = 4)	1	0.24/5	11	25	15	3.90	7.2	28	37
	8*	0.12/8	11	25	15	3.90	5.6	24	42
10	0	0.45/5	10	25	13	4.00	7.9	33	35
(n = 5)	1	0.34/10	9	25	12	3.30	8.6	23	30
	8*	0.08/13	9	27	11	3.24	7.9	20	29
20	0	0.34/6	10	26	16	4.22	9.5	42	20
(n = 10)	1	0.24/6	10	25	17	3.17	6.8	31	25
	8*	0.07/8	9	26	18	3.41	8.7	34	26

(MPAP – mean pulmonary artery pressure; CVP – central venous pressure; PAOP – pulmonary artery occlusion pressure; RVSWI – right ventricular stroke work index; Q_s/Q_t – intra-pulmonary shunt; PaO_2 – arterial oxygen tension; FiO_2 – inspired oxygen fraction).

Conclusions: 546C88 does not appear to increase MPAP or worsen pulmonary gas exchange in patients with septic shock, when given by infusion for up to 8 h. 546C88 is a novel vasoactive agent for the treatment of septic shock which will now be evaluated in a randomised, placebo-controlled safety and efficacy study.

EVALUATION OF ^2H_2O AND THE THERMAL INDICATORS FOR INDICATOR DILUTION MEASUREMENT OF CARDIAC OUTPUT

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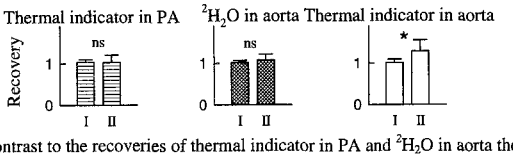
Objectives : To compare cardiac output (Q) data obtained for thermal indicators in pulmonary artery (Q_{TPA}) and aorta (Q_{TAO}) and for the stable isotope ^2H_2O in aorta (Q_{2H2O}) with indocyanine green (ICG) in aorta (Q_{ICG}) as reference.
Methods : An indicator solution of ice cold H_2O (9.4 mL), ^2H_2O (0.6 mL) and ICG (10 mg) was injected as bolus via the injection port of a Swan-Ganz catheter. Q_{ICG} and Q_{2H2O} was measured using a dual optical system (Penn Lab Instruments, Philadephia, PA, USA). Q_{TPA} and Q_{TAO} was measured using a thermal dye system (COLD Z-02, Pulsion Medizintechnik GmbH&Co KG, Munich, Germany). Recovery of an indicator was calculated as Q_{ICG} divided by Q for the indicator. 54 boluses were administrated in a group (I) of 6 anaesthetized pulmonary healthy sheep while Q was altered with high dose halothane (n=18), low dose halothane (n=18) and dobutamine infusion (n=18). Another 18 boluses were administrated in a group (II) of 6 anaesthetized sheep with stable oleic acid induced pulmonary oedema during dobutamine infusion.
Results: For all registered 72 boluses there was no difference between the four indicators in the measurement of Q: Q_{ICG} 4.3±1.7 L/min, Q_{TPA} 4.2±1.7 L/min, Q_{2H2O} 4.3±1.6 L/min and Q_{TAO} 4.2±1.6 L/min. The recoveries (n=54 boluses) for all tested indicators were close to 1.0 independent of Q_{ICG} in the wide range from 1.4 to 7.1 L/min in the group I.



In contrast to the recoveries of thermal indicator in PA and ^2H_2O in aorta the recovery of thermal indicator in aorta was significantly increased in group II (n=18 boluses) over group I (n=18 boluses) (1.3±0.3 vs. 1.0±0.1, p=0.04).
Conclusions: The "overrecovery" of thermal indicator in aorta is in agreement with Böcks deconvolution study (1) and results in erroneous values for Q. The most pausible explanation is the distortion of the thermal curve caused by the slow response time of the thermal detection instrument as shown by Ganz (2).
1. Böck et. al. J Appl Physiol 1988; 64: 1210-1216.
2. Ganz et. al. Circulation 1964; 30:86-89.

ESTIMATION OF EXTRAVASCULAR LUNGWATER USING THE THERMAL DYE METHOD

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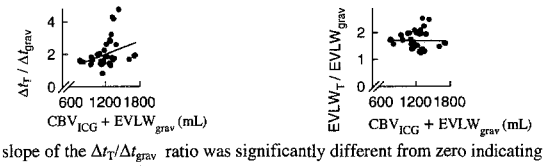
Objectives: To assess the thermo dye method using indocyanine green (ICG) and thermal indicator for the estimation of lung water ($EVLW_T$).
Methods: Ice cold indicator solution of ICG (10 mg) in water (10 mL) was injected as bolus via a central venous line. Dilution curves for ICG and thermal indicator were registered in aorta with a thermal dye system (COLD Z-02, Pulsion Med. technik GmbH&Co KG, Munich, Germany). Cardiac output and mean transit times were measured (t_{ICG}, Q_{TAO}, t_{TAO}). Q for ICG in aorta (Q_{ICG}) was measured with a separate spectrometer.
Data analysis: $EVLW_{grav}$ was reference for $EVLW_T$ calculated as Q_{TAO} times the difference in mean transit time between t_{TAO} and t_{ICG} (Δt_T). As reference for Δt_T $EVLW_{grav}$ was divided by Q_{ICG} to obtain Δt_{grav}. A reference distribution volume for thermal indicator was calculated as the sum of central blood volume and $EVLW_{grav}$. 54 boluses were administrated in a group (I) of 6 anaesthetized pulmonary healthy sheep while Q was altered. Another 18 boluses were administrated in a group (II) of 6 anaesthetized sheep with stable oleic acid induced pulmonary oedema. $EVLW_{grav}$ measurement was performed postmortem.
Results: For 72 boluses thermal parameters were significantly different from their respective reference parameter: Δt_T 9.6±7.6 s vs. Δt_{grav} 5.4±3.2 s ($p<0.001$), $EVLW_T$ 556±319 mL vs. $EVLW_{grav}$ 338±169 mL ($p<0.001$). In group I the ratio between thermal parameters and respective reference parameters (n=54) were independent of Q_{ICG} from 1.4 to 7.1 L/min.



The slope of the $\Delta t_T/\Delta t_{grav}$ ratio was significantly different from zero indicating a non-linear relationship between Δt_T the thermal distribution volume.
Conclusions: The most plausible explanation for the non-linear measurement Δt_T is the distortion of the thermal curve caused by the slow respons time of the thermal detection instrument as shown by Ganz (1). This error causes the discrepancy found in this and other studies between $EVLW_T$ and $EVLW_{grav}$ (2).
1. Ganz Circ. 1964; 3086-89. 2. Wickerts J Physiol, Lond. 1992; 458: 425-438.

ESTIMATION OF EXTRAVASCULAR LUNGWATER USING OPTICAL DETECTION OF ^2H_2O

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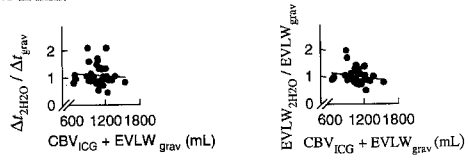
Objectives: To compare data obtained with the double indicator dilution method using indocyanine green (ICG) and the stable isotope ^2H_2O for the estimation of extravascular lung water ($EVLW_{2H2O}$) to gravimetric lungwater data ($EVLW_{grav}$).
Methods: An indicator solution of ICG (10 mg) and ^2H_2O (0.6 mL) was injected as bolus via the injection port of a Swan-Ganz catheter. Dilution curves for ICG and ^2H_2O was registered in aorta with a dual optical system (Penn Lab Instruments, Philadephia, PA, USA). Cardiac output and mean tranist time was measured for both tracers (Q_{ICG}, t_{ICG}, Q_{2H2O}, t_{2H2O}) (1).
Data analysis: $EVLW_{grav}$ was reference for $EVLW_{2H2O}$ calculated as Q_{2H2O} times the difference in mean transit time between t_{2H2O} and t_{ICG} (Δt_{2H2O}). As reference for Δt_{2H2O} $EVLW_{grav}$ was divided by Q_{ICG} to obtain Δt_{grav}. A reference distribution volume for ^2H_2O was calculated as the sum of central blood volume and $EVLW_{grav}$. 54 boluses were administrated in a group (I) of 6 anaesthetized pulmonary healthy sheep while Q was altered. Another 18 boluses were administrated in a group (II) of 6 anaesthetized sheep with stable oleic acid induced pulmonary oedema. $EVLW_{grav}$ measurement was performed postmortem.
Results: For 72 boluses ^2H_2O parameters were not significantly different from their respective reference parameter: Δt_{2H2O} 5.3±3.5 s vs. Δt_{grav} 5.4±3.2 s, $EVLW_{2H2O}$ 332±195 mL vs. $EVLW_{grav}$ 338±169 mL. In group I the ratio between ^2H_2O parameters and respective reference parameters (n=54) were independent of Q_{ICG} from 1.4 to 7.1 L/min.



Distribution volume for ^2H_2O did not influence ^2H_2O parameters.
Conclusions: The accurate measurement of Δt_{2H2O} indpendent of Q and volume influence resulted in $EVLW_{2H2O}$ values close to gravimetric values. These results are in agreement with Chinards original studies (2).
1. Wallin et. al. J Appl Physiol 1994; 76: 1868-75.
2. Chinard et al. Circulation Research 1962; 10: 473-490.

TRANSPLANTED HEART FUNCTION IN THE EARLY POSTOPERATIVE PERIOD

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The aim of the study was to assess left and right ventricular function in the early postoperative period after orthotopic heart transplantation to elaborate therapeutic approaches of heart function abnormalities correction.
Matherial and methods. Haemodynamic monitoring data of twenty one patients (19 men, 2 women) age from 18 to 56 were studied. Cardiac output, pulmonary artery, right atrium and pulmonary wedged pressure were measured with Swan-Gans catheter. Central haemodynamic indices were calculated with the help of computer-based monitoring system. Relations of ventricular stroke work index to it's end-diastolic pressure were used for ventricular function assessment.
Results. In most cases right ventricular disfunction was the main problem. Isolated right ventricular failure with high pulmonary vascular resistance (PVR) was observed in 24% (5pts), without high PVR-in 43% (9pts) and with left ventricular failure-in 33% (7pts). One of the most important reasons for right ventricular failure was the time of heart ischemia more than 90min, which is of great importance in the case of distance harvesting. The most effective treatment for cardiac failure was combination of dobutamine with isoprotherenol, atrial pacing and vasodilatators in case of right ventricular disfunction. All cases with isolated right ventricular failure were treated sucsessfully. Biventricular heart failure was a sighn of bad prognosis and the reason of death in 2 cases.
Conclusion. Right ventricular disfunction is the main problem during transplanted heart adaptation in the early postoperative period. Optimal therapeutic management of cardiac disfunction includes infusion of dobutamine in combination with isoprotherenol, atrial pacing and vasodilatators.

INFARCTUS OF MYOCARDY-INFLUENCE OF LOCALISATION AND RISK-FACTORS ON THE SURVAVE PATIENTS

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The aim of the investigate is analisis five years survives patients with A.I.M.in dependence of locality and risk-factors.

Patients and method:

We analised 391 patients (273 males and 118 women), average 59,8 years. For statistic evaluation we used Life-table sistem in oder to estimate prognostic determinants.

Results:

-Infarctus-diaphragmalis had 112 patiets (28,64%)from which 84 patients (74,79%) survived five years.
-Infarctus of the anteroseptalis location had 110 patients (28,34%), from which 66 patients (59,69%) survived five years.
-Infarctus on the anterior wall had 88 patients (22,5%), from which 46 (52,05%) survived 5 years.
-Non Q infarctus was registrated in the 35 patients (8,95%),from which 21 (60,96%) survived five years.
-Mix localisation of infarcts had 45 patients (11,50%), from which only 6 patients (12,39%) survived five years.

Risk-factors of the coronary disease (diabetes, hypertensy, hypertrigliceridy), approximaty had similary influence on the survive patients, which was statistic estimated.

- Hypertensy had 103 patients survived 61 patients (59,48%)
- Diabetes had 82 patients survived 44 patients (53,56%)
- Hyperttrigliceridy had 92 patients - survived 58 patients (62,87%)
-Others risk-factors had 114 patients-survived 60 patients (52,78%)

Conclusion:

Localisation of the infarctus myocardy and arrival risk-factors have statistic significant influence on the survives of patients.

9. Mechanical Ventilation

DIAPHRAGM KINETICS DURING PNEUMATIC BELT RESPIRATORY ASSISTANCE, A SONOGRAPHIC STUDY IN DUCHENNE MUSCULAR DYSTROPHY.

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Background and purposes
Patients with respiratory muscle paralysis may benefit from respiratory assistance by abdomino-diaphragmatic pneumatic belt. We used a non invasive technique, M-mode sonography, to assess the effect of this device on diaphragmatic excursion.
Material and methods
We measured the amplitude of right diaphragm motion in seven patients with Duchenne muscular dystrophy in supine position with various thoracic posture (0°, 45°, 75°), without and during pneumatic belt respiratory assistance.
Result
Without respiratory assistance, the thoracic posture had no significant consequence on the amplitude of diaphragm motion, either in quiet or deep breathing. The pneumatic belt increased the diaphragm motion amplitude from 7.1 ± 3.6 mm to 17.71 ± 5.5 mm (p = 0.009) at 45° tilt angle, and from 8.4 ± 3.8 mm to 19.3 ± 5.8 mm (p = 0.009) at 75° tilt angle. The tidal volume increased from 211 ± 78 to 373 + 99 ml at 45° tilt angle, and from 229 ± 78 to 447 ± 143 ml at 75° tilt angle (p = 0.009).
Two patients could not bear the horizontal position (0° tilt). In the five other patients, the pneumatic belt increased but not significantly the amplitude of diaphragm motion (9.2 ± 4.9 mm to 15.5 ± 7.3 mm).
After an overnight respiratory assistance, PaO2 increased from 66.4 ± 8.7 to 73 ± 10.1 mmHg (p = 0.015), SaO2 increased from 91.1 ± 2.5 % to 91.9 ± 3 % (p = 0.015), and PaCO2 decreased from 52 ± 6.4 to 46.4 ± 4 mmHg (p = 0.015)
Conclusion
According to the ventilatory pattern result, M-mode sonography allows to measure non invasively the improvement of diaphragm kinetics obtained by pneumatic belt respiratory assistance, and may be helpful for its adjustment.

INSPIRATORY EFFORT DURING NON-INVASIVE MECHANICAL VENTILATION WITH FLOW AND PRESSURE TRIGGERS IN COPD PATIENTS.

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Objective: To study the effect of flow triggering (flow sensitivity 1 and 5 L/min) vs pressure triggering (-1cmH20) on inspiratory effort during pressure support ventilation (PSV) and assited/controlled mode (A/C) in 8 stable COPD patients non-invasively ventilated with a full face mask.
Methods: The patients were studied during randomized 15 min. runs using a Bird 8400 ST ventilator at zero PEEP (ZEEP). Trigger values for pressure (-1cmH20) and flow (1 L/min) were the lowest allowed by this ventilator. The transdiaphragmatic pressure time product per breath (PTPdi), dynamic intrinsic PEEP (PEEPi,dyn), maximal airway pressure drop during inspiration (ΔPaw) and ventilatory variables (Ti,Te,TTot,RR,Vt and minute ventilation) were measured.
Results: No major problems due to airleaks or to auto-triggering phenomena were observed in the patients, so that all of them were able to perform all the protocol runs. Minute ventilation and respiratory pattern were not different using the two triggering systems. The PTPdi was significantly higher during both PSV (10.6±6.8 cmH20 x sec) and A/C (10.1±5) with pressure triggering, as respect to PSV (8.9±7.5, p<0.02) and A/C (5.8±4.4, p<0.001) with flow triggering (1 L/m). No differences were observed between 1 and 5 L/min flow triggers. ΔPaw was also significantly larger during pressure triggering; PEEPi,dyn was reduced during flow triggering being 5.5±1.5 cmH20 (PSV flow trigger) vs 8.1±1.5 (PSV pressure trigger) and 4.4±1.3 (A/C flow trigger) vs 6.5±1 (A/C pressure trigger).
Conclusions: In stable COPD patients non-invasively ventilated, flow triggering reduces the respiratory effort during both PSV and A/C mode as compared to pressure triggering. This may be partly due to a decrease in PEEPi,dyn using a flow-by system.

MUTUAL INTERACTION OF LEFT AND RIGHT LUNGS DURING MECHANICAL VENTILATION IN PIGLETS

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Objective. Cardiac output is higher during alternating ventilation (AV) (i.e. differential ventilation of the lungs with a phase shift of half a ventilatory cycle) than during synchronous ventilation (SV) of both lungs[1]. We verified the hypothesis that the higher cardiac output depended on a lower central venous pressure and intrathoracic pressure, due to a lower mean lung volume, which we attributed to part of the expansion of the inflated lung at the expense of the expiring, opposite lung[2]. We studied this interaction between the lungs during one-sided inflation, which we called cross-talk.
Method. In 6 anaesthetized and paralyzed piglets we applied short periods (30 s) of one-sided ventilation (10 breaths per min, bpm), while the other lung was open to the ambient air. The air flow into the non-ventilated lung during expiration of the ventilated lung was integrated to volume. We studied l-to-r and r-to-l cross-talk at ventilatory rates of 10, 15 and 20 bpm. The amount of cross-talk was the volume displacement in the non-ventilated lung.
Results. During 10 bpm the r-to-l crosstalk was 23 ± 4.7 % (mean ± sd) of the tidal volume to the right lung and the l-to-r crosstalk 31 ± 6.3 % of the left tidal volume. Both values increased at 20 bpm to 30 ± 4.1 % ($p < 0.05$) and 39 ± 7.7 % ($p < 0.01$) respectively. The values at 15 bpm were in between.
Conclusion. We concluded that the lower mean lung volume and lower thoracic expansion during AV compared to SV depends on partial expansion of the inflated lung into the non-inflated lung, resulting in a lower mean intrathoracic pressure as the main reason for the higher cardiac output during AV.
1. Versprille A et al. Intensive Care Med. in press.
2. Versprille A et al. Submitted.

MECHANICAL VENTILATION AFTER SURFACTANT ADMINISTRATION FOR RESPIRATORY DISTRESS SYNDROME (RDS).

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Objective: Natural surfactant given for RDS in premature infants leads to a rapid improvement in oxygenation, but lung compliance did not improve in most studies. However, acute effects on lung mechanics during and immediately after surfactant administration have not been studied before.
Methods: A total of 13 administrations of bovine surfactant in recommended doses was given via a small catheter into the distal endotracheal tube either as a bolus (n=8) or as a slow infusion (n=5) in 10 infants with established RDS. Static compliance (C), resistance (R) and time constant (TC=CxR) of the lung were measured every 3 minutes with a lung function cart (Sensormedics 2600) without interrupting ventilation. 3 infants receiving synthetic surfactant were studied as controls.
Results: After surfactant as a bolus or during infusion C first decreased but then increased, whereas R increased immediately with great fluctuations but did not return to baseline. This pattern was more pronounced in infusion than in bolus administration. Change of C and R varied greatly in the individual case, maximum C was > 400 %, maximum R > 700 % of baseline value. Retreatment was followed by an increase in R in all 3 patients, but C increased only in the one who was responder. Patients receiving synthetic surfactant had no change of C or R and were non-responders.
Conclusion: Administration of natural surfactant can lead to dramatic increases in TC so expiratory time must be long enough to avoid inadvertent PEEP. The change of lung mechanics does not occur after synthetic surfactant and there may be a different pattern in responders vs. non-responders.
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PRESSURE SUPPORT IN DIFFERENT VENTILATORY MODES HAS DIFFERENT EFFECTS ON RESPIRATORY MECHANICS

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OBJECTIVE: To find out if pressure support (PS) in different ventilatory modes exert different effects on respiratory mechanics.

METHODS: PS(5, 10, 15 cmH_2O sequentially) was applied in SIMV and CPAP modes in 14 patients on mechanical ventilation. Data of respiratory mechanics obtained by CP-100 monitor (Bicore, USA) were analyzed.

RESULTS: 1. Common effects of PS in both CPAP and SIMV modes

PS (cmH_2O)		0	5	10	15	p value
V_T	CPAP	0.28±0.09	0.29±0.09	0.31±0.10	0.34±0.12	0.002
	SIMV	0.31±0.11	0.32±0.09	0.34±0.16	0.36±0.15	0.001
WOB*	CPAP	1.40±1.02	1.01±0.80	0.80±0.85	0.68±0.76	0.0001
(J/L)	SIMV	0.97±0.77	0.76±0.64	0.57±0.55	0.49±0.49	0.0001
PTP	CPAP	300±216	217±165	179±187	122±114	0.0001
	SIMV	218±181	178±157	130±147	108±129	0.0017

*work of breathing pressure time product, cmH_2O·sec/min

2. Different effect of PS between CPAP and SIMV modes

PS (cmH_2O)		0	5	10	15	p value
RR	CPAP	27.9±6.7	30.0±6.6	26.1±9.1	27.5±5.7	0.505
	SIMV	27.4±5.1	27.8±6.5	27.6±6.2	25.1±5.4	0.0001
$P_{0.1}$	CPAP	6.2±3.5	4.8±2.8	4.8±3.8	3.9±2.5	0.0061
(cmH_2O)	SIMV	4.3±2.1	4.0±1.8	3.5±1.6	3.5±1.9	0.054
T_I/T_{TOT}	CPAP	0.40±0.05	0.39±0.04	0.37±0.04	0.35±0.04	0.0004
	SIMV	0.40±0.08	0.35±0.07	0.38±0.10	0.37±0.10	0.287

3. At a comparable level of V_T and PTP was lower(179±187 vs. 218±181, p=0.042), and T_I/T_{TOT} was shorter(0.37±0.04 vs. 0.40±0.08, p= 0.026) in CPAP+PS mode than in SIMV alone which has been conventionally used for a weaning method.

CONCLUSION: PS decreased RR in SIMV mode but not in CPAP mode, and it improved $P_{0.1}$ and T_I/T_{TOT} in CPAP mode but not in SIMV mode. The efficiency of respiratory muscle work was better in CPAP+PS than in SIMV alone at comparable V_T.

COMBINATION OF CONTINUOUS JET EXTRA-TRACHEAL GAS INSUFFLATION (CJEGI) AND PRESSURE-CONTROLLED VENTILATION FOR REFRACTORY HYPOXEMIA MANAGEMENT IN ACUTE LUNG INJURY

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OBJECTIVES: Acute lung injury (ALI) sometimes induces severe hypoxemia which may be refractory to conventional modes of mechanical ventilation (MV). The *aim* of this study was to observe some cardio-pulmonary effects of an alternative method of ventilatory management of severe ALI.

METHODS: Five patients with severe ALI (MURRAY scores >3) requiring MV were studied. Protocol inclusion was considered when a control-mode of MV (with a F_IO_2=1.0 and a PEEP level <15 cmH_2O) was not able to get either a P_aO_2/F_IO_2 ratio >55 or a S_aO_2 >85%. Patients were sedated, paralyzed, and a ventilator (Servo 900C) was used for pressure-control ventilation (PCV). F_IO_2 was maintained at 1.0 and PEEP removed. Continuous gas flow (250±50 mL/Kg) was humidified and jet-delivered through a tube (7 mm ID, 18 mL capacity, 0.09 mL/cm H_2O compliance) ended in a nozzle (0.8 mm ID) attached to the endotracheal tube connector. A thermodilution flow-directed catheter was inserted in pulmonary artery. Following variables were recorded 15 minutes before and after protocol started: tidal volume (V_T), minute ventilation (V_E), intratracheal pressures (P_{aw}), wedge pulmonary artery pressure (WP), central venous pressure (CVP), mean arterial pressure (MAP), cardiac index (CI), arterial and mixed venous oxyhemoglobin saturation (SaO_2, SvO_2), oxygen delivery (DO_2), oxygen consumption (VO_2), intrapulmonary shunting (Q_s/Q_t), and oxygen extraction ratio (ERO).

RESULTS:

	PCV+PEEP	*CJEGI+PCV*
PEEP (cmH_2O)	11.9±1.7	14.6±1.8
SaO_2 (%)	71±8	96±4*
MAP (mmHg)	78±10	73±9
WP (mmHg)	12±4	15±3
CI ($L/mn/m^2$)	5.01±1.7	4.85±1.6
DO_2 ($mL/mn./m^2$)	493±154	632±171**
VO_2 ($mL/mn./m^2$)	184±33	177±31
ERO (%)	39±15	27±9**
Q_s/Q_t (%)	44±7	25±5**

*p<0.001 **p<0.005

CONCLUSIONS: CJEGI seems to improve pulmonary and tissue oxygenation in some cases of ALI with refractory hypoxemia. CJEGI may be an alternative method of artificial ventilation in hopeless settings but it still requires a thorough evaluation.

COMPARISON OF HIGH FREQUENCY PERCUSSIVE VENTILATION AND CONVENTIONAL VENTILATION AFTER INHALATION INJURY: PRELIMINARY RESULTS

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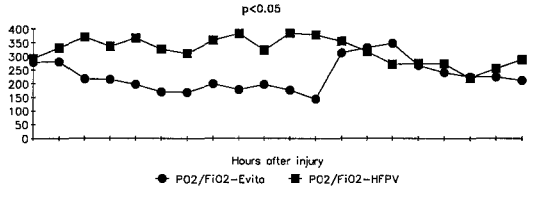
Many patients (pts) require artificial ventilatory support after inhalation injury which is responsible for severe acute respiratory failure.

High Frequency Percussive Ventilation (HFPV) combines conventional ventilatory cycles with high frequency percussions (400 to 900 cycles/min). HFPV is a recent alternative to conventional ventilation (CV).

19 pts requiring artificial ventilation after severe inhalation injury were randomised: group I (9 pts - mean age 51.2 ± 20.7) under CV (Evita, Dräger) and group II (10pts - mean age 35.8 ± 12.1) under HFPV (VDR4, Percussionaire Corp.).

Current ICU parameters were studied every two hours for 5 days: blood oxygenation (PaO2, PaCO2 ...), ventilatory (FiO2, Peak Inspiratory Pressure ...) and hemodynamic data (HR, Mean Arterial Pressure, CVP ...).

A statistical analysis (Wilcoxon test) demonstrated a significant higher PaO2/FiO2 in group II ($p<0.05$) from day 0 to day 3.



No sigificant difference was observed with the other parameters.

This observation suggests that HFPV could allow to ventilate at lower FiO2 and improve blood oxygenation during the acute phase after inhalation injury reducing toxicity risk related to high FiO2.

Further studies are necessary to confirm these results and evaluate the possible implications on mortality after smoke inhalation and for other ICU pts.

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NORMOCAPNIC VENTILATION AT FREQUENCIES 2 - 25 Hz IN RATS USING VOLUME CONTROLLED HIGH FREQUENCY VENTILATOR WITH CONSTANT FLOW INSPIRIUM AND PRESSURE CONTROLLED EXPIRIUM

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Objectives: To design a system for volume controlled high frequency ventilation (HFV) and to estimate the dependence of the tidal volume (V_T) on frequency (f) in normocapnic ventilation in rats at frequencies 2 - 25 Hz.
Methods: A new system for volume controlled HFV was devised consisting of the generator of the constant flow during inspirium and the constant pressure during expirium. The ventilator allows ventilation at frequencies 2 - 25 Hz with the relative inspiratory time (Ti) 0.2 - 0.8. The airway pressure was measured at the proximal port of tracheostomic cannula , at the same site inspiratory and expiratory flow was measured using modified Lilly-type of pressure-differential flow sensor. Non-linearity of flow sensor was compensated on line by derived equation based on calibration at static and dynamic conditions. Flow and pressure data were evaluated on line using original software. Value of the positive end expiratory pressure (PEEP) was servo-regulated by analogous feed-back. In animal experiments white Wistar rats (400-430 g) narcotized with ketamine/xylazine with cannulated carotid and femoral arteries were kept at the rectal temperature 37°C. The arterial pressure was monitored. After tracheotomy the metal cannula (2mm i.d.) was inserted, animals were curarized and ventilated at the following condition: PEEP = 0.1 kPa, Ti = 0.5 . The dead space of ventilator including canula was 0.45 mL. The initial frequency was 2Hz and 10 min after each change of the ventilatory regimen the blood gases analysis was performed. The frequency was changed according to the following schedule : 2 Hz→4 Hz→8 Hz→4 Hz→16 Hz→4 Hz→25 Hz→4 Hz. V_T for each frequency was regulated to maintain normocapnic ventilation with arterial $pCO_2 = 40 \pm 2$ mm Hg. The arterial pO_2 was always above 70 mm Hg.
Results: For normocapnic ventilation in rats the following tidal volumes V_T [mL/kg] were found : $V_{T1} = 5.91 \pm 0.30$ mL/kg for $f_1 = 2$ Hz, $V_{T2} = 4.31 \pm 0.12$ mL/kg for $f_2 = 4$ Hz, $V_{T3} = 3.30 \pm 0.27$ mL/kg for $f_3 = 8$ Hz, $V_{T4} = 2.61 \pm 0.08$ mL/kg for $f_4 = 16$ Hz and $V_{T5} = 2.18 \pm 0.13$ mL/kg for $f_5 = 25$ Hz (presented as mean values ± s.d., n = 6). The regression analysis using the mean values resulted in the equation for normocapnic V_T in rats in our experiments : $V_{TN} = 37.5 * f^{-0.39}$.
Conclusions: The described system allowing ventilation in a wide frequency range 2 - 25 Hz with accurate measurements of airway pressures and V_T might be useful for optimisation of artificial ventilation in new-borns with different lung pathologies.
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A STUDY OF THE EFFECT OF POSITIVE END EXPIRATORY PRESSURE ON RESPIRATORY DEAD SPACE

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Objectives: To study the effect of intrinsic and applied positive end expiratory pressure (PEEP) on respiratory dead space (Vd/Vt) and shunt (Qs/Qt).
Methods: Measurements were conducted on 6 ventilated patients (Puritan Bennett 7200ae with metabolic monitor PB 7250 set to measure end tidal CO_2). All measurements were repeated with the patient stabilised at 5cm, 10cm and 15cm PEEP. Inclusion criteria were: 1) haemodynamic stability for 1 hr; 2) pulmonary artery flotation catheter in situ; 3) volume control ventilation with plateau of 0.5s; 4) $FiO_2 > 0.6$ to maintain $PaO_2 > 10$ kPa with 5cm PEEP; 5) Qs/Qt > 20%; 6) PaO_2/FiO_2 ratio <150. Measured variables included: expired minute volume; plateau airway pressure; applied and intrinsic PEEP; fractional end tidal CO_2; arterial and mixed venous blood gases and haemodynamic variables.
Results: Statistical analysis was performed using repeated measures ANOVA. Significant decreases in cardiac index (CI, $p<0.01$), compliance ($p<0.05$) and oxygen delivery index (DO_2, $p<0.02$) occurred with increasing PEEP (Table 1). No other variable showed any significant change.

	5cm PEEP	10cm PEEP	15cm PEEP
Vd/Vt	0.44 (0.14)	0.45 (0.13)	0.47 (0.12)
CI (l/min/m²)	5.5 (1.6)	5.2 (1.9)	5.0 (1.6)
DO_2(ml/min/m²)	860 (246)	783 (272)	752 (241)
Qs/Qt (%)	35.7 (8.1)	36.7 (5.9)	34.6 (6.0)
compliance (l/cmH_2O)	0.61 (0.2)	0.56 (0.1)	0.5 (0.1)

Table 1: Effect of increasing levels of PEEP on haemodynamic and respiratory variables. Values in brackets represent standard deviation.

Conclusion: These results suggest that high levels of PEEP may be of little or no clinical benefit in some patients with severe ARDS. The observed decrease in compliance presumably reflects over-expansion of alveoli which together with the decrease in cardiac index and the consequent reduction in DO_2 may be detrimental.

Changes of Lung Mechanics Following Tracheostomy in Patients with Prolonged Mechanical Ventilation

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Objectives: To measure the changes of pulmonary mechanics before and after tracheostomy in patients with prolonged mechanical ventilation and to determine factors that predict the outcome of liberation from mechanical ventilation.
Design: Prospective.
Setting: Respiratory intensive care unit (RICU) in a tertiary hospital.
Patients: Twenty patients with chronic lung disease requiring long-term mechanical ventilation. Tracheostomy is indicated for further care.
Intervention: Tracheostomy.
Measurements and Results: Pulmonary mechanics including respiratory rate (RR), tidal volume (V_T), peak inspiratory pressure (PIP), intrinsic positive end expiratory pressure ($PEEP_i$), lung compliance (C_{LD}), mean airway resistance (RAW_M), work of breathing (WOB), pressure time product (PTP) by Bicore CP-100 pulmonary monitor were recorded 24 hours before and after tracheotomy. Ventilator setting parameters remained the same during surgical intervention and were also recorded for comparison. Generally, the mechanics including PIP, WOB, RAW_M and PTP showed improvment after tracheostomy. But only PIP was significantly reduced (pre 33.4 ± 11.8 to post 28.6 ± 9.2, $p < 0.05$). Changes of WOBp showed significant correlation with pre-operation RR, minute volume (MV), WOBp, and PEEPi. Changes of RAW_M were also significantly correlated with pre-operation PEEP, VT, and RAW_M. The patients were divided into two groups according to their outcome after two week follow-up. Group 1 included eight patients who were completely weaned from ventilator; group 2 included twelve patients who still remained ventilator-dependent or were mortality. There was no difference in age, duration of mechanical ventilation, pre, post or changes of several lung mechanics between the groups of patients. Pre-Tracheostomy $PEEP_i$ and C_{LD} showed significant difference between these two groups (1.1 ± 1.6 vs 2.7 ± 1.4 in $PEEP_i$; 47.3 ± 36.9 vs 28.8 ± 16.5 in C_{LD}, $p < 0.05$). Pre-tracheostomy ventilator setting in mode of assist/control also showed significant higher percentage in group 2 (37.5 % in group 1 vs 66.6 % in group 2).
Conclusion: In prolonged mechanical ventilation patients with chronic lung disease, tracheostomy will significantly improve PIP and slightly reduce WOBp, RAW_M and PTP. Patients who used pressure support mode before tracheostomy had better underlying lung conditions (lower lung compliance and auto-PEEP) will have better chance to wean from mechanical ventilation.

IDEAL ENDOTRACHEAL TUBE (ETT) PLACEMENT BY REFERENCING MEASUREMENTS ON THE TUBE

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Objectives : The ideal position of the Endotracheal Tube (ETT) within the trachea is 5 ± 2 cm from the carina with the head and neck in neutral position (Goodman's Criteria). We assessed the possibility in accomplishing ideal placement of oral ETTs in an Asian population by positioning them at the reference marks of 23 cm in men and 21 cm in women.
Design : Prospective cohort study.
Setting : Adult Medical Intensive Care Unit (MICU) of a University affiliated hospital.
Methods : All consecutive patients orally intubated in the MICU between January to April 1995 were studied. ETTs were positioned according to the reference marks mentioned above (measurements from upper incisors). The position of the ETT tip in relation to the carina was measured on the chest radiograph done with the patient's head in neutral position.
Results : A total of 59 men and 46 women were studied (n=105). The mean distance of ETT tip to carina was 4.1 cm. Using the reference markings, 29 cases (27.6%) had the ETT tip < 3 cm from the carina and 5 cases (4.8%) >7 cm. One case resulted in an endobronchial intubation. The mean height of all patients were 167 cm (153-187) for males and 155 cm (140-170) for females. Of the patients with ETT tip <3 cm from carina, the mean height was 163 cm and 151 cm respectively.
Conclusion : Adopting the above quoted reference marks did not result in ideal positioning of the ETT in a significant proportion of cases (32.4%). We postulate that is because our Asian population is generally shorter than those in previous studies.

THE RELATIONSHIP BETWEEN $PaCO_2$ AND VENTILATION PARAMETERS IN PREDICTING SURVIVAL IN CONGENITAL DIAPHRAGMATIC HERNIA

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Forty-eight infants with congenital diaphragmatic hernia presenting within the first 6 hours of life, who underwent surgical rapair,were analysed prospectively in order to produce a reliable index of severity of disease that would reliably predict eventual outcome. There were 25 survivors and 23 deaths in this series (mortality 48%).Using arterialPCO_2 values measured 2 hours after surgical repairand correlating them with an index of mechanical ventilation,we have been able to clearly define two groups of diaphragmatic hernia based on their response to hyperventilation.
The first group, with CO_2 retention and severe preductal shunting,was unresponsive to hyperventilation with high rates and pressures the mortality was 90%. The second group responded well to hyperventilation and demonstrated reversable ductal shunting only.Survival in this group was 97%. Arterial CO_2 accurately reflects the degree of lung development in this disease and separates those patients with severe pulmonary hypoplasia where the outcome is invariably fatal, from those with a well developed contralateral lung where there is excellent potential for survival.

ARTERIAL BLOOD GASES VARIABILITY IN STABLE ICU PATIENTS

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The variability of arterial blood gases (Po_2, Pco_2) and the pH (ABG) was examined in 20 stable ICU patients, few hours before a successful weaning from the ventilator. All patients were lightly sedated and the ventilatory contitions were pressure support (PS) for 9 and PS plus intermitted mantatory ventilation in 11.

In each patient, 6 speciments of ABG were measured at 10 min intervals during a 1-h study period. At the same time with ABG the arterial blood pressure (BP), the heart rate (cf), the tidal volume (TV) and the respiratory rate (rf) were measured.

For all the patients, the mean coefficient of variation (C) was 3.45 percent for Po_2, 3.53 percent for Pco_2 and 2.27 percent for HCO_3. The average SD for pH was 0.008, the corresponding C for systolic BP, diastolic BP, cf, TV, rf were 4.35, 5.21, 3.68, 2.51, 4.18 percent.

We conclude that the spontaneous variability of arterial blood gases in ICU patients is not substantial when they have stable the heamodynamic and the ventilatory parameters.

THE USE OF FLUOROCARBON OXYGENATION IN THE CRITICAL PATIENTS

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Objective: The prevention and treatment of hypoxia in the critical patients.

Methods: Infusions of perphtoran - a blood substitute with gas-transporting function based on perphtorhydrocarbon - in 496 patients with acute hypovolemia, microcirculatory disturbance, tissue gas exchange and metabolism; pulmonary lavage in 104; longterm extrapulmonary oxigenation with fluorocarbon oxygenator in combination with ultrafiltration, hemosorption and hemodialysis - in 73 patients.

Results: Perphtoran increases blood volume, CO,SV, decreases SVR, improves capillary blood flow, increases the blood oxygen capacity, tissue oxygen tension, IO2 del, VO2 by improving the rheologic properties of blood and plasma, normalizes O2 ext., prevents and eliminates fat embolisation and ARDS. decreases the need for blood transfusions and infusions of plasma expanders by 1.3-1.4 times. Alveolar ventilation-perfusion ratio remains unchanged with its increased effective utilization. There was no surfactant destruction during lavage. Extrapulmonary oxygenation of small volumes of venous blood eliminates venous destruction and then arterial hypoxia and increases pulmonary oxygenation. The use of fluorocarbon oxygenators during hemosorption and hemodialysis provides the atraumatic and longterm oxygenation of arterial blood and increases elimination of CO2 which prevents the development of hypoxic complications.

Conclusions: Perphtoran and fluorocarbon oxygenators are effective in the correction of hypoxia in the critical patients.

Oxygen Consumption, Occluded Airway Pressures and Pulmonary Function Tests during weaning in critically ill patients.

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Objectives: To determine if there are differences in oxygen consumption (VO_2) during weaning from mechanical ventilation (during total ventilatory support and spontaneous ventilation with CPAP), and to compare different predictive parameters of weaning in predicting success of weaning.

Methods: Prospective study in 20 critically ill patients treated with mechanical ventilation for at least 48h, who fulfilled at least 3 of 4 standard weaning criteria (Vt>5ml/kg; respiratory frecuency (f) <35; PIMax > 20 cm H_2O; PaO_2/FiO_2 > 150). Baseline measurements: f, Vt, P0.1, PIMax, f/Vt, P0.1*(f/Vt), P0.1/PIMax.

Study protocol: Measurement of VO_2, VCO_2 (MedGraphics), Vt, f, VE, and arterial blood gases during total ventilatory support (CMV), and after 30 and 120 minutes of spontaneous ventilation with CPAP 5 cm H_2O. The weaning trial was stopped, failure to wean diagnosed, and MV resumed if a patient presented significant tachypnea, tachycardia, bradycardia, cardiac rythm disturbances, hypertension, hypotension, hypoxemia or hypercapnia.

Results: Four patients did not complete the weaning trial, 16 were extubated, and 2 of them had to be reintubated before 48h, being considered also weaning failures. During CMV, VO_2/kg was 4.07 ± 0.2 ml/Kg/min, and 5.09 ± 0.4 mlO_2/Kg/min after 30' on CPAP 5 cm H_2O ($p < 0,01$). 14 of 15 patients (93%) with 4 standard criteria were extubated, while only 2 of 5 (40%) with 3 criteria ($p<0,01$). Next table shows the differences between different parameters studied:

	f / Vt	P0.1 x (f/Vt)	P0.1/PIMax	VO_2 / kg CMV	VO_2 / kg CPAP 30'
Success X ± SEM	75.02 ± 8.1	298.4 ± 52.3	7.28 ± 0.92	3.87 ±.019	4.72 ± 0.22
Failure X ± SEM	121.22 ± 46.3	957.8 ± 411.4	14.17 ± 1.86	4.87 ± 0.78	6.6 ± 1.83
p	0.04	0.02	0.02	0.07	0.06

Conclusions: The determination of different weaning indexes is useful to differentiate patients who will be extubated from those who will not. While indirect calorimetry gives an estimation of the increase in oxygen consumption attributable to respiratory muscles, this measurement does not allow us to predict the final outcome of weaning in critically ill patients.

Study supported by grant FIS 92 / 1073.

EFFECT OF POSITION DURING MECHANICAL VENTILATION ON EXTENT AND DISTRIBUTION OF LUNG INJURY IN AN OLEIC ACID MODEL

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Background: We have previously shown that mechanical ventilation at high transpulmonary pressures (TPP) causes dependent lung injury in normal, supine dogs. Prone positioning results in a lesser degree and more homogeneous distribution of injury.

Objectives: Compare the extent and distribution of lung injury in dogs pre-injured with oleic acid (OA) and ventilated with high TPP and adequate PEEP in the prone and supine position.

Methods: Lung injury was induced with OA (0.06-0.09 ml/kg) in anesthetized, paralyzed, and intubated dogs (n=10) during volume controlled ventilation: rate=12/min, PEEP=5 cmH2O, TI/TTOT=0.3, FIO2=0.6, VT=15 ml/kg. Animals were rotated during the OA infusion and the following 90 minute stabilization period to assure uniform injury. In the *supine* position, PEEP was set 1-2 cmH2O above the lower inflection point (as determined by the pressure-volume curve), and VT was set to obtain a TPP of 35 cmH2O. Animals were ventilated in either the prone (n=5) or supine (n=5) position for four hours. Pulmonary artery occlusion pressure was maintained constant (4-6 mmHg) with saline infusion. At the end of the protocol the lungs were removed and divided by template into dependent (D) and nondependent (ND) sections for wet weight/dry weight (WW/DW) and grading of histologic lung injury (HLI; scale 0-3).

Results:

WW/DW	Supine	Prone	HLI	Supine	Prone
Total	9.6±0.6	9.2±0.5	Total	1.13±0.30	0.68±0.17 †
D	9.8±0.8	9.6±0.7	D	1.68±0.74 *	0.47±0.37 †*
ND	9.2±1.1	9.1±0.4	ND	0.59±0.48	0.88±0.55 †

Mean ±SD; † $p < 0.05$ Prone vs Supine; * $p < 0.05$ D vs ND

Conclusions: (1) Following injury with oleic acid, mechanical ventilation with high TPP and adequate PEEP results in similar levels of lung edema, but less histologic evidence of lung injury in the prone than the supine position. (2) Histologic lung injury distributed preferentially to the dorsal regions regardless of position, whereas lung edema tended to distribute more equally between D and ND regions. (Supported by NIH SCOR HL-51052 and Ramsey Foundation).

EFFICACY AND SAFETY OF COMBINED HIGH FREQUENCY OSCILLATION (CHFO) COMPARED TO CONVENTIONAL MECHANICAL VENTILATION.

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Oscillatron ® is a pneumatic device that generates high frequency oscillation by means of a reciprocating system in the form of a membrane. It generates sinusoidal wave form at 200 to 1000 cycles/min. The system does not deliver gas but must be adapted to the proximal respiratory circuit of a conventional ventilator, resulting in CHFO. It was developed to enhance intrapulmonary diffusion during mechanical ventilation and to mobilise endobronchial secretions.

Methods. We measured arterial blood gases and haemodynamics during a first period of conventional ventilation (CPPV) followed by two 30 min periods of CHFO (sequences : 600 and 900 c/min : group 1, n = 11; 900 and 600 c/min : group 2, n = 8). Measurements were made at the end of each period. Cardiac output was measured using thermodilution method; FiO2 and PEEP were kept unchanged throughout the study. Intrinsic PEEP was also evaluated by means of an occlusive valve.

Results. Pa02 is not significantly modified during CHFO at 600 or 900 c/min. PaCO2 is slightly decreased at 600 c/min ($p = 0.06$). However, intrinsic PEEP remains unchanged. There is no sequential effect (Gr. 1 vs Gr. 2). There is no more effect of CHFO for patients who are at a FiO2 higher than 0.50 (n = 9). No changes in haemodynamics are observed except a slight increase in central venous pressure (CVP) during CHFO ($p < 0.01$).

	CPPV	CHFO		CPPV	CHFO	
		600	900		900	600
PaO2	81.7±16.9	83.5±13.3	86.4±22.6	82.4±12.2	87.0±11.2	85.4±9.8
* PaCO2	39.4±5.7	38.3±7.0	39.5±6.7	37.6±2.8	35.8±3.7	35.6±3.5
** CVP	12.3±3.6	12.8±3.4	13.1±3.4	12.3±3.6	13±3	13±3.6

One way ANOVA with repeated measurements * $p = 0.06$; ** $p < 0.01$.

Conclusions : (1) CHFO does not significantly modify gas exchanges. (2) CHFO has no significant adverse effects on haemodynamics. (3) The mechanism by which CVP is slightly increased remains to be investigated.

EFFECTS OF INSPIRATORY MUSCLE UNLOADING ON NEUROMUSCULAR OUTPUT

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Objectives: To examine the effects of inspiratory muscles unloading on neuromuscular output at controlled levels of chemical stimuli.

Methods: The ventilatory response to CO_2 was examined in ten normal subjects using rebreathing method. Ventilation ($\dot{V}_I$) and respiratory muscle pressure output (Pmus) at the same end-tidal partial pressure of CO_2 ($P_{ET}CO_2$) were compared with and without combined flow and volume-proportional pressure assist in two protocols (A and B). Protocol A (n=10): Two levels of assist were studied; flow assist (FA) of 2 $cmH_2O/l/sec$ and volume assist (VA) of 2 cmH_2O/l (Assist 1), and FA of 2 $cmH_2O/l/sec$ and VA of 4 cmH_2O/l (Assist 2). All conditions were applied randomly. $\dot{V}_I$, tidal volume (V_T) and breathing frequency (F) were measured breath by breath and plotted as a function of $P_{ET}CO_2$. Protocol B: In 5 subjects, in addition to above measurements, esophageal (Pes) and gastric (Pg) pressures were measured and the time courses of transdiaphragmatic pressure (Pdi) and Pmus were calculated. One level of assist (Assist 2) was studied in this protocol.

Results: In both protocols inspiratory muscle unloading did not change the F response to CO_2. Compared to control, with assist V_T response was displaced upwards; at $P_{ET}CO_2$ of 55 mmHg V_T was increased significantly by 0.4±0.1 l and 0.7±0.2 l in protocol A with assist 1 and 2, respectively, and by 0.5±0.1 l in protocol B with assist 2 ($P<0.05$). $\dot{V}_I$ responses showed similar changes as V_T responses. In both protocols the slope of $\dot{V}_I$ response ($\dot{V}_I/P_{ET}CO_2$) did not change significantly with unloading. At low $P_{ET}CO_2$ (50 mmHg), Pdi and Pmus waveforms did not differ with and without assist. With unloading, at high $P_{ET}CO_2$ (59 mmHg), Pdi and Pmus at the end of neural inspiration decreased by 18.8±8.3% and 11.7±15.7%, respectively, from control values. Neither change was significant ($P>0.05$). By theoretical analysis we estimated the expected changes in V_T and $\dot{V}_I$ when the levels of assist used in both protocols were applied in the absence of any change in neural output response to CO_2. The predicted response was similar to that observed, indicating that the small difference in Pdi and Pmus between control and unloading runs was due to intrinsic properties of respiratory muscles and respiratory system.

Conclusions: These results suggest that when chemical stimulus is controlled, respiratory motor output is not downregulated with unloading.

RESPONSE OF RESPIRATORY OUTPUT TO INSPIRATORY FLOW RATE: EFFECTS OF BREATHING ROUTE AND AIRWAY ANESTHESIA.

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The determinants of the response of the respiratory output to inspiratory flow rates ($\dot{V}_I$) were examined in awake normal subjects. Subjects were connected to a volume-cycle ventilator in the assist/control mode and $\dot{V}_I$ was increased in steps from 30 to 90 l/min and then back to 30 l/min. $\dot{V}_I$ pattern was square, and all breaths were subject-triggered. In six subjects the effects of breathing route (nasal or mouth) and temperature and volume of inspired gas (Protocol A) and in 8 subjects the effects of airway anesthesia (upper and lower airways, Protocol B) on the response of respiratory output to varying $\dot{V}_I$ were studied. In Protocol B, in order to calculate muscle pressure during inspiration (Pmus), respiratory system mechanics were measured using the interrupter method at end-inspiration. Independent of conditions studied breathing frequency increased significantly and end-tidal concentration of CO_2 decreased as $\dot{V}_I$ increased. The response was graded and reversible and not affected by breathing route, temperature and volume of inspired gas and airway anesthesia. With and without airway anesthesia (Protocol B) neural inspiratory and expiratory time and neural duty cycle, estimated from Pmus waveform, decreased significantly as $\dot{V}_I$ increased. At all conditions studied the rate of change in airway pressure prior to triggering the ventilator tended to increase as $\dot{V}_I$ increased. The changes in timing and drive were nearly complete within the first two breaths after transition with no evidence of adaptation during a given $\dot{V}_I$ period. We conclude that $\dot{V}_I$ exerts an excitatory effect on respiratory output which is independent of breathing route, temperature and volume of inspirate and airway anesthesia. The response most likely is neural in origin, mediated through receptors not accessible to anesthesia such as those located in chest wall or below the airway mucosa.

RESPONSE OF RESPIRATORY OUTPUT TO INSPIRATORY FLOW RATE: EFFECTS OF NREM SLEEP

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It has been shown, in mechanically ventilated awake normal humans, that increasing inspiratory flow rate ($\dot{V}_I$) exerts an excitatory effect on respiratory output. It is not known if this effect persists during sleep. To test this seven normal adults were studied during wakefulness and NREM sleep. Subjects were connected through a nose-mask to a volume-cycled ventilator in the assist/control mode and $\dot{V}_I$ was increased in steps (3-4 breaths each) from 30 to 70 l/min and then back to 30 l/min. $\dot{V}_I$ pattern was square, and all breaths were subject-triggered. Forty-one trials during NREM sleep and 10 during wakefulness were analyzed. Both during sleep and wakefulness minute ventilation increased and total breath duration (T_{TOT}) decreased significantly in a graded and reversible manner as $\dot{V}_I$ increased. These changes were complete in the first breath after $\dot{V}_I$ transition. The response was significantly less during sleep than during wakefulness ($P<0.05$); at 30 l/min T_{TOT}, expressed as % of that at 70 l/min, was 110.2±1.3% during sleep and 127.8±3.9% during wakefulness. During wakefulness, at 30 l/min, the rate of change in airway pressure prior to triggering the ventilator, an index of respiratory drive, was 60% of that at 70 l/min ($P<0.05$). The corresponding value during sleep was 86% ($P>0.05$). In four sleeping subjects the increase in $\dot{V}_I$ was sustained for 1.5-2 min. There was no evidence for adaptation of the response; T_{TOT}, averaged over the last three breaths, did not differ from that obtained when $\dot{V}_I$ was sustained for only 3-4 breaths. We conclude that 1) $\dot{V}_I$ exerts an excitatory effect on respiratory output, mediated by a reflex neural mechanism and 2) the gain of this reflex is attenuated by sleep.

New approaches to portable chest radiography in critical care units

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Chest radiographs is a common complementary technique for patients in critical care units, with a low-cost and easily available. However, it has certain well-known limits in diagnosis, the most important derived from the low quality of some pictures. In this paper we make a general review of some new technical approaches developed for improving the quality of the images, and so incrensing the diagnostic value of conventional radiology. We begin dealing with the correct positioning of the patient, trough the filtering techniques, the synchronization of radiology and ventilation, and we make reference to the new computerized systems for digital image processing.

Conclusions: The portable radiographic system is a device that probably with maintain for many years in critical care units as a basic non-invasive diagnostic tool. But we need an increase in the efficiency of it, applying means as simple as a correct positioning of the patient, or the use of fitlers or synchronizers. Thus we should improve the general standards of portable radiography.

"Are circular circuits safe? Quantifying undelivered tidal volume in pediatrics patients".

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Objectives: To evaluate the overall influence of internal compliance of circular circuits on delivered tidad volume (VT).

Methods: We studied prospectively 14 ASA I pediatrics patients (2 to 10 yr. old) scheduled for elective general surgery. Mechanical ventilation was supplied by an Ohmeda Excel 210 (circular circuit). The internal compliance of the circuit (Cc)-anesthesia machine plus external circuit-was determined by the supersyringe method: Corrugated DAR tubes of 10 mm. ID and 1.5 m. long (children < 30 kg), and a corrugated DAR set of 15 mm. ID and 1.5 m. long (children > 30 kg) were respectively used for Ccl an Cc2 values of 9.3 and 9.5 ml/cm H2O. A VT of 10 mlg/kg and respiratory frequency was adjusted for an end-tidal CO2 (ETPCO2) between 30–35 mmHg. Tidal volumes (measured by spirometry) and airway pressure (Paw) data were recorded every ten minutes. Volumes and thorax-lung compliances were calculated as follows: (VT delivered = VTadjusted-Vol. compressible, being Vol. compressible = Co × Ppeak (aw). Apparent compliance (Ca) = VT adjusted/Pplateau(aw), and true compliance (Ct) = =VT delivered/Pplateau(aw)). Comparative statistics were separately designed between calculated compliance data and tidal volumes on a paired sample T-test basis.

Results: Calculated values for volumes and thorax-lung compliances were:

Parameter	Mean ± SD	Range
VT adjusted (ml)	451 ± 126	263 – 659
VT Delivered (ml)	288 ± 120	104 – 483
VT lost (%)	38.8 ± 10.7	23.7 – 64.1
Apparent compliance (Ca) (ml/cm H2O)	33.8 ± 9.4	16.5 – 53.1
True compliance (Ct) (ml/cm H20)	21.6 ± 9.0	6.1 39.6
Ratio Ca/Ct (%)	1.696 (69.6 %)	

($p < 0.001$ on a paired sample T-test for volumes and thorax-lung compliances. Confidence interval: 99 %).

Conclusions: Due to the elevated internal compliance of the circular circuit there is a remarkable difference between adjusted and delivered VT: mean undelivered VT was 38.8 % and reached as high as 64.1 %. There is also a significative error in calculating true thorax-lung compliance: its overestimation can be as high as 69.6 %. Circular circuits are considered safe and cost-saving for anesthetical practice. Nevertheless we conclude that anesthetists should bearin mind VT losses when using circular circuits, due to compressible volume.

Use of high frequency jet ventilation in patients with tracheal stenosis

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Tracheal stenosis is one of the most serious complications of patients submitted to prolonged endotracheal intubation, in which the decrease in inner diameter of upper airway makes it very difficult to achieve a correct ventilation.

Objectives: Compare the results of applying high frequency jet ventilation (HFJV) to some of these patients with conventional controlled ventilation (CMV).

Methods: We used a prototype of high frequency jet ventilator (Santiago-2) developed in our University, and we developed a tracheal tube in wich we modified the distal tip (conic tip). We applied this system to two patients which were initially ventilated in the operating room with usual controlled mecanical ventilation (CMV) following the standards of our department, and then intubated with the special endotracheal tube and ventilated with HFJV.

Results: We could verify a proper ventilation of both patients with CMV and HFJV. During HFJV, the airway pressures were lower than those recorded during CMV. A lower airway pressure prevents lesions due to high pressures.

Conclusions: HFJV is a good method of ventilation for patients with significative stenosis of the trachea, not only during surgical procedures, but also during ventilation for long periods in critically 111 patients.

HEMODIALYSIS-INDUCED HYPOXEMIA AND RESPIRATORY DRIVE DEPRESSION IN MECHANICALLY VENTILATED PATIENTS WITH PRESSURE SUPPORT MODE

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Objectives: To observe whether partial mechanical ventilation support with pressure support mode can prevent hemodialysis(H/D)-induced hypoxemia and to detect if H/D with high concentration bicarbonate dialysate will depress respiratory drive and results in hypoventilation and hypoxemia.
Design: Prospective
Materials and Methods: We have performed 22 times H/D of 4 hours' interval with biocompatible dialyzer (AM-50: cuprammonium rayon) and bicarbonate dialysate (35mmol/L) on 22 mechanically ventilated renal failure patients with APACHE III score 77±18, and FiO_2 25-35% in medical ICU of a tertiary hospital . The ventilatory setting is pressure support mode. The pressure level and FiO2 were kept constant during H/D. Arterial blood gas, WBC count, and mean BP was checked according to the schedule: 0'(immediately before H/D), 15', 30', 60', 120', 180', 240'. Respiratory drive (represented by $P_{0.1}$), tidal volume(Ti) and minute ventilation(VE) were continuously recorded by pulmonary mechanics monitor (Bicore CP-100). The mean value of the breaths 5 minutes before blood sampling were used to represent the ventilatory status of that period. ANOVA test is used for comparison between groups. For $P_{0.1}$, Hierarchical Cluster method is applied to divide the cases into two groups of similar change.
Results: The results showed no significant hypoxemia (PaO_2: p value: 0.959), and no significant change in $PaCO_2$(p:0.959), $P(A\text{-}a)O_2$(p:0.999), pH(p:0.298), HCO_3^- (p:0.086), mean BP(p:0.683), WBC count(p:0.792), Ti(p:0.997), VE(p:0.982) and $P_{0.1}$(p:0.201). Although no significant change of respiratory drive during H/D, some patients did show progressive decrease in $P_{0.1}$ found by Hierarchical Cluster method [Group 1: n = 4/18; $P_{0.1}$ (p:0.0013), Group 2: n=13/18; $P_{0.1}$(p:0.293)]. But again, the respiratory center depression result in no decrease in PaO_2(p: 0.977 vs 0.999), VE(p: 0.703 vs 0.995) and Ti(p: 0.937 vs 0.997).
Conclusion: 1. In patients with renal and respiratory failure even only partial ventilatory support with pressure mode can prevent H/D-induced hypoxemia. 2. About 22% (4/18) cases suffered from respiratory center depression and decrease in respiratory drive during H/D with high concentration bicarbonate dialysate, but it didn't contribute to hypoxemia or hypoventilation.

PORTABLE LUNG AS ALTERNATIVE TO ENDOTRACHEAL INTUBATION IN ELDERLY PATIENTS WITH CHRONIC PULMONARY DISEASE AND ACUTE RESPIRATORY FAILURE.

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Objectives: Evaluate Portable Lung (PL) as emergency support in Acute Respiratory Failure (ARF) in sub-Intensive Respiratory Care.

Methods: 16 pts (m age 72.4±5.3 range 62-80) with chronic lung disease showed ARF: paO2 38.1±10.1 mmHg; paCO2 81±12.2 mmHg (63-117); pH 7.26±0.1 (7.09-7.39); APACHE II 27.5±6.4, SAPS 12.3±3.2. All of them were placed inside PL-DIMA connected with Negative Pressure Chest Respirator, Emerson 33-CR, and ventilated for 28.9±14.3 h (12-96). No pt was eligible for Endotracheal Intubation (EtI) when placed inside PL.

Results: 2 pts died in PL after 52 and 54 hours of ventilation. Four had infective belated complications (more than 10 days after PL ventilation) and died. 10 pts survived and before weaning paO2 was 52.6±9 mmHg (p 0.05); paCO2 was 56.1±8.3 mmHg (p 0.001), pH 7.42 ±0.03 (p 0.005); APACHE II 15.9±2.5 (p 0.001); SAPS 7.4±2.05 (p 0.001). Then we tried to wean them from PL by non invasive nasal IPPV or BI-Level: 7 had been successfully weaned. Three ipersecretive patients needed thracheostomy: two survived and were placed in positive pressure ventilation, one died in ICU.

Conclusions: our data suggest that PL is very useful, non invasive and low-expensive emergency support for ARF, expecially in the elderly with severe chronic pulmonary disease and relative controindications to EtI. PL seems to be an effective alternative when it is not immediatly possible to perform EtI.

CARDIOVASCULAR AND RESPIRATORY CHANGES RESULTING FROM PRESSURE SUPPORT VENTILATION IN POLYTRAUMA PATIENTS

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Objectives Evaluate the influence of different pressure support ventilation (PSV) levels on cardiovascular and respiratory funcion in ICU polytrauma patients .

Methods We studied 15 polytrauma ICU patients , who were in weaning process , after long term mechanical ventilation for acute respiratory failure . Mean age 52 (37-71) yrs . They all were connected to servo ventilators Siemens 900C , and all were in stable condition , without sedation , inotropes or diuretics . The hemodynamic studies were done with continuous SVO2 , Swan Ganz catheter (Oximetrix , Abbott) . They all were in spontanuous mode (spont) with 5 cm H2O CPAP for at least one hour . We turned them to PSV with 0 inspiratory assistance (PSV 0 cm H2O) and after 60 min we applied PSV 10 cm H2O , and after 60 min PSV 20 cm H2O . Hemodynamic and respiratory measurements were done before and after the application of insiratory assistance . The results were statistically analyzed with ANOVA .

Results . *Respiratory variables* . No significant changes in minute volume (VE). Tidal volume (VT) and mean airway pressure (mPaw) increased statistically significant ($p< 0.001$) . Respiratory rate (RR) decreased significantly ($p<0.01$) . Blood gase showed no difference . *Cardiovascular variables* . Cardiac output (CO) decreased NS , heart rate (HR) had no change , central venous pressure (CVP) , mean pulmonary artery pressure (mPAP) , pulmonary capillary wedge pressure (PCWP) , increased NS , oxygen delivery (DO2) decreased NS , oxygen consumption (VO2) decreased NS .

Conclusions . PSV is a very useful respiratory mode helping patients to be weaned from long term mechanical ventilation . It has beneficial effects on respiratory function and oxygen consumption without affecting seriously the hemodynamic parameters , possibly due to a decrease of the work of breathing .

ASSESSMENT OF PULMONARY GAS EXCHANGE IN MECHANICALLY VENTILATED PATIENTS

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The multiple inert gas elimination technique (MIGET) can be used to assess the effects of any given mode of mechanical ventilation on the pulmonary and systemic factors determining arterial PO_2 and PCO_2. However, a potential problem in mechanically ventilated patients is that the 10 L mixing box (MB-10L) placed in series in the expiratory side of the circuit of the ventilator to sample mixed expired gas may provoke substantial discrepancies between the tidal volume set in the ventilator and the effective tidal volume delivered to the patient, due to the increase in the compression volume (V_C) of the circuit. The effects of the MB-10L on the V_C were compared with those produced by a new 1 L mixing box (MB-1L) specifically designed to produce adequate gas mixing and to prevent loss of the two most soluble gases (ether and acetone) used in the MIGET. At any given peak cycling pressure (P_{peak}, cm H_2O), the V_C (ml) provoked by the MB-10L was substantially higher ($V_C = 7.4*P_{peak}$) than that provoked by the new MB-1L ($V_C = 1.4*P_{peak}$). At a $P_{peak} = 50$ cm H_2O, the V_C were 377 ml (MB-10L) and 67 ml (MB-1L), respectively ($p< 0.001$). In a group of 6 subjects (4M /2F, 57±6 years), for each of six the gases used in the MIGET, the regression line between the mixed expired partial pressures simultaneously obtained from MB-1L and MB-10L fell on the identity line. It is concluded that the new MB-1L allows adequate assessment of the effect of different modalities of mechanical ventilatory support on pulmonary gas exchange, with less potential for gas compression and thus hypoventilation.

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IS TISSUE OXYGENATION RELATED TO PEEP VALUES?

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Objectives of this study was to examine the effect of different levels of PEEP on postoperative SvO2 and PvO2 values in a group of patients, following open heart surgery.

Methods: Upon transfer to ICU, 67 patients (54 males and 13 females) of mean age 63±6 years, were randomly assigned to receive 0 (N=22), 5 (N=24), or 10 cm of PEEP (N=21). There were no statistically significant differences in demographic data or preoperative respiratory status among the three groups. All patients were ventilated on the assist control mode with a tidal volume of 10 ml/Kg. The fraction of inspired oxygen (F_IO_2) was adjusted to keep a PaO2 around 100 mmHg. Mixed venous PO2 and SvO2 were measured at 30 min, 4 and 8 hours after application of mechanical ventilation in the ICU, just before extubation (BE), half hour after extubation (AE), and at 4 hours post-extubation. Differences at each study time were analysed by ANOVA.

Results: Mean SvO2 and PvO2 values among the three groups, for all study intervals, are presented in the table.

Conclusion: We found no differences (p=NS) in tissue oxygenation (expressed by SvO2 and PvO2) among the three groups, at any study interval, in the early postoperative course of patients following open heart surgery.

Table: Mean SvO2 and PvO2 values in three groups.

		1/2h	4h	8h	BE	AE	4h	p
SvO2	(PEEP=0)	67	65	67	67	65	65	NS
	(PEEP=5)	68	69	68	69	67	68	
	(PEEP=10)	68	68	67	67	67	67	
PvO2	(PEEP=0)	36	37	37	37	35	35	NS
	(PEEP=5)	36	37	36	37	36	36	
	(PEEP=10)	35	35	36	37	36	35	

CARDIORESPIRATORY EFFECTS OF PRESSURE REGULATED VOLUME CONTROL, PRESSURE CONTROL AND VOLUME CONTROL VENTILATION IN PATIENTS WITH ACUTE LUNG INJURY.

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Objectives: To compare the cardiorespiratory effects of pressure control (PC), volume control (VC) and pressure regulated volume control (PRVC) ventilation in postoperative cardiac surgery patients with lung injury.
Methods: We studied eight patients (age 65±11 yrs) with lung injury following open heart surgery. All patients were ventilated with a Servoventilator (Siemens-Elema model 300). In all modes, tidal volume (10 ml/Kg), respiratory frequency, I:E ratio, PEEP and F_IO_2 were held constant. Peak inspiratory pressure (PIP) and mean airway (Paw) were recorded in all patients and hemodynamic parameters including cardiac output were measured in 4 patients. Data were compared using ANOVA for repeated measures.
Results:

	PC	VC	PRVC
PIP (cm H_2O)	36.4±9.8	43.6±9.1*	35.9±7.9
Paw	16.2±4.7	16.2±4.7	15.7±3.4

*mean±SD. *p<0.05 when compared with PC or PRVC.*

There were no differences in PIP between PC and PRVC. PIP was higher in VC than in PC or PRVC. No significant differences in Paw were found among the three modes. No changes in hemodynamics or gas exchange indices were found.
Conclusions: We conclude that PRVC induces essentially the same cardiorespiratory effects as PC. Because of its ability to guarantee a constant tidal volume, PRVC may be superior to PC in certain patients with diffuse lung injury.

AIRWAY PRESSURE FLUCTUATIONS DURING BREATHING IN A HIGH COMPLIANCE, TWO BALLOON CPAP-SYSTEM.

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Objectives: To evaluate airway pressure fluctuation (APF) during spontaneous breathing in a high compliance CPAP system.
Methods: The CPAP system consisted of two 7L weighted balloons in a wedge shaped holder. Ventilating gas flowed from one balloon through a low resistance one way valve into a tracheal tube (ETT) provided with a Pycor CO_2 sensor to monitor rebreathing. The ETT was connected to a piston drive mechanical lung. Expired gas flowed through a low resistance valve into a second weighted balloon, from where it was exhausted through a PEEP valve connected in parallel with the second weighted balloon. We evaluated system performance at V_T from 70 to 500ml, at RR from 10 to 120 bpm, while closely monitoring CPAP airway pressure swings. At V_T of 400 and 500ml the RR was limited to 60 bpm. For comparison we explored APS of a one 16L balloon CPAP system, the CPAP mode of the Puritan Bennett 7200, and Siemens 300 ventilators, when connected to a healthy adult volunteer breathing through an ETT.
Results: The Compliance (Cpl.) of one 7L balloon system was linear over a range from 1.0 to 3.3L, with a Cpl. of 4.0 L/cm H_2O.The Cpl. of the 16 L balloon (0.5 L/cm H_2O) was linear between a volume of 13 and 14.5 L. APF of the weighted balloon system was under 1 cm H_2O at all V_T (except at a V_T of 500ml APS was 1.5cm H_2O), while the APF in the 16L balloon was up to 3 cm H_2O. APF with human volunteers with the two commercially available ventilators in the CPAP mode was about 7 cm H_2O; while under identical conditions APF in the 16L balloon system was 1.5 cmH_2O; and in the two 7L balloon system was below 1cm H_2O.
Conclusions: CPAP using the two balloon system exhibits lower airway pressure fluctuations than a single balloon system; and is substantially lower than found in the two commercially available ventilators when used in the CPAP mode.

VENTILATORY SUPPORT IN COPD DURING PROPORTIONAL ASSIST VENTILATION (PAV): EFFECTS ON BREATHING PATTERN AND INSPIRATORY EFFORT.

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Intrinsic PEEP (PEEPi), and high elastance and resistance increase inspiratory work load in COPD. CPAP reduces work of breathing by counterbalancing PEEPi. PAV provides flow (FA) and volume (VA) assistance proportionally to patient resistance and elastance and inspiratory effort. We studied the effects of partitioned support (CPAP-FA-VA) on breathing pattern and inspiratory effort in five COPD patients on PAV compared to spontaneous ventilation (SV) and full support (FS: CPAP+FA+VA). Flow, volume, minute ventilation (V_E) respiratory rate (RR), inspiratory swing in esophageal pressure (ΔPes), and its integral per breath (PTI/b) and per minute (PTI/m) were measured.

	SV	**CPAP**	**FA**	**VA**	**FS**
V_E	8±3	8±4	13±3*	10.±2*	12±3*
RR	23±6	21±7	24±13	24±12	19±16
ΔPes	14.9±3.1	10.8±4.1*	9.5±0.6*	13.9±1.7*	9.4±2.5*
PTP/b	12.1±3.5	7.8±1.7*	7.2±2.2*	10.9±5.8*	6.9±4.8*
PTP/m	277±94	165±42*	151±35*	242±65*	125±20*

$\bar{X}$ ± *SD.* * *p < 0.05: 2-ways ANOVA and Dunnet's test vs SV*

CPAP decreased of 35% inspiratory effort, without changes in V_E. During PAV with FA, the largest increase in V_E was observed (62%). Inspiratory effort decreased of 40% with FA. During PAV with VA, V_E increased of 27% with a reduction of inspiratory effort indices of only 10%. The largest decrease in inspiratory muscle effort (45%) was observed during FS, despite an increase in VE of only 45%. In conclusion, to reduce inspiratory muscle effort and increase V_E in COPD patients during PAV, the optimal strategy is associate CPAP and FA. In such patients, VA seems to have a little role.

MONITORING LONGITUDINAL CHANGES IN ENDOTRACHEAL TUBE RESISTANCE DURING PROLONGED MECHANICAL VENTILATION

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The flow resistance of an endotracheal tube (Rett) exceeds that of the native upper airway and can increase further during routine clinical use. Despite the potential for increases in Rett to significantly influence patient care, the magnitude and time course of changes in Rett expected in patients subjected to prolonged (>48 hrs) mechanical ventilation is unknown. To address this issue, Rett was determined daily beginning immediately post-intubation in 38 patients mechanically ventilated for a period of 4-18 days. Patients were orally or nasally intubated with ETTs ranging in size from 7.5 to 9.0 mm ID. Flow, airway pressure, and tracheal pressure recorded from an intraluminal catheter positioned at the carinal end of the ETT were measured during controlled mechanical ventilation using a range of constant inspiratory flow (~0.5-1.5 L/s). Rohrer's constants K1 and K2 were obtained from the intercept and slope, respectively, of the Rett-flow relationship. Correlation coefficients ranged from 0.871 to 0.999. The sum of K1 and K2 (which represents Rett at a flow of 1.0 L/s) on the first ventilated day were comparable to previously determined *in vitro* values, averaging 8.56 ± 0.57 (SE) compared to 8.19 ± 0.38 (SE) cmH_2O/L/s ($p > 0.1$). Daily changes in Rett were variable within patients. For the group as a whole, however, there was a consistent and generally progressive increase in Rett over time which amounted to 7.22% per day ($r = 0.77$). On the last intubated day, Rett averaged 150.9 ± 10.8% of the initial post-intubation value. In conclusion, significant and clinically relevant changes in Rett do occur over time in patients undergoing prolonged mechanical ventilation. These results indicate the feasibility as well as the potential importance of routinely monitoring Rett in this setting.

Support: RHNCE, Montreal Chest Institute Research Centre, FRSQ.

PROPORTIONAL ASSIST VENTILATION (PAV) IMPROVES BREATHING PATTERN AND INSPIRATORY EFFORT IN ACUTE RESPIRATORY FAILURE (ARF)

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PAV was designed to reduce the inspiratory effort used to overcome respiratory resistance (Rrs) and elastance (Ers) by separately applying pressure in proportion to flow (flow assist, FA) and volume (volume assist, VA). The purpose of this study was to determine the effects of systematically varying the level of combined FA and VA on breathing pattern and inspiratory effort in patients with ARF of varied etiology. Flow, volume, esophageal pressure (Pes), and transdiaphragmatic pressure (Pdi) were determined in 5 intubated patients with ARF in which FA and VA were varied together from 0-80% of Rrs and Ers, respectively. Representative results (mean ± SE) are shown below. Compared to spontaneous breathing (PAV 0%), PAV increased tidal volume (V_T) while respiratory rate (RR) fell so that there was a small but consistent rise in minute ventilation ($\dot{V}_E$). This was accompanied by a graded reduction in inspiratory effort, as measured by the pressure-time integral ($\int P$) of Pes and Pdi expressed either per minute or per liter $\dot{V}_E$. In conclusion, FA and VA forms of PAV used together can improve breathing pattern while reducing inspiratory effort in patients with ARF.

	PAV 0%	PAV 20%	PAV 40%	PAV 60%	PAV 80%
V_T, ml	307±37	343±47	375±52	390±50	431±49
RR, breaths/min	30.9±3.3	29.7±3.4	29.1±3.5	28.2±3.4	26.2±3.0
$\dot{V}_E$, L/min	9.4±1.5	10.1±1.8	10.7±1.8	10.9±1.8	11.2±1.5
$\int$ Pes, cmH_2O	311±24	291±20	241±16	205±17	165±15
$\int$ Pes, $cmH_2O \cdot s/L$	35.1±3.9	30.5±3.4	23.8±2.9	19.9±2.1	15.3±1.2
$\int$ Pdi, cmH_2O	305±87	288±65	237±55	194±45	164±43
$\int$ Pdi, $cmH_2O \cdot s/L$	33.8±7.1	29.5±5.0	23.0±4.2	18.1±3.1	14.9±2.8

Support: RHNCE, Montreal Chest Institute Research Centre, FRSQ.

EtCO2 MONITORING DURING INDEPENDENT LUNG VENTILATION WITH LOW TIDAL VOLUME

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Objective: To perform independent lung ventilation (ILV) with individual tidal volume (Vt) set at a value generating a plateau airway pressure (Pplat) ≤ 25 cmH_2O and to evaluate the usefulness of the continuous monitoring of end-tidal CO_2 ($EtCO_2$) as a guide to titrate individual lung Vt during ILV and for the weaning from ILV.

Methods: In seven patients, ILV was performed with two ventilators set with the same FiO_2 and respiratory rate. Each lung was ventilated with a Vt that developed a Pplat ≤ 25 cmH_2O. This setting led to a lower Vt on pathological lung (PL). Vt was increased in PL following $EtCO_2$ and $PaCO_2$-$EtCO_2$ variations. ILV was discontinuated when $EtCO_2$, Vt and statical compliance (Cst) were similar in both lungs.

Results: One hour after starting ILV (T_1), PL mean Vt was significantly lower than in normal lungs (NL) (224 ± 46 ml vs 377 ± 76.6 ml, $p<0.001$). Two individual behaviours were observed on T_1 in PL: four patients presented low $EtCO_2$ (range 18 - 31 mmHg) and normal $PaCO_2$ (range 38 - 42 mmHg), while three patients had normal $EtCO_2$ (range 35 - 45 mmHg) with high $PaCO_2$ (range 44 - 61 mmHg). One hour before stopping ILV (T_2), Vt, $EtCO_2$ and $PaCO_2$ were the same in each lung. The PaO_2/FiO_2 ratio improved in all patients from the beginning of ILV. Cst of PL was 52.6 ± 30 % of the normal lungs' Cst on T_1 and improved to 97.6 ± 27 % of NL's Cst on T_2 ($p<0.005$ vs T_1).

Conclusions: Setting Vt of PL to a value not overcoming a Pplat threshold does not impair oxygenation and is helpful in avoiding barotraumatism. Measurements of differential $EtCO_2$ and of the differential $PaCO_2$-$EtCO_2$ gradient can be used to titrate Vt allocation during ILV and as a guide for the weaning from ILV.

COMPARISON OF AIRWAY OPENING AND TRACHEAL PRESSURE REGULATED FORMS OF PROPORTIONAL ASSIST VENTILATION.

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Total respiratory resistance in mechanically ventilated patients exceeds values obtained in normal subjects, due to the added and highly flow dependent resistance of the endotracheal tube (Rett). This can adversely effect the efficacy of pressure regulated modes of assisted ventilation, such as pressure support (PSV) and proportional assist ventilation (PAV). Recent work demonstrates that the influence of Rett during PSV can be overcome by using tracheal (Ptr) rather than airway opening (Pao) pressure to regulate the pressure applied (Intensive Care Med 20:S41, 1994). The purpose of this study was to see if this approach would also be effective during PAV. Flow, volume, Pao, Ptr, and transdiaphragmatic pressure (Pdi) were measured in 5 intubated patients in which either Pao or Ptr were used to regulate the pressure applied during PAV where volume assistance was varied from 20 to 80% of respiratory elastance. Representative results (mean ± SE) are shown below. Compared to spontaneous breathing (PAV 0%), PAV increased tidal volume (V_T) while reducing respiratory rate (RR) so that minute ventilation ($\dot{V}_E$) also rose. This was associated with a reduction in inspiratory effort, as reflected by a decrease in the pressure-time integral ($\int P$) of Pes and Pdi both per minute and per liter $\dot{V}_E$. The effects on breathing pattern were similar for Pao and Ptr regulated PAV. In contrast, the reduction in inspiratory effort was always greater for Ptr regulated PAV. In conclusion, the volume assistance provided by PAV is more effective when Ptr rather than Pao is used to regulate the pressure applied.

	PAV 0%	PAV 20-40%		PAV 60-80%	
		Pao	Ptr	Pao	Ptr
V_T, ml	266±41	333±55	360±48	369±52	441±59
RR, breaths/min	32.6±3.8	30.3±3.6	28.1±3.5	27.8±3.3	26.7±3.1
$\dot{V}_E$, L/min	8.4±1.3	9.8±1.7	10.0±1.8	10.2±1.7	11.6±2.6
$\int$ Pes, cmH_2O	275±26	237±21	199±9	195±22	161±10
$\int$ Pes, $cmH_2O \cdot s/L$	33.5±3.0	26.8±2.8	21.9±4.2	21.6±2.1	15.5±3.4
$\int$ Pdi, cmH_2O	290±53	248±49	201±33	209±37	145±23
$\int$ Pdi, $cmH_2O \cdot s/L$	33.0±3.7	25.7±3.9	20.4±4.1	20.8±3.1	14.3±3.5

INTRINSIC POSITIVE END EXPIRATORY PRESSURE: HOW TO DETECT IT?

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Objectives: The detrimental effects of intrinsic PEEP during mechanical ventilation, in terms of decreased efficiency of respiratory muscles, increased work of breathing and impairment of hemodynamics are well established. As several techniques to evaluate PEEPi have been proposed, the influence of methodology on recorded PEEPi values is still unclear.

Methods: 63 couples of PEEPi measurements using both the end expiratory occlusion technique (PEEPi int.) and peak inspiratory pressure variation to increasing external PEEP technique (PEEPi peak) were performed in 34 patients during support (PSV) or control (CMV, PCV) ventilation and statistically evaluated using linear regression test.

TAB I: PEEPi Mean±SD (range)

	PEEP int.	PEEP peak p
Total (n 63)	6.87±4.87 (0-20)	5.41±3.3 (1-16)
Support V. (n 29)	4.55±3.5 (0-12)	3.9±2.3 (1-10)
Control V. (n 34)	8.85±4.6 (2-20)	6.79±3.5 (2-16)
RR<15/m' (n 17)	9.18±6.2 (0-20)	7.47±4.8 (2-16)
RR 16-25/m' (n 30)	6.07±3.5 (0-14)	4.83±2.2 (1-10)
RR >25/m' (n 16)	5.94±4.0 (0-12)	4.19±2.1 (1-9)

Results: The mean value of PEEPi peak was lower than PEEPi int. either during support and control ventilation, but with a very good correlation; wile higer respiratory rates and lower PEEPi values reduce the degree of correlation between the two techniques.

TAB II: PEEPi Int vs Peak p

	n	r	p
Total	63	0.736	0.0001
Support V.	29	0.602	0.0001
Control V	34	0.693	0.0001
RR<15/m'	17	0.759	0.0001
RR 16-25/m'	30	0.655	0.0001
RR >25/m'	16	0.656	0.006
PEEPi 0-5 cmH_2O	29	0.363	0.053
PEEPi 6-10 cmH_2O	25	0.509	0.009
PEEPi 11-20 cmH_2O	9	0.714	0.031

Conclusions: The severity of illness and the kind of ventilation could not only cause the development of intrinsic PEEP but also interfere in its detection, suggesting a careful use of autopeep estimate techniques.

BIPAP VENTILATION IN COMPARISON TO S-CMV AND S-IMV/PSV REDUCES DURATION OF INTUBATION AND CONSUMPTION OF ANALGESICS AND SEDATIVES IN SHORT TERM VENTILATED PATIENTS

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Objectives: Influence of ventilation modes on consumption of analgesics and sedatives, duration of intubation and ventilatory function.
Methods: Retrospective data analysis of 596 adult patients with normal pulmonary function before operation and uneventful course following coronary artery bypass graft surgery over an 18 month period. We compared assist/controlled mandatory ventilation (S-CMV, 123 patients), synchronized intermittent mandatory ventilation with inspiratory pressure support (S-IMV/PSV, 431 patients) and biphasic positive airway pressure ventilation (BIPAP, 42 patients).
Results: Patients ventilated with BIPAP had a significantly shorter mean duration of intubation (10.1 h, $p< 0.05$) than patients treated with S-IMV/-PSV (14.7 h) and S-CMV (13.2 h). With S-CMV 39.9% of the patients required single or multiple doses of midazolam but only 13.5% in the S-IMV-/PSV group and 9.5% in the BIPAP group. The mean total amount of midazolam of these patients was significantly higher in the S-CMV group (8.8 mg) than in the S-IMV/PSV group (6.6 mg, $p<0.05$) and in the BIPAP group (4.3 mg, $p<0.05$). The consumption of pethidine and piritramide did not differ between S-CMV and S-IMV/PSV but was significantly lower during BIPAP ($p<0.05$). After extubation the $paCO_2$ patients was highest in the S-CMV group.
Conclusion: Ventilatory support with BIPAP reduces the consumption of analgesics and sedatives and duration of intubation. Unrestricted spontaneous breathing as well as fully ventilatory support allow adequate adaptation to the patients requirements. BIPAP seems to be an alternative to S-CMV and S-IMV/PSV ventilation not only in patients with severe ARDS but also in short term ventilated patients.

EXPONENTIAL VS. LOGARITHMIC ANALYSIS OF THE GRADUAL DECREASE IN TRACHEAL PRESSURE AFTER END INSPIRATORY OCCLUSION.

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Objectives: After end-inspiratory airway occlusion we examined the ensuing gradual decrease in tracheal pressure (P_{tr}) with the following equations proposed by Bates et al. and Hildebrandt:
$P_{tr} = P'_{tr}\, e^{-t_{occ}/\tau_2} + P_{st,rs}$ (Bates) [1]
where P'_{tr} is tracheal pressure immediately after occlusion, t_{occ} is occlusion time, τ_2 is viscoelastic time constant of respiratory system, and $P_{st,rs}$ is static elastic recoil pressure of respiratory system.
$P_{tr}(t) = H_1 - H_2 \log t$ (Hildebrandt) [2]
where H_1 and H_2 are parameters depending on lung volume, and initial time is 1 s for analytical reasons.
Materials & methods: We studied 8 healthy patients intubated, anestethized with propofol, paralyzed with vecuronium, and mechanically ventilated with constant flow (0.5 l/s) at ZEEP for minor surgery. Pressure was measured in the trachea. Flow was measured with a pneumotachograph and volume was obtained by numerical integration. The rapid occlusions were produced by an external valve. The signals were sampled at a frequency of 200 Hz and processed on a PC. The influence of the cardiac artifacts during the occlusion time (4 s) was reduced by a software low-pass filter Kaiser Finite duration Impulse Response of elevated order.
Results: The mean (± SD) coefficient of correlation using Eq. 1 was 0.912 ± 0.168, and using Eq. 2 was 0.884 ± 0.045. The values of τ_2 (Eq. 1), however, decreased with increasing the tidal volume (V_t) according to the following equation: $\tau_2 = 1.52 - 0.65\ V_t$. Similary, the values of H_1 and H_2 increased with increasing V_t according to the following functions: $H_1 = 4.4 + 13\ V_t$ and $H_2 = 1.15 + 1.88\ V_t$.
Conclusions: The behaviour of τ_2 of Eq. 1 suggests that the linear viscoelastic model is not sufficient to further describe the mechanical properties of the respiratory system over the V_t range (6-14 ml/kg) in ventilated patients. Infact this model predicts that τ_2 is constant and independent of tidal volume.
On the other hand the plastoelastic model is not sufficient to further describe the mechanical properties of the respiratory system. In fact τ_2 obtained by fitting an exponential for data of Eq. 2, is determined by the time of end-inspiratory airway occlusion.

A NEW METHOD FOR DETERMINATION OF VISCOELASTIC CONSTANTS OF RESPIRATORY SYSTEM.

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Objectives: According to the viscoelastic model, the viscoelastic pressure of the respiratory system $P_{visc,rs}$ during lung inflation with constant flow Φ is given by: $P_{visc,rs} = R_2\, \Phi\, (1 - e^{-T_i/\tau_2})$ [1] where T_i is inspiratory time and R_2 and τ_2 are resistance and time constant of viscoelastic unit. In the past, the viscoelatic constants were determinated by performing a series of occlusions at different lung volumes, or a series of occlusions at a fixed lung volume achieved with various inflation flows. In the present study we have developed a new method for determining τ_2 and R_2 which requires a single constant flow inflation. Our method is based on determination of $P_{visc,rs}$ during a single breath constant flow inflation, and of τ_2 during the ensuing end-inspiratory airway occlusion. During the occlusion the tracheal pressure P_{tr} declines according the following function: $P_{tr} = P'_{tr}\, e^{-t_{occ}/\tau_2} + P_{st,rs}$ [2] where P'_{tr} is tracheal pressure immediately after occlusion, t_{occ} is occlusion time, $P_{st,rs}$ is static elastic recoil pressure of respiratory system, and τ_2 is viscoelastic time constant. We first determinated τ_2 by analyzing the time-course of P_{tr} according to Eq. 2 and next determining R_2 according to Eq. 1, using the experimental values of $P_{visc,rs}$, Φ and T_i, as well as τ_2 obtained with Eq. 2.
Materials & methods: We studied 8 healthy patients intubated, anestethized with propofol, paralyzed with vecuronium, and mechanically ventilated with constant flow (0.5 l/s) at ZEEP for minor surgery. Pres-sure was measured in the trachea. Flow was measured with a pneumotachograph and volume was obtained by numerical integration. The rapid occlusions were produced by an external valve. The signals were sampled at a frequency of 200 Hz and processed on a PC. The influence of the cardiac artifacts during the occlusion time (4 s) was reduced by a software low-pass filter Kaiser Finite duration Impulse Response of elevated order.
Results: The mean coefficient of correlation with Eq. 2 was 0.912. With V_t of 7 ml/kg, the mean values (± SD) of τ_2 and R_2 of the 8 subjects amounted to 1.128 ± 0.100 s and 3.990 ± 0.890 $cmH_2O\ l^{-1}$ s. With the traditional multi breath method the corresponding values were 0.711 ± 0.257 s and 4.445 ± 1.474 $cmH_2O\ l^{-1}$ s, respectively. With the T-test the difference between new and traditional τ_2 was statistically significant, between new and traditional R_2 was not significant.
Conclusions: With the single breath method it is possible to compute τ_2 and R_2. The mean values of R_2 with V_t of 7 ml/kg, however, was slightly different than those obtained with the traditional multi breath method.

REHABILITATION PROGRAMME AND HOME CARE FOR CHRONICALLY ILL INDIVIDUALS

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The application of modern principles of respiratory care and mechanical ventilation in ICUs has resulted in increased survival of critically ill individuals with neuromuscular, skeletal and irreversible pulmonary diseases.
In these chronically ill individuals mechanical ventilation, long term O_2 therapy (LTOT) and continuous home care is considered a chronic life supporting technique that can not be withdrawn after their discharge from an ICU.
The aim of this study was to present the results of a Rehabilitation Programme and home care that runs in our ward.
Twenty three patients were referred to our clinic from ICUs during 1993-94. A specific Rehabilitation Programme designed according to individual's needs was performed. Patients that benefitted from this programme were grouped into the following disorders. 1) Post TB Respiratory Failure 6(26%) 2) Neuromuscular diseases, 3(21%) 3) Undiagnosed SAS 3(13%) 4) COPD 9(39%) (3 patients had a overlap syndrom).
The programme consists of : 1) assessment and mechanical support if needed of the respiratory system with non invasive methods (nasal or via tracheostomy). 2) group and individual respiratory therapy 3) mobilization 4) nutritional support 5) educational classes for the members of the family.
Three from the patients passed away (during the year), 11 are under NIPPV during night with or without O_2 supply, 13 pts recieve LTOT.
Conclusion: The development of a programme for chronically ill individuals in especially designed wards in hospitals and the overall care at home is considered necessary at least in Hospitals with ICUs.
A Rehabilitation Programme and Home Care permits the fast but safe discharge of these patients from units of acute medicine that the cost of treatment is high and besides permits beds that are invaluable.
We considered that the Rehabilitation Programme and Home Care in our ward is the first performed in Greek chronically ill pts and even though there is no special administrative support we think that the results are quite satisfactory.

BREATHING FREQUENCY, INSPIRATORY PRESSURE AND MAXIMAL INSPIRATORY PRESSURE (fxIP/MIP) AS PREDICTORS OF WEANING OUTCOME IN COPD PATIENTS

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Objective: We postulated that the product of the respiratory frequency (f) and the ratio of inspiratory pressure (IP) to maximal inspiratory pressure (MIP) would predict the weaning outcome in decompensated COPD patients better than either variable alone or other indices previously proposed.
Methods: In 28 decompensated COPD patients with difficult weaning, we measured, daily, respiratory mechanics data both during mechanical ventilation and after ten minutes of spontaneous breathing. Then we calculated weaning indices reported in literature and some new integrated indices. According to the results of the discriminant analysis, we considered the integrative index CROP (acronym of compliance, rate, oxygenation and pressure), the rapid shallow breathing index f/V_T, the load/capacity ratio IP/MIP, and the following new index: f x IP/MIP. We used receiver-operating-characteristic (ROC) analysis by calculating the area under the curve considered as the overall probability of correct classification.
Results: main results are reported in the following table

	Discriminant analysis		ROC curve analysis
	threshold value	classification error %	area under the curve
CROP	16	17	0.93
f/V_T	84	28	0.79
IP/MIP	0.41	16	0.91
f x IP/MIP	10	12	0.95

Conclusions: IP is related to its corresponding tidal volume, thus f x IP/MIP corresponds to the ratio of the minute respiratory load to the capacity.
f x IP/MIP is easy to measure at patient's bedside and requires simple and cheap equipment.
In decompensated COPD patients, the measurement of f x IP/MIP after 10 minutes of spontaneous breathing can predict weaning outcome better than the commonly used indices.

BEDSIDE ENDURANCE INDICES PREDICTING WEANING IN DECOMPENSATED COPD PATIENTS.

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Objective: To evaluate the reliability of some indices of endurance in predicting the weaning outcome of decompensated COPD patients.
Methods: In 28 decompensated COPD patients with difficult weaning from mechanical ventilation (MV) we measured, daily, blood gas analysis, ventilatory and airway pressure pattern during MV, breathing pattern (frequency (f) and tidal volume (V_T)), inspiratory pressure (IP), and maximal IP (MIP) during spontaneous breathing (SB). Thereafter we calculated the following weaning indices: CROP (Compliance * MIP * (PaO_2/PAO_2) / f), f/V_T, IP/MIP.
Data obtained the day at which the patient was considered ready for a trial of SB on clinical grounds but weaning failed (WF) and those obtained the day of the successful weaning (WS) were compared statistically through the Wilcoxon rank-sum pair analysis. In order to quantify the predictive accuracy for each index with respect to successful weaning we calculated sensitivity, specificity, and diagnostic accuracy according with the standard formulas. Threshold values (Tv) were determined from published data.
Results:

	WF	WS	Tv	Se	Sp	DA
CROP	11,6 ± 4,5	30,8 ± 15,8#	13	0,96	0,75	0,86
f/V_T	107 ± 37	69 ± 26#	100	0,89	0,54	0,71
IP / MIP	0,51 ± 0,1	0,32 ± 0,08#	0,4	0,82	0,86	0,84

# p<0,001; WF: weaning failure; WS: weaning successful; Tv: threshold value; Se: Sensitivity = True positive/(True positive + False negative); Sp: Specificity = True negative/(True negative + False positive); DA: Diagnostic Accuracy = (True positive + true negative)/(True positive + True negative + False positive + False negative)

Conclusions: The aim of weaning indices is to improve the physician skill to recognise the right time to discontinue MV. In this study CROP and IP/MIP showed an adequate diagnostic accuracy in predicting weaning outcome of COPD patients requiring prolonged MV. f/V_T showed a slightly less specificity. In COPD patients indices which measure the load/capacity ratio seem to predict weaning outcome better than indices analysing the respiratory pattern. Accordingly the former indices can be used extensively in clinical decision-making of weaning.

TIME DEPENDENT EFFECTS OF INVERSE RATIO VENTILATION IN ARDS

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Objectives : To assess the influence of time on the effects of inverse ratio ventilation (IRV) in patients with ARDS.

Methods : Five patients (64 ± 6 yrs) suffering from ARDS (lung injury score > 2.5) for 48 hours or less entered into the study. IRV (volume controlled, decelerating flow, 20 % inspiratory pause, I/E = 2/1) was compared to conventional ventilation (CV) (volume controlled, constant flow, no inspiratory pause, I/E = 1/2). These two modes were applied for 6 hours in a randomized order, with the same levels of total PEEP (PEEPt = PEEP + PEEPi), tidal volume (8.0 ± 0.7 ml/kg), respiratory rate (20 ± 0 bpm) and FiO2 (63 ± 2 %). Measurements (respiratory mechanics, hemodynamics, arterial and mixed venous blood gases) were performed after 1, 2, 4 and 6 hours of application of each mode.

Results : are expressed as mean ± SEM and compared by ANOVA.

	CV		IRV	
	H1	H6	H1	H6
pPaw (cmH_2O)	35 ± 2	36 ± 2	27 ± 2#$	26 ± 2#$
Pplat (cmH_2O)	26 ± 2	26 ± 2	25 ± 2	24 ± 2
mPaw (cmH_2O)	15 ± 0.7	15 ± 0.7	17 ± 0.9#$	17 ± 0.7#$
PEEP (cmH_2O)	9.8 ± 0.7	9.9 ± 0.8	6.1 ± 1.3#$	6.0 ± 1.2#$
PEEPi (cmH_2O)	1.2 ± 0.2	1.0 ± 0.4	4.6 ± 0.9#$	4.3 ± 0.8#$
PaO_2 (mmHg)	86 ± 9	81 ± 4	78 ± 9	76 ± 6
PvO_2 (mmHg)	43 ± 1	43 ± 2	40 ± 3	40 ± 1
$PaCO_2$ (mmHg)	50 ± 4	52 ± 6	45 ± 4#$	45 ± 3#$
HR (bpm)	90 ± 7	90 ± 7	89 + 7	87 ± 7
MAP (mmHg)	76 ± 3	85 ± 7	83 + 4	86 ± 6
PAP (mmHg)	34 ± 4	35 ± 4	36 ± 3	36 ± 4
PAOP (mmHg)	11 ± 1	12 ± 1	12 ± 1	12 ± 1
CI ($l/min/m^2$)	3.9 ± 0.4	4.0 ± 0.5	3.5 ± 0.5	3.8 ± 0.5
DO_2 ($ml/min/m^2$)	544 ± 58	553 ± 70	474 ± 69	518 ± 68

: different from **CVH1** (p<0.05). $: different from **CVH6** (p<0.05).
H1 : results after one hour. H6 : results after 6 hours.
In each mode, no significant difference was observed between H1 and H6.

Conclusion : These preliminary results do not support the existence of a "time dependent" effect of IRV in ARDS.

AMPLIFIED PERIODIC BREATHING USING PROPORTIONAL ASSIST VENTILATION

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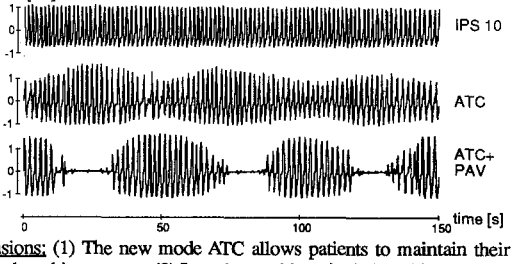
Background and methods: Periodic breathing (PB) is characterized by repetitive cyclic variation in minute ventilation. PB is considered to be provoked by an instability in the respiratory control. In intubated, spontaneously breathing patients conventional modes of pressure support ventilation, i.e., triggered inspiratory pressure support (IPS), do not allow patients to breathe with their inherent breathing pattern. Therefore, PB, if existing, will appear mainly after extubation. Since our new mode of pressure support ventilation "automatic tube compensation" (ATC) continuously corrects for the flow-dependent tube resistance during inspiration and expiration ("electronic" extubation), it permits patients to maintain their own inherent breathing pattern. Then, if necessary, tracheal pressure can be additionally supported by volume-proportional and/or by flow-proportional pressure support (proportional assist ventilation, PAV).
Case: We report the case of a 70-year-old male patient who was intubated due to acute respiratory insufficiency after acute myocardial infarction with left ventricular dysfunction. During IPS of 10 mbar the patient showed a regular breathing pattern which became periodic during ATC. In addition, proportional assist ventilation of 10 mbar/L increased periodic breathing in such a way that the typical Cheyne-Stokes breathing pattern occurred (see figure).



Conclusions: (1) The new mode ATC allows patients to maintain their own inherent breathing pattern. (2) In patients with periodic breathing, proportional assist ventilation has to be used cautiously.

REAPPEREANCE OF THE HERING-BREUER REFLEX IN INTUBATED ADULT PATIENTS

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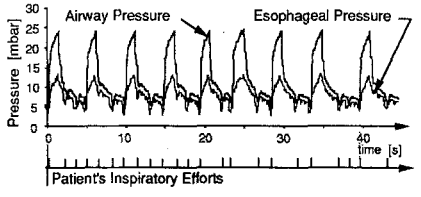
Background: The Hering-Breuer reflex (HBR) is characterized by an inhibition of inspiration during lung inflation. This response has been recognized as an important vagally mediated mechanism for regulating the rate and depth of respiration in newborn mammals. In adult man the HBR is considered to be active only at lung volumes well above functional residual capacity, i.e., at tidal volumes above 1000 ml. Assessment of the HBR requires specialized methods such as single breath or multiple occlusion technique.
Methods: In the presence of desynchronization between ventilator and patient, which frequently occurs during triggered inspiratory pressure support ventilation (IPS)(see figure), prolongation of the interval between inspiratory efforts (indicated by negative deflection of the esophageal pressure) due to lung inflation exposes an active HBR. We examined the occurrence of HBR in intubated critically ill patients. Strength of HBR was assessed by the formula: prolongation [%] = ((inspiratory interval of interest - preceding inspiratory interval)/preceding inspiratory interval) * 100.
Results: 18 of 50 patients examined showed moderate to severe desynchronization. In 17 of these 18 patients a (re)activation of the HBR was found. The strength of HBR amounted to 134 ± 51%. There was a significant correlation between tidal volume and strength of HBR. In contrast to previous reports, an active HBR was shown during lung inflation well below 1000 ml.



Conclusions: (1) Activity of HBR is frequently observed in adult critically ill patients during inspiratory pressure support ventilation. (2) In the presence of desynchronization the activity of HBR can be assessed directly, i.e., without specialized techniques.

OCCURRENCE OF PERIODIC BREATHING IN INTUBATED PATIENTS AND THE INFLUENCE OF SEDATION

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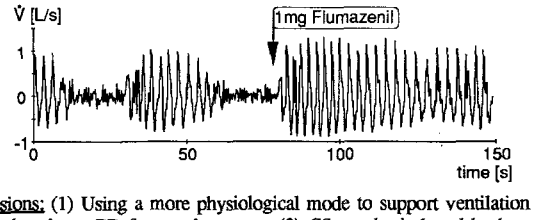
Background: Cheyne-Stokes respiration (CS) is characterized by regular, recurring periods of hyperpnea and apnea. In normal subjects, CS may occur after hyperventilation, after arrival in high altitude, or during sleep. It has also been observed in patients with prolonged circulation time due to congestive heart failure, as well as in some neurological patients. There is no report about the influence of sedative drugs on periodic breathing (PB) and CS.
Methods: In intubated patients conventional modes of pressure support do not allow patients to breathe with their inherent breathing pattern. Therefore, periodic breathing and CS are rarely seen. Since our new mode of pressure support ventilation "automatic tube compensation" (ATC) continuously corrects for the flow-dependent tube resistance during inspiration and expiration ("electronic" extubation) it permits patients to maintain their own inherent breathing pattern even if pathological, e.g., periodic.
Results: Using this new mode of pressure support ventilation, periodic breathing was unmasked in 13 of 37 intubated patients, 6 of which showed CS. In 4 of these 6 patients the occurrence of CS was linked to impaired left ventricular function with increased circulation time. Normal left ventricular and neurologic function was found in the remaining 2 patients. In 1 of these 2 patients CS disappeared after intravenous administration of the benzo-diazepine antagonist Flumazenil (figure). Consequently, in this patient CS was induced by benzodiazepine sedation.



Conclusions: (1) Using a more physiological mode to support ventilation in intubated patients, PB frequently occurs. (2) CS can be induced by benzodiazepine sedation and stopped by administration of the specific antagonist.

AUTOMATIC TUBE COMPENSATION (ATC) AND PROPORTIONAL ASSIST VENTILATION (PAV): FIRST CLINICAL EXPERIENCE WITH THESE NEW MODES OF PRESSURE SUPPORT IN INTUBATED PATIENTS

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Background: Triggered inspiratory pressure support ventilation (IPS) is commonly used to support inspiration in intubated spontaneously breathing patients. Despite its usefulness IPS shows some disadvantages which can be deleterious in critically ill patients:
- additional work of breathing to be performed by the patient due to the flow-dependent tube resistance
- desynchronization between patient and ventilator due to inherent triggering failures of the IPS mode
- suppression of the patient's inherent breathing pattern
- inability to predict successful extubation in difficult-to-wean patients

Methods: Based on the known flow-dependent tube resistance our new mode "automatic tube compensation" (ATC) compensates for the pressure drop across the endotracheal tube ("electronic" extubation). Then, if necessary, tracheal pressure can be supported by volume-proportional pressure support (VPPS) and/or by flow-proportional pressure support (FPPS).
Results: Hitherto, we have examined 20 patients after open-heart surgery and 50 patients with acute respiratory insufficiency (ARI) or ARDS using ATC with/without VPPS/FPPS. Preliminary results suggest that the new mode
- avoids additional work of breathing due to accurate compensation of the pressure drop across the endotracheal tube during in-/ expiration
- prevents desynchronization between patient and ventilator
- allows patients to breathe with their inherent breathing pattern
- accurately predicts the outcome of extubation even in difficult-to-wean patients due to "electronic" extubation

Conclusions: The new mode ATC with/without VPPS/FPPS allows to support ventilation in a more physiologic manner and overcomes the disadvantages of conventional modes of pressure support in intubated patients.

IN VIVO DETERMINATION OF TUBE COEFFICIENTS FOR COMPLETE AUTOMATIC TUBE COMPENSATION (ATC)

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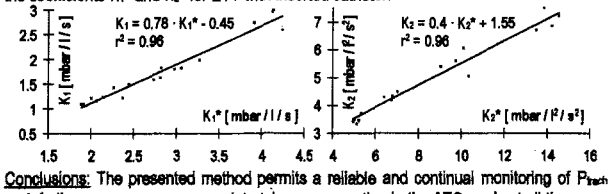
Objectives: In contrast to conventional modes for pressure supported spontaneous breathing, our newly developed ventilatory mode „Automatic Tube Compensation" (ATC) completely compensates for the flow-dependent pressure drop ΔP_{ETT} across the endotracheal tube (ETT). In the ATC mode, the ventilator supplies a flow V' in order to maintain a constant tracheal pressure P_{trach}. To this end, P_{trach} has to be continuously determined. Since continued measurement of P_{trach} by introducing a catheter via the ETT is not reliable, we opted for its continuous calculation according to the following equation: $P_{trach} = P_{aw} - \Delta P_{ETT}$, P_{aw} being the continuously measured airway pressure. This also requires the continual measurement of flow V' to calculate ΔP_{ETT} using the non-linear approximation: $\Delta P_{ETT} = K_1 \cdot V' + K_2 \cdot V'^2$. The constant tube coefficients K_1 and K_2 are mathematically determined by means of a least-squares-fit procedure based on laboratory investigations. Tracheal secretions, however, reduce the cross-section of the ETT. Consequently, the values of K_1 and K_2 are changed rendering the P_{trach} calculations inaccurate. Therefore, K_1 and K_2 have to be periodically updated to ensure an accurate monitoring of P_{trach} and a complete tube compensation under ATC at any time.
Methods: For updating K_1 and K_2, P_{trach} is measured only for a few consecutive breaths by means of a catheter introduced into the ETT. As the catheter itself partially obstructs the ETT, merely the coefficients K_1^* and K_2^* for ETT with catheter inside can be computed online using a least-squares-fit procedure. To reveal the relationship between K_1 and K_1^* and between K_2 and K_2^*, the pressure drop ΔP_{ETT} of conventionally used ETTs of different lengths and inner diameters with and without inserted catheter was measured in order to determine both pairs of coefficients.
Results: A linear relationship was found between K_1 and K_1^*, as well as between K_2 and K_2^*. Thus, the current tube coefficients K_1 and K_2 can be easily calculated on the basis of the coefficients K_1^* and K_2^* for ETT with inserted catheter.



Conclusions: The presented method permits a reliable and continual monitoring of P_{trach} and, furthermore, ensures a complete tube compensation in the ATC mode at all times.

ADDITIONAL WORK OF BREATHING (WOB_{add}) DURING INSPIRATORY PRESSURE SUPPORT (IPS) AND AUTOMATIC TUBE COMPENSATION (ATC)

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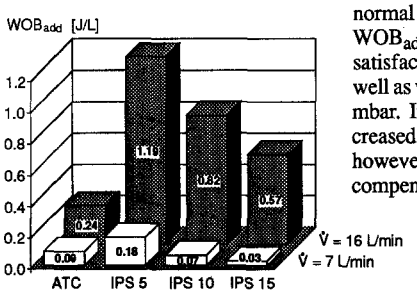
Background: The intubated and spontaneously breathing patient often has to perform additional work of breathing (WOB_{add}) to overcome the resistance of the endotracheal tube (ETT) and the demand-flow valve. To avoid WOB_{add} we developed a new mode of ventilatory support during spontaneous breathing. This mode automatically compensates for the ETT resistance (automatic tube compensation, ATC), independently of the patient's breathing effort. As WOB_{add} can also be lowered with conventional inspiratory pressure support (IPS) it was the aim of our study to investigate WOB_{add} in both ventilatory modes in patients with different ventilatory demands.

Patients and methods: We measured WOB_{add} in 6 post-operatively ventilated patients without lung injury (minute ventilation V'=7L/min) and in 4 patients with acute respiratory insufficiency (V'=16L/min) both under ATC and under IPS of 5, 10 and 15mbar.



Results: In patients with normal minute ventilation WOB_{add} compensation is satisfactory with ATC as well as with IPS of 10 or 15 mbar. In patients with increased minute ventilation, however, only ATC can compensate for WOB_{add}.

IMPACT OF SEDATION AND RELAXATION ON LUNG AND CHEST WALL MECHANICS

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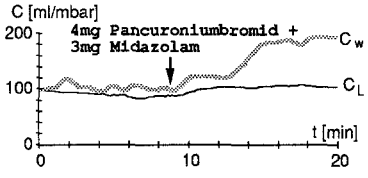
Background: One of the first steps in weaning patients from controlled mechanical ventilation is to stop muscle relaxation and to reduce sedation. It can take several hours, however, until the patient is able to trigger the ventilator and to breathe spontaneously. During this period, many patients display a sudden increase in peak airway pressure of up to 30%.

Patients and methods: To investigate the reason for this potentially dangerous effect, we continuously measured lung and chest wall mechanics in post-operatively ventilated patients. Lung mechanics (airway resistance and lung compliance) was measured using the esophageal balloon technique as described in [1]. Chest wall mechanics (tissue resistance and chest wall compliance) was calculated from lung mechanics and total respiratory system mechanics as described in [2].

Results: We found a decrease of chest wall compliance (C_w) to be the main reason for episodes of sudden airway pressure increase while lung compliance (C_L) remained unchanged. The decrease of C_w can be interpreted as an instantaneous increase of ventilatory muscle tension. Consequently, muscle tension can be decreased and C_w can be increased again by administration of sedatives and muscle relaxants as shown in the figure.



Conclusion: We conclude that when reducing sedation and relaxation under controlled mechanical ventilation, a pressure limited mode should be preferred to avoid an excessively high pressure load on the lungs.

1 Brunner JX, Wolff G. Pulmonary function indices. Berlin: Springer, 1988
2 Guttmann J et al. Technology and Health Care 1994; 2:175-191

REALISATION OF AUTOMATIC TUBE COMPENSATION (ATC) WITH PROPORTIONAL ASSIST VENTILATION (PAV) IN AN EXPERIMENTAL AND A COMMERCIAL VENTILATOR

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Background: Two major problems arise during ventilatory support of intubated, spontaneously breathing patients: additional work of breathing and patient-ventilator desynchrony. Both problems are caused by technical inadequacies: the flow-dependent resistance of the endotracheal tube and the unphysiological time-course of the inspiratory pressure support. We therefore developed a new mode of ventilatory support for automatic compensation of the endotracheal tube resistance (ATC) by closed-loop control of the calculated tracheal pressure. For additional support we deliver a volume- and flow-proportional increase of the tracheal pressure (PAV). This mode is realised in an experimental ventilator described in [1]. Recently, a similar mode was implemented in a test line of a commercial ventilator (EVITA 2, Dräger, Lübeck). The purpose of our study is to compare the two ventilators.

Patients and methods: *Experimental ventilator:* The pneumatic piece of equipment is taken from an EVITA 1 ventilator. The inspiratory and expiratory pneumatic valves are controlled by an external micro-controller programmed with our algorithms. Sensors for measuring P_{aw} and V' are close to the patient (20cm away). A blower at the end of the expiratory branch produces a subatmospheric pressure for complete expiratory tube compensation. *Commercial ventilator:* P_{aw} and V' are measured inside the ventilator (1.8 m away from the patient). No blower is used, thus P_{aw} cannot be lowered to subatmospheric values. We investigated the characteristics of both ventilators in an active lung model as well as in patients needing ventilation due to a variety of reasons.

Results: Compared to the experimental ventilator, operation and usage of the commercial ventilator is simple and save. The placement of the sensors far from the patient, however, causes a larger response time which leads to greater deviations of the tracheal pressure from the target value. Furthermore, in patients with low end-expiratory pressure (PEEP), the tube compensation during expiration is incomplete.

1 Fabry B et al. Automatic compensation of endotracheal tube resistance in spontaneously breathing patients. Techn. Health Care 1994; 1:281-291

HYPOTENSION AT THE BEGINNING OF MECHANICAL VENTILATION: A CLINICAL STUDY

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OBJECTIVE: 1) To determine the incidence of hypotension (H) associated with emergency intubation of mechanical ventilation, and 2) to establish its relationship with respiratory mechanics (RM) and arterial blood gases.

METHODS: 50 adult medical patients who had endotracheal intubation and mechanical ventilation performed in the Emergency Room, in a prospective consecutive manner, were evaluated. Data collected included patient demographics, diagnoses, blood pressure and arterial blood gas levels before and after intubation, and RM, including calculated pulmonary end-inspiratory volume above Functional Residual Capacity (VEIc) and calculated dynamic hyperinflation (DHc). All patients received midazolan and atracurium to facilitate tracheal intubation and RM measurement. Hypotension was defined as a decrease in systolic pressure higher than 40 mmHg or an absolute decrease in systolic blood pressure below to 90 mHg within 1 hour of intubation. 14 patients were excluded because met at least one of the following exclusion criteria: preexisting shock or H (8), cardiac arrest (5) and barotrauma (1).

RESULTS: 12 of 36 patients (33%) developed H and 8 of them had severe chronic air-flow obstruction (CAO) as cause of ventilatory failure (45% of all patients with this diagnosis). Data of RM are show in the following table:

	PD	Ps	PEEPi	Crs	Ri	VEIc *	DHc *
with H	30.4 ± 1	19.5 ± 1	8.3 ± 1	59.8 ± 7	17.9 ± 1	1134 ± 134	559 ± 135
without H	30.7 ± 1	19 ± 1	6.8 ± 1	50.5 ± 4	17.9 ± 1	892 ± 64	352 ± 66

* $p < 0.1$

There weren't any association between PEEPi or other airway pressures (Paw) and H, but calculated pulmonary volumes had tendency to be larger in patients with H ($p < 0.1$). High $PaCO_2$ before tracheal intubation (87.4 ± 9 mmHg) with a quickly decrease after starting mechanical ventilation was a usual finding ($p < 0.01$) in patients who developed H.

CONCLUSIONS: 1) There was a high incidence of H (33%). 2) H was not related to Paw. 3) There was a good relationship between H and high arterial $PaCO_2$ before traqueal intubation and its fast "washing" with mechanical ventilation. 4) Because CAO patients had the highest incidence of H, controlled mechanical hypoventilation driven by $PaCO_2$ changes and pulmonary volumes monitoring instead Paw, should be attempted in these patients to avoid this complication after tracheal intubation.

COMPENSATION OF THE ADDED WORK OF BREATHING USING INSPIRATORY PRESSURE SUPPORT (IPS) AND AUTOMATIC TUBE COMPENSATION (ATC)

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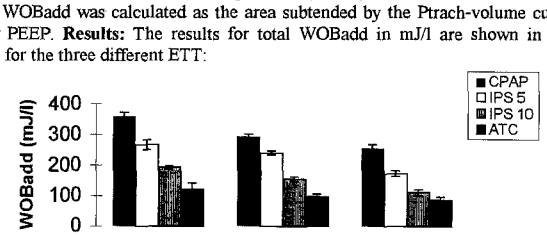
Introduction: The endotracheal tube (ETT) and demand valve devices cause an added work of breathing (WOBadd), which is the work necessary to overcome the resistive load of the ETT and the breathing circuit (1). Application of IPS has been shown to partly compensate this added work (1). Since the amount of WOBadd is flow dependent, a fixed IPS is not adequate to completly compensate the WOBadd (2). Therefore, ATC has been developed as a new form of assisted spontaneous breathing (3), which provides a flow-dependent pressure support. Thereby, it theoretically should compensate all the WOBadd due to the tube. The purpose of this study was to evaluate the reduction of WOBadd with IPS and ATC for different ETT. **Methods:** A mechanical lung model (LS 4000, Dräger, Lübeck, FRG) was used to generate a constant spontaneous breathing pattern. The LS 4000 was connected to an artificial trachea (AT, 10 cm long, 22 mm ID). The AT was intubated with three different tubes of 7.0, 8.0, 9.0 mm ID and connected to an Evita 2 ventilator modified to provide ATC as an option (Dräger, Lübeck, FRG). Flow and airway pressure were measured between the y-piece and the ETT for four different modes of ventilation: CPAP, IPS of 5 and 10 cm H_2O and ATC all with a PEEP of 10 cm H_2O. The tracheal pressure (Ptrach) was measured in the AT. Total WOBadd was calculated as the area subtended by the Ptrach-volume curve below PEEP. **Results:** The results for total WOBadd in mJ/l are shown in the figure for the three different ETT:



Conclusion: For all investigated ETT, ATC leads to a reduction of WOBadd to its minimal value. **References: 1.** Intensive Care Med (1988) 14: 632-639. **2.** Schriftenreihe INA (1994) 84: 79-99. **3.**Technology and health care (1994) 1: 281-291

EVALUATION OF FACIAL MASK PRESSURE SUPPORT VENTILATION (FMPSV) DURING ACUTE CARDIOGENIC PULMONARY EDEMA (26 cases)

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Non invasive positive pressure support ventilation has been proposed as an efficient alternative to conventional mechanical ventilation during acute respiratory failure(ARF).
Objectives : assess the efficacy of FMPSV during acute cardiogenic pulmonary edema (ACPE) and evaluate the criteria of failure.
Methods : 26 patients consecutively admitted in the ICU for ACPE were prospectively included : age (mean±sd) : 74±13 years, Simplified Acute Physiologic Score SAPS1 : 11.3±4.1, SAPS2 : 24.9±23.5, Echocardiographic Left Ventricular Shortening Fraction : 27.8±8.6%. On admission, FMPSV was started with the following initial parameters : FiO2 .93±.17, level of pressure support : 25±4.8 cm H2O, PEEP 3.5±2.3 cm H2O. Failure of FMPSV was defined by the necessity of invasive ventilation (after tracheal intubation) within the first 48 hours. Statistical analysis was made by non parametric tests and t-test.
Results : under FMPSV, all patients showed an immediate (within 15 min) improvement, with reduced RR ($p<.001$) and PaCO2 ($p<.05$), increased SpO2 ($p<.001$), PaO2 ($p<.001$) and pH ($p<.001$), baseline versus 15th min and 60th min. The weaning of FMPSV was possible in mean after 19±24 hours in the Success group (21/26).

		RR	SpO2	pH	PaO2	PaCO2	CPK
Baseline	S	36±5.3	84.7±13	7.25±12	61±15	53.5±17	176±149
	F	36±3 NS	82.2±17 NS	7.34±09 NS	59.8±27 NS	31.9±2.1**	1282±2080*
15th min	S	22±5	96.3±4				
	F	20±3 NS	92.6±5 NS				
60th min	S	19±5	97.7±4	7.34±07	270±126	43.4±6.4	
	F	16±5 NS	95.8±2 NS	7.39±09 NS	181±157 NS	29.4±1.8**	

Legend : PaO2-PaCO2 : mmHg, SpO2 : %, CPK : Creatine Phosphokinase : UI/l, RR : Respiratoy Rate: breath/min, S=success, F=failure, *=p<.05, **=p<.01, NS = non significant, F versus S
Nevertheless, in 5/26 patients, invasive ventilation was necessary in mean 12.6±12 hours after beginning of FMPSV. There was no significant difference between the two groups (Success, Failure) in following parameters : sex, age, previous history, medical treatment, SAPS1 & 2, clinical signs (RR, SpO2, Heart Rate, Blood Pressure, Glasgow Score...), radiological and echocardiographic findings and standard biological parameters. Only two parameters were related with Failure : *1.a low value of PaCO2* on admission until the patients were intubated. *2. an increased level of CPK* in relation with an acute myocardial infarction (4/5 cases in the failure group, vs 3/21 cases in the Success group, X^2(with continuity correction) : $p<.05$).
Conclusion : FMPSV is a noninvasive, safe, rapidly effective method of treatment in ACPE, which may avoid tracheal intubation. Further studies are necessary to precise if association of ARF and low PaCO2 (<35mmHg) and/or acute myocardial infarction represents an indication of immediate invasive ventilation.

ADDED WORK OF BREATHING FOR DIFFERENT LEVELS OF INSPIRATORY PRESSURE SUPPORT (IPS) IN FOUR DIFFERENT VENTILATORS

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Introduction: Since the added work of breathing (WOBadd) imposed by the endotracheal tube (ETT) and the breathing circuit is regarded as an important contribution to the total work of breathing, considerable effort has been undertaken to compensate for this added work. IPS has been found to decrease the WOBadd imposed by different ventilators (1, 2). Because of the flow dependent pressure drop across the ETT the tracheal pressure (Ptr) should be measured to estimate the total imposed WOBadd (WOBtot) (3, 4). The aim of this study was to assess the circuit imposed work (WOBcirc) and WOBtot (including ETT) for different demand valve ventilators during CPAP and IPS. **Methods:** A mechanical lung model (LS 4000, Dräger, Lübeck, FRG) generated a constant spontaneuos breathing pattern. The LS 4000 was connected to an artificial trachea (AT), intubated with an 8.0 mm ETT, and connected to one of four ventilators (Servo 900C and Servo 300, Siemens,- Elema, Sweden; Evita2, Dräger, Lübeck, FRG; PB 7200ae, Puritan Bennett, Carlsbad, USA). Three different modes of ventilator settings were tested (CPAP, IPS 5 and 10 mbar; trigger set at maximal sensitivity, PEEP always 10 mbar). Flow and airway pressure (Paw) were measured between the y-piece and the ETT; tracheal pressure (Ptr) was measured in the AT. WOBtot was calculated as the area under the Ptr-volume curve below PEEP, WOBcirc was calculated as the area under the Paw-volume curve below PEEP. **Results:** In the table WOBtot, WOBcirc, minimal and maximal Paw (Pawmin, Pawmax), minimal and maximal Ptr (Ptrmin, Ptrmax) are given for each ventilator and each mode of ventilation. Data are expressed as mean ± standard deviation.

ventilator	mode	WOBtot (mJ/l)	WOBcirc (mJ/l)	Pawmin (mbar)	Pawmax (mbar)	Ptrmin (mbar)	Ptrmax (mbar)
Servo 900	CPAP	274,3±43,9	11,7±6,7	4,0±0,2	14,5±0,1	2,7±0,1	14,7±0,2
	IPS 5	213,7±66,3	6,9±2,9	4,2±0,1	16,5±0,1	3,0±0,1	16,6±0,1
	IPS 10	165,5±11,4	3,9±0,4	4,3±0,2	20,9±0,2	3,2±0,1	20,8±0,1
Servo 300	CPAP	222,8±30,1	12,8±6,3	4,8±0,1	13,2±0	3,4±0,1	13,4±0
	IPS 5	153,1±9,8	4,7±1,3	6,0±0,1	16,5±0	4,7±0,1	16,8±0
	IPS 10	96,2±10,9	2,7±0,9	5,3±0	21,8±0	4,5±0,1	22,1±0,1
PB7200ae	CPAP	374,6±18,1	126,5±7,8	6,7±0,1	11,3±0,2	3,8±0,1	11,4±0,1
	IPS 5	186,3±11,3	1,4±0,2	8,4±0,1	15,8±0,1	6,3±0,1	15,0±0,3
	IPS 10	78,8±16,2	2,3±0,8	8,3±0,1	20,6±0,2	8,0±0,1	19,3±0,2
Evita 2	CPAP	292,7±8,0	51,2±6,0	7,8±0,1	12,2±0,3	5,1±0,1	12,5±0,2
	IPS 5	239,6±7,4	11,6±1,4	7,7±0,3	14,8±0,3	5,6±0,1	15,0±0,1
	IPS 10	141,8±11,5	7,0±3,6	7,8±0,5	19,3±0,3	6,3±0,2	19,3±0,2

Conclusions: For all ventilators the WOBtot is much higher than WOBcirc. IPS almost eliminates WOBcirc, whereas WOBtot is only incompletely compensated. Differences between ventilators can partly be attributed to different levels of pressurization. **References: 1.** Intensive Care Med 1988; 14:632-39. **2.** Chest 1988; 93:499-505. **3.** Crit Care Med 1992; 20:528-33. **4.** Schriftenreihe INA1994; 84:79-99.

ASSESSMENT OF THE AIRWAY OCCLUSION METHOD TO ESTIMATE RESPIRATORY SYSTEM COMPLIANCE (Cpl,rs) DURING PRESSURE SUPPORT VENTILATION (PSV)

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Aim of the study was to assess Cpl,rs measurement obtained by the airway occlusion method during PSV. We therefore studied 31 paralyzed CPPV ventilated ALI patients (Lung Injury Score =2.25±0.6) that were weaned to PSV. We performed end inspiratory and end expiratory airway occlusions using the hold function of the ventilator (Siemens Servo 900C), first during CPPV and then within the 24th PSV hour.
Airway pressure and flow signals were recorded (CP100 BICORE) for subsequent analysis. An airway pressure plateau was defined as a 0 flow tracing in which airway pressure was stable for at least 0.25 sec. End inspiratory (Pel,rsi) and end expiratory (Pel,rse) recoil pressures were then measured as the mean airway pressure during plateaus. Cpl,rs was computed as TV/(Pel,rsi-Pel,rse). The inspiratory (Tpl,insp) and expiratory (Tpl,exp) plateau times, P0.1 and respiratory rate were measured on PSV tracings.
The following correlation was found: Cpl,PSV = 1.4+0.98*Cpl,CPPV (ml/cmH2O), r=0.945 ($p<0.001$).
Tpl,insp (2.22±1.18 sec) was longer than Tpl,exp (1.59±1.08 sec) ($p<0.005$). Tpl,insp was negatively correlated to respiratory rate ($r=0.42$ $p<0.02$). Tpl,exp was negatively correlated with both respiratory rate ($r=0.59$ $p<0.001$) and P0.1 ($r=0.453$ $p<0.02$).
CONCLUSIONS: 1) Cpl,rs can be adequately estimated during PSV using the airway occlusion method; 2) During PSV inspiratory plateaus are longer than the expiratory ones; 3) The length of plateaus is negatively affected by the respiratory drive.

WEANING FAILURE FROM VOLUME CONTROLLED VENTILATION (VCV) TO PRESSURE SUPPORT VENTILATION (PSV) IN ALI PATIENTS: GAS EXCHANGE AND CT SCAN FINDINGS

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We retrospectively compared CT scan and gas exchange findings between a group of patients successfully weaned from VCV to PSV (group S = 11 patients) and a group who failed the weaning (group F = 6 patients). We selected 17 ALI patients (LIS=2.5±0.4) in VCV mode who had available a chest CT scan performed within 4 days from the weaning trial. A PSV trial was began as soon as the patient reached hemodynamic stability and a PaO2 >80 mmHg, irrespective of FiO2 (PEEP <15 cmH2O). Maximum PSV level was < (Pel,rs-PEEP) measured during VCV, where Pel,rs was the respiratory system elastic recoil pressure at end inspiration. PSV ventilation was considered successful if a respiratory rate <40 bpm, an increase in FiO2 lower than 0.2 compared to VCV, a PaCO2 increase <20% of VCV value and hemodynamic stability were maintained during the next 48 hours of PSV. If any of these conditions was not met the trial was declared a failure. Three end expiration chest CT scans (apex,hilum and base level) were taken at the clinical PEEP and were observed by a radiologist unaware of the trial, who counted all airspace overdistentions (bullae) larger than 1 cm in each patient.

	Group S	Group F	
PaCO2 (mmHg)	49.8±11.8	64.9±11.8	p<0.05
Vd/Vt (%)	54.8±11	69.9±11.6	p<0.05
Bullae(n°)	0.8±1.1	5±5	p<0.05

PaO2/FiO2, PEEP, VE, TV and Murray Score values did not differ between groups. **CONCLUSIONS:** 1) patients belonging to Group F showed higher dead space fraction compared to Group S, and an increased number of bullae; 2) no differences in oxygenation derangement were found.

PaCO2 AND ACID BASE CHANGES DURING WEANING FROM CONTROLLED VENTILATION (CV) TO PRESSURE SUPPORT VENTILATION (PSV) IN ALI PATIENTS

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We wished to investigate PaCO2 and acid base changes in ALI patients weaned from CV to PSV. We retrospectively analyzed the weaning trials of a general population (G) of 46 ALI patients, all free of COPD and of any neurological impairment. Muscle relaxants were administered during CV. We also isolated a subset (H) of 12 patients who had been hypercapnic (PaCO2>50mmHg) for at least 3 days (range 3 to 60 days) before the end of CV. The PSV trial was started as soon as PaO2 was > 80 mmHg, irrespective of FiO2 and with PEEP < 15 cmH2O and the PSV level had to be < (Pplateau-PEEP) as measured during CV.
PaCO2, pHa, base excess (BE) were collected before discontinuation of CV and on the 1st day of PSV:

	CV (G)	PSV (G)	CV (H)	PSV (H)
PaCO2 (mmHg)	50.0±11.7 *	43.8±4.5	64.7±9.7 *	49.3±7.6
pH	7.404±.054 *	7.442±.054	7.386±.042 *	7.460±.049
BE(mEq/l)	5.2±5.1	5.2±4.1	11.0±4.9	9.6±3.4

* p<0.01 CV vs. PSV
Both the general population and its hypercapnic subgroup showed a trend to PaCO2 normalization, going from CV to PSV, with resulting alkalemia. In fact, the PaCO2 change (DPaCO2 = PaCO2(CV) - PaCO2(PSV)) was related to PaCO2(CV) both in group G (DPaCO2 = 0.71 * PaCO2(CV) - 29.4, r = 0.83) and in group H (DPaCO2 = 0.67 * PaCO2(CV) - 28, r = 0.69). These data suggest that CV with hypercapnia lasting longer than 3 days does not guarantee maintenance of increased PaCO2 during PSV, despite adequate compensation of acidosis.

EFFECT OF PEEP ON CARDIAC OUTPUT VALUES MEASURED BY ELECTRICAL BIOIMPEDANCE

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Objective: To assess the degree of correlation of cardiac output measured by thoracic electrical bioimpedance and thermodilution in mechanically ventilated patients with different levels of positive end-expiratory pressure (PEEP).

Methods: Prospective study with 10 ventilated patients, 7 after head injury and 3 with postoperative sepsis, with normal cardiac output. Simultaneous determination of cardiac output by thermodilution and thoracic electrical bioimpedance performed with different levels of PEEP (0-5-15 cm H2O).

Results: Cardiac output measured by thermodilution during sequential increment of PEEP did not vary: 7.3 ± 2.5 for PEEP 0, 7.4 ± 2.7 for PEEP 5 and 6.9 ± 1.7 L/min for PEEP 15. Simultaneously the bioimpedance device recorded a significant increase in cardiac output from 4.4 ± 1.3 for PEEP 0 to 6.0 ± 1.9 L/mi for PEEP 15. ($P < 0,05$).

Conclusion: Cardiac output measured by bioimpedance cannot replace the invasive thermodilution methods of cardiac measurement output during mechanical ventilation with PEEP.

ARDS IN MULTIPLE TRAUMA PATIENTS (MTP) IN AN ICU.

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Objectives: To study ARDS in MTP in an ICU and estimate the prognostic factors.
Patients(pts) and methods: From 181 MTP who entered in the ICU, 41(22,5%) developed ARDS, 33 ♂ (80,5%), 8 ♀ (19,5%). Mean age:51,3±10,9 years(21-81). Mean stay in ICU:18,4±6,7 days(5-94).30 pts(73,2%) had had emergency operation(abdomen,CNS) and 20(48,8%) multiple blood transfusion. Major injuries:Head injury 14(34,1%), ribs fractures 6(14,6%), fractures of upper limbs 7(17,1%), fractures of pelvis and lower limbs 17(41,5%), rupture of spleen or and liver 23(56,1%), spinal cord injury 2 (4,9%),other 5(12,2%).Mean injury severity score (ISS): 32,1±6,7.
Results: Before mechanical ventilation (MV) under controlled oxygenotherapy FiO_2:0,5: Mean PaO_2:49,8±5,5 mmHg, $PaCO_2$:32,3±3,1 mmHg. Under MV: Mean FiO_2 of the respirator during the first 48h:0,62±0,08. Mean PEEP: 7,3±1,6 cm H_2O. Mean duration of MV: 12,0±3,4 days. Compliance: 23,4±7,1 ml/cm H_2O. Time of weaning:2,6±1,2 days. Mortality rate: 18/41=43,9%.
Conclusions: 1)MTP who develop ARDS have worse prognosis than MTP without ARDS($p<0,05$). 2) Weaning is more difficult in pts with head injury($p<0,05$) and ISS>30 ($p<0,01$), in elderly($p<0,05$) and in pts who need FiO_2>0,6 ($p<0,05$) and PEEP>10 cm H_2O ($p<0,05$). 3) Pts with ISS>30 need longer duration of MV ($p<0,01$). 4) The mortality rate is higher in pts with ISS>30 ($p<0,001$), with head injury ($p<0,01$) and in elderly ($p<0,05$). 5) Paradoxally, compliance was found to be higher in pts>60 years than in pts<60 years ($p<0,05$).

THE EFFECTS OF EXTRINSIC PEEP ON LUNG INFLATION AND REGIONAL COMPLIANCE IN MECHANICALLY VENTILATED COPD PATIENTS: A CT SCAN STUDY.

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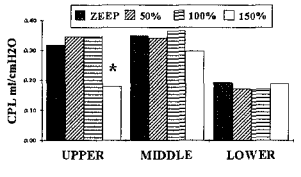
Objectives. We investigated by CT scan the effects of extrinsic PEEP (PEEPe) on lung inflation, tidal volume distribution and regional compliance in sedated, paralyzed chronic obstructive pulmonary disease (COPD) patients with dynamic hyperinflation (PEEPi).

Methods. Two CT section (end expiration, end inspiration) were obtained at lung base level in 4 patients (individual analysis for each of the eight lungs) at 4 PEEPe levels: PEEPe = 0 cmH2O (ZEEP) and PEEPe amounting to 50%, 100% and 150% of the PEEPi at ZEEP (9.5 ± 4 cmH2O). Tidal volume was kept constant (8 ± 1.4 ml/kg). Each lung section was divided into 3 zones equally spaced along the vertical axis: UPPER (the most ventral), MIDDLE and LOWER (the most dorsal) zone. For each zone we computed: gas volume at end expiration (GASe) and at end inspiration (GASi), tidal volume (DGAS=GASi-GASe) and compliance (Cpl=DGAS/DP;.DP=plateau pressure-actual PEEPi). We also computed the lung inflation as the entire CT section gas volume at end expiration (total GASe).

Results. At each PEEP level both GASe and GASi were higher in the UPPER than in the LOWER zone (at ZEEP respectively 39±6 *vs* 28±7 % and 38±6 *vs* 28±7 %, p<0.05). Up to PEEPe= 100%PEEPi we observed a vertical gradient of DGAS distribution (higher DGAS in the UPPER than in the LOWER zone, at ZEEP 37±14 *vs* 27±24 %, p<0.05). The total GASe slightly increased at PEEPe= 100%PEEPi. At PEEPe= 150% of PEEPi the total GASe markedly increased (89±25 vs 82±30ml at ZEEP, p<0.001), while the DGAS vertical gradient was no more observed and the UPPER zone Cpl decreased (*p<0.01) compared to ZEEP.



Conclusions. We conclude that in COPD patients with dynamic hyperinflation only the application of PEEPe higher than PEEPi produces a further increase of lung inflation, decreasing Cpl of the UPPER zone (the more expanded one) probably by stretching phenomena, and causing DGAS redistribution from the non dependent to the dependent lung zones.

EFFECTS OF POSITIVE END-EXPIRATORY PRESSURE (PEEP) IN PATIENTS WITH ACUTE AND CHRONIC LUNG DISEASE DURING PRESSURE SUPPORT (PS) VENTILATION.

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Objectives: To investigate the effects of PEEP and PS on respiratory pattern and inspiratory effort during PS ventilation in patients with acute lung injury or acute exacerbation of chronic lung disease.

Methods: 4 pts with acute (A) ($PaCO_2$= 39±1.7 mmHg, PaO_2/PAO_2= 0.4±0.1) and 4 pts with chronic (C)($PaCO_2$= 51±15 mmHg, PaO_2/PAO_2= 0.3±0.1) lung disease were studied in PS ventilation during the weaning phase. Measuring airway pressure, esophageal pressure and gas flow we computed respiratory rate (RR, bpm), tidal volume (TV, ml) and pressure time product (PTP, cmH2O*s/min), which is an index of oxygen muscle consumption. Measurements were collected, after 15 min of stabilization, at 5 and 15 cmH2O PS and at two different PEEP levels (0 and 8 cmH2O).

Results: Data, expressed as mean ± SD.

PS	5				15			
PEEP	0		8		0		8	
Pts	A	C	A	C	A	C	A	C
TV	570 ± 328	285 ± 50 *	584 ± 384	305 ± 58 *	680 ± 265	339 ± 75 *#	748 ± 420	381 ± 86 *#
RR	22 ± 8	35 ± 6 *	21 ± 10	29 ± 6 *	19 ± 10	29 ± 3 *#	17 ± 10	26 ± 1 *#
PTP	198 ± 80	357 ± 63 *	165 ± 81	246 ± 68 °	166 ± 83	130 ± 104 #	105 ± 86	50 ± 34 °#

* P<0.05 A vs C; ° P<0.01 PEEP 0 vs 8; # P<0.05 PS 5 vs 15

Conclusions: During PSV: 1) breathing pattern and PTP are different between A and C; 2) in both groups PEEP does not modify breathing pattern; 3) PEEP reduces PTP in C but not in A; 4) PS modifies breathing pattern and reduces PTP in C but not in A.

EVALUATION OF A NEW HEAT AND MOISTURE EXCHANGER WITHOUT HYGROSCOPIC SALTS.

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OBJECTIVE: To test the performance of a new heat and moisture exchanger (HME): Twistair, Baxter. This is a hydrophobic-hydrophilic HME without hygroscopic salts.

METHOD: We evaluated the HME performance with a previously described method (1); it consists of a "lung simulator" connected to a mechanical ventilator and a flow divider, with a dry and a wet thermal probe inserted into inspiratory and expiratory limbs. Absolute humidity (AH) is calculated, from wet and dry temperatures, using Carrier's tables. Mechanical ventilator was adjusted at a tidal volume of 500 ml and a respiratory rate of 20 bpm. Measurements were made at 1 hr and 24 hrs. Room temperature was maintained within 23±1 °C.

RESULTS: AH values (mg H_2O l^{-1}) are reported as mean ± S.D.

1 hr	24 hrs
28,83±0,55	28,53±1,10

CONCLUSIONS: The tested HME provides an adequate humidification of airways for anaesthesia procedures even if no hygroscopic salts are used.

REFERENCE: Intensive Care Med. 1993; 19:351-2.

EFFECTS ON WORK OF BREATHING AND GAS EXCHANGE OF DIFFERENT INSPIRATORY FLOW RATES DURING PRESSURE SUPPORT VENTILATION.

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OBJECTIVE: To investigate whether variations in peak inspiratory flow (PIF) would affect ventilatory and blood gas variables during pressure support (PS) ventilation.

METHODS: We studied 7 pts, connected to Bear 1000 and ventilated at costant PS (15 cm H_2O), PEEP (5±2 cm H_2O) and F_IO_2 (0.47±0.15). Measuring gas flow, airway and esophageal pressures we computed PIF, tidal volume (VT), respiratory rate (RR), work of breathing per minute (WOB/min), and respiratory drive (P0.1). We changed the pressurization rate (PR) and PIF at three different levels: lowest, highest and optimal. Optimal pressure slope was defined as that resulting in minimum WOB/min. Measurements were collected after 15 min of stable ventilation.

RESULTS: Data are presented as mean ± S.D.

	LOWEST	HIGHEST	OPTIMAL
PIF(l/s)	0.46±0.1	1.09±0.1	0.79±0.2 *
TV(ml)	361±258	399±59	429±174
RR(bpm)	27±7	30±10	24±8 *
WOB/min(J/min)	9.7±7.1	2.6±2.7	0.9±1.2 *
P0.1(cm H_2O)	3.3±2.3	1.8±1.1	1.1±0.5 *
P_aO_2(mmHg)	85±17	84±13	84±19
P_aCO_2(mmHg)	33±4	34±3	34±3

* p<0.01 Optimal vs Lowest and Highest PR

CONCLUSIONS: The ability to adjust PR and PIF during PS ventilation is an important tool to provide optimal PS, while seems to have no significant effects on gas exchange.

ANALYSIS OF P0.1 RESPONSE TO STEP CHANGES IN PRESSURE SUPPORT (PS) LEVEL

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P0.1, an index of respiratory drive, has been shown to decrease with increasing PS levels, and viceversa. However, P0.1 susceptibility and response time, relative to PS changes, still remain to be explored. **Methods.** We studied 5 patients in PS ventilation for ARF, with normal respiratory centre function. P0.1 was continuously measured by means of an automatic breath analyser during 3 consecutive PS steps of 15 min each. The first step (BPSstart) and the third step (BPSend) corresponded to the PS level applied to each patient previously to the beginning of the study, while the second step (BPS+8) corresponded to an increase of 8 cmH2O in PS level. The P0.1 breath-by-breath values were filtered by a moving median filter (n=5). After identification of steady state for each step, the P0.1 90% response time was measured, by graphical analysis, both for the rising PS period (P0.1 T90rise) and for the falling PS period (P0.1 T90fall).

Results and conclusions. The table shows individual and mean values for steady state P0.1 in each step, and for the P0.1 T90's. Mean P0.1 steady state values were compared with the Friedman test, mean T90's with the Spearman test.

N° patients	P0.1 BPSstart (cmH2O)	P0.1 BPS+8 (cmH2O)	P0.1 BPSend (cmH2O)	P0.1 T90rise (sec)	P0.1 T90 fall (sec)
1	2.5	0.8	1.7	25	52
2	1.7	0.5	1.5	16	16
3	2.6	1.5	2.7	82	200
4	2.7	1.6	3.5	50	100
5	2.7	1.2	2.6	65	120
m±sd	2.4±.42	1.1±.47	2.4±.81	47.6±27.4	97.6±70.2

P0.1 changes were opposed to PS changes, homogeneous and major (p=.02). In contrast, the T90's were inhomogeneous, ranging from 16 to 200 sec. Average P0.1 T90fall was longer than average P0.1 T90 rise ($p<.05$), which indicates that P0.1 responded much slower to falling PS than to rising PS. P0.1 can be controlled by the PS level. However, the response time of P0.1 to PS seems difficult to be predicted, widely varying between patients, and varying with the direction of the PS change.

P0.1 AND RESPIRATORY RATE RESPONSES TO STEP CHANGES IN PRESSURE SUPPORT (PS) LEVEL

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Increasing levels of PS lead to progressive de-recruitment of the respiratory muscles, and viceversa. Both P0.1 and respiratory rate (RR) reflect patient's respiratory activity and have been suggested as variables for guiding an automatic feedback regulation of PSV. We have compared the response of these two parameters to step changes of PS of ± 8 cmH2O. **Methods.** The study included 10 patients in PSV for ARF, with normal respiratory centre function. P0.1 and RR were continuously measured by means of an automatic breath analyser during 3 consecutive PS steps, each one applied for 15 min. The first step (BPSstart) and the third step (BPSend) corresponded to the PS level applied to each patient previously to the beginning of the study, while the second step (BPS+8) corresponded to an increase of 8 cmH2O in PS level. For each step, P0.1 and RR values were expressed as average over a 5-min period in steady state.

Results and conclusions. The table shows individual and mean values for P0.1 and RR, in each step. Comparison by Friedman test.

N° patients	P0.1 BPSstart (cmH2O)	P0.1 BPS+8 (cmH2O)	P0.1 BPSend (cmH2O)	RR BPSstart (/min)	RR BPS+8 (/min)	RR BPSend (/min)
1	2.5	0.8	1.7	24.7	25.6	19.4
2	2.2	1.5	1.9	34.1	33.6	33.9
3	3.5	3.3	2.4	27.6	26.9	23.4
4	1.5	0.9	1.5	37.8	28.7	36.2
5	5.8	3.6	5.4	32.3	29.7	32.9
6	1.7	0.5	1.5	25.2	23.4	24.9
7	2.6	1.5	2.7	19.6	18.4	20.3
8	2.7	1.6	3.5	19.8	19.4	19.7
9	1.4	0.9	1.7	23.8	21.6	27.0
10	2.7	1.2	2.6	24.3	21.6	21.8
m±sd	2.7±1.3	1.6±1.0	2.5±1.2	26.9±6.0	24.9±4.9	26.0±6.3

On average PS level changes were associated with opposed changes in both P0.1 and RR. Changes in P0.1 were remarkable, homogeneous and highly significant ($p<.002$), while changes in RR were less pronounced, inhomogeneous and less significant ($p<.02$). It seems therefore that P0.1 is a better index than RR for estimating a change in load for the respiratory muscles.

COMPARISON BETWEEN CONVENTIONAL RESPIRATORY MECHANICS AND LEAST SQUARES FITTING (LSF) METHOD IN PARALYZED PATIENTS.

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Recently, the LSF method has been described as an interesitng alternative to conventional tecniques used to measure total respiratory mechanics, providing, over these latter, advantages such as no need for hold maneuvers and no need for particular flow patterns. Data on the reliability of the LSF method, however, are still few.

Methods. 9 sets of measurements were obtained in each of 7 ARDS patients, paralyzed and ventilated in CMV with constant inspiratory flow and an end-inspiratory pause equal to 15% of Ttot. The LSF method provided data for total compliance (CtotLSF) and total resistance (RtotLSF) by multiple linear regression analysis of airway pressure, flow and volume change, applied over the entire breath. The LSF measurements were automatic and continuous, and each value used for analysis was the average of 160 consecutive cycles. Conventional measurements of dynamic compliance (Cdyn), quasistatic compliance (Cqs), minimum inspiratory resistance (Rmin) and maximum inspiratory resistance (Rmax) were obtained by the constant flow, end-inspiratory occlusion method, each value being the average of 3 measuremts. CtotLSF was compared with Cdyn and Cqs, while RtotLSF was compared with Rmin and Rmax.

Results. CtotLSF showed a high correlation both with Cdyn (Cdyn=.87•CtotLSF+1.14, r^2=.982), and with Cqs (Cqs =.94•CtotLSF +1.19, r^2=.984). The average difference between CtotLSF and Cqs, yet, was much lower (+.36±1.79 ml/cmH2O) than the one between CtotLSF and Cdyn (+2.43±2.40 ml/cmH2O). RtotLSF correlated much better with Rmax (Rmax=.88•RtotLSF+.98, r^2=.914) than with Rmin (Rmin =.58•RtotLSF +.1.71, r^2=.804). The average difference between RtotLSF and Rmin was +4.48±3.48 cmH2O/l/s, while the one between RtotLSF and Rmax was +.81±2.03, confirming the better agreement between RtotLSF and Rmax.

Conclusion. The agreement between RtotLSF and Rmax suggests that RtotLSF takes into account both the airway and the tissue components of resistance, unlike Rmin which only expresses airway resistance. The agreement between CtotLSF and Cqs indicates that CtotLSF expresses the pure elastic components of the respiratory system.

A SIMPLE METHOD FOR THE EVALUATION OF THE EXPIRATORY TIME CONSTANT DURING VOLUME CONTROLLED VENTILATION (CMV).

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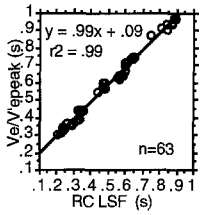
In the paralyzed patient, the expiratory time constant (RCe) of the unit represented by total respiratory system and ventilator can be calculated from the slope of the expiratory flow-volume curve. Recently it has been suggested that an estimate of this slope is provided by the Ve/V'epeak ratio, Ve being the exaled tidal volume and V'epeak the peak expiratory flow.The reliability of this method is still little known.

Methods. 9 sets of measurements were obtained in 7 mechanically ventilated ARDS patients during paralysis and CMV. Measurements of ventilator expiratory resistance (Rext) and of total respiratory mechanics were performed in order to calculate these 3 reference measurements for Ve/V'epeak: RCdyn=(Rmin+Rext)•Cdyn, RCstat=(Rmax+Rext)•Cqs, RCLSF=(RLSF+Rext)•CLSF. Cdyn (dynamic compliance), Cqs (quasistatic compliance), Rmin (minimum inspiratory resistance), Rmax (maximum inspiratory resistance) were obtained by the constant flow, end-inspiratory occlusion method. CLSF and RLSF respectively corresponded to measurements of total respiratory system compliance and resistance by the least squares fitting method.

Results and conclusions.

Ve/V'epeak showed a high correlation with all 3 reference measurements, RCdyn (Ve/V'epeak=1.07•RCdyn-.18, r^2=.939), RCstat (Ve/V'epeak = .97 •RCstat -.12, r^2= .929), and especially RCLSF (see fig).



The RCe values obtained by each of the 4 methods were close, but different. The highest values were obtained with Ve/V'epeak, the lowest ones with RCdyn, while intermediate values were obtained with RCstat and RCLSF. In paralyzed ARDS patients, Ve/V'epeak is a simple and reliable alternative to the assessment of RCe by calculation from the different components of resistance and compliance. The reliability of Ve/V'epeak in patients with dynamic pulmonary hyperinflation still remains to be defined.

AUTOMATIC DETERMINATION OF THE P/V RELATIONSHIP OF THE RESPIRATORY SYSTEM DURING MECHANICAL VENTILATION

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Objectives: The static pressure volume curve of the respiratory system (P/V_{st}) provides valuable information, but the extensive data analysis prevents its use in clinical routine. Dynamic P/V-curves are simpler to record. The objective of this study was to develop an automated method to obtain quasi-static P/V-curves (P/V_{qs}) during low flow inflation as well as to measure resistance. Preliminary tests were done in normal subjects and subjects with varying degree of lung disease.
Methods: A computer/ventilator interface (CVI) was constructed for control of a Servo Ventilator 900C during an automatic sequence: a) a normal breath, b) a prolonged expiration at zero PEEP, c) a low flow inflation of a predetermined volume, d) analysis of ventilator pressure and flow. Pressure was corrected for tube resistance. Airway resistance was calculated from a) and used to derive P/V_{qs} from c). As reference, P/V_{st} was obtained by the occlusion method.
Results: In non-obstructive diseases the method performed well at volume and pressure controlled ventilation. Static and quasi-static compliance were virtually identical. P/V_{qs} clearly reflected the lower inflection point and, when present, the upper inflection point (UIP). In some patients UIP was more evident in P/V_{qs}, especially at an increased inflation flow rate. In obstructive diseases, the method for subtraction of resistive pressure was inadequate.
Conclusions: The system for automated computer controlled studies of lung mechanics based on a standard ventilator provides comprehensive information. Differences between P/V_{st} and P/V_{qs} imply that the latter reflects also other factors than P/V_{st} that contribute to impedance at hyperdistension. The clinical significance of the two curves remains to be shown.

COMBINED HIGH-FREQUENCY JET VENTILATION IN PATIENTS WITH SEVERE RESPIRATORY INSUFFICIENCY.

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Objective: to evaluate the effect of combined high frequency jet ventilation (CHFJV) in patients with severe respiratory insufficiency (SRI).
Methods: in a retrospective study of the period 1985-1995 we analyzed patients suffering from SRI who were refractory to conventional mechanical ventilation and were treated with combined high-frequency jet ventilation (CHFJV). Refractory to conventional mechanical ventilation was defined as a $PaO_2/Fio_2 \leq 100$, despite maximal ventilator settings: PEEP $\geq$ 8 cm H_20 , $Fio_2 \geq 0.6$. A total of 43 patients matched these criteria, 27 males and 16 females with a median age of 44 (17-72) years. Seventeen suffered from severe trauma. CHFJV was started following a median period of 3 (1-22) days of conventional mechanical ventilation. Prior to CHFJV ventilation parameters expressed as median were the following: Fio_2 0.8, Pao_2/Fio_2 78, PEEP 12 cm H_2O peak airway pressure (PAP) 48 cm H_2O.
CHFJV consisted of high frequency jet ventilation with a frequency of 100 to 300 breaths/minute, driving pressure of 1.8 to 3.5 atm, and inspiration time of 20 to 30 percent, superimposed on the whole cycle of conventional mechanical ventilation with a frequency of 10 to 20 breaths/minute and tidal volumes of 100 to 400 ml.
Results: following two days of CHFJV 31 of 43 patients showed an improvement of ventilatory parameters; PEEP could be reduced to < 8 cm H_2O in 14 patients, the PAP was decreased with > 5 cm H_2O in 20 patients, FiO_2 could be reduced to < 0.6 in 27 patients and finally the median PaO_2/FiO_2 ratio changed from 78 to 133.
During CHFJV 23 patients died, 4 of respiratory failure and 19 due to multiple organ failure, 6 died within two days of CHFJV. The median duration of CHFJV in survivors and nonsurvivors was 6 days in both groups.
Conclusions: our data show that with CHFJV in the majority of patients with SRI who are refractory to conventional mechanical ventilation the ventilatory parameters can be improved.

THE OUTCOME OF MECHANICAL VENTILATION IN PATIENTS AGED 70 AND OVER

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Objective: To determine the outcome of mechanical ventilation in patients aged 70 and over.
Design: Retrospective chart review of all mechanically ventilated patients aged 70 and over in a medical intensive care unit between January 1, 1970 and December 31, 1990.
Methods: A total of 315 mechanically ventilated patients aged 70 and over are described. Recorded data included demographics, previous medical history, time of admission and discharge in the hospital and intensive care unit, diagnosis at the time of admission, duration of mechanical ventilation, ventilator parameters, in-hospital complications and final outcome. Furthermore we calculated the APACHE 3 score for every patient. Differences between survivors and non-survivors are described and logistic regression analysis was performed to determine the independent risk factors for in-hospital death.
Results: The median age was 75 years. The patients were mechanically ventilated for a mean of 10.3 ± 13.8 days. Thirteen percent were ventilated for more than 3 weeks. The median APACHE 3 score was 67. One hundred eighteen patients (37.5%) survived until hospital discharge. Patients admitted after a cardiac arrest had a very poor prognosis with a mortality of 85.7%. Survivors spent more days on the ventilator and remained longer in the medical intensive care unit. Mortality increased with an increasing APACHE 3 score. The independent risk factors for outcome were a cardiac arrest as reason for admission, shock during the ICU stay, serum creatinine at admission and the highest required FiO_2.
Conclusion: We conclude that the prognosis for mechanically ventilated patients aged 70 and over is largely dependent on the acute health status and the occurrence of complications during the intensive care unit stay.

A STRATEGY TO MINIMIZE PEEP LEVELS WHILE ENSURING ADEQUATE RECRUITMENT OF THE LUNGS IN ACUTE LUNG INJURY.

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Background and Objectives: Although ventilation with PEEP above the inflection point (P_{inf}) has been shown to reduce lung injury by recruiting previously closed alveolar regions, it carries the risk of hyperinflating the lungs. In the present study we set out to develop a new strategy to recruit the lung during ventilation with small Vt, while maintaining PEEP levels as low as possible. We hypothesized that if the lung was recruited with a sustained inflation (SI) to total lung capacity, recruitment would be maintained as long as the PEEP level was higher than the critical closing pressure of the lung, as observed on the deflation limb of the PV curve (AJRCCM 1995;151(4):A432). The purpose of this study was to examine the hypothesis that a strategy using SI and a PEEP<P_{inf} would induce less lung injury during small tidal ventilation than ventilation at the same low PEEP level without using a recruitment strategy in a model of respiratory distress syndrome.
Methods: We used a randomized protocol with 4 groups to ventilate 40 nonperfused, lavaged rat lungs with small Vt (5 to 6 ml/kg) for 2 hours and studied the effect on compliance and lung injury. Group 1: PEEP>P_{inf}; group 2: PEEP<P_{inf} with an SI, inflation to 30 cm H_2O over 30 sec, to recruit volume; group 3: PEEP<P_{inf} without SI; group 4: control group, lungs were inflated at PEEP<P_{inf}, but not ventilated.
Results: In group 2 and group 4 static compliance did not change after ventilation (Table). In group 3 static compliance fell significantly. Group 1 showed significant changes in the PV curve, which were less severe than in group 3. Results from morphological examination are pending but preliminary results showed less lung injury in group 2, compared to group 3.
Conclusions: Small tidal ventilation following a recruitment manoeuvre in a model of respiratory distress syndrome allows ventilation on the deflation limb of the PV curve at a PEEP below P_{inf}. This strategy (1) minimizes lung injury as well as, or better than using PEEP above P_{inf} and (2) ensures a lower PEEP to minimize the detrimental consequences of high lung volume ventilation.

Group	1 (PEEP>Pinf)	2 (with SI)	3 (without SI)	not ventilated
PEEP (cmH2O)	15.1 ± 0.57	8.4 ± 1.26	8.5 ± 1.38	8.2 ±1.03
Cstat (ml/cmH2O) before	0.39 ± 0.05	0.39 ± 0.04	0.40 ± 0.03	0.37 ± 0.04
Cstat (ml/cmH2O) after	0.33 ± 0.05*	0.38 ± 0.05	0.32 ± 0.02**	0.35 ± 0.04
Cstat = static compliance at Ptp = 30 cmH2O means ± SD; *p<0.05; **p<0.001 compared to value before ventilation				

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ELECTROENCEPHALOGRAPHIC (EEG) EXAMINATION OF THE PATIENTS WEANING FROM MECHANICAL VENTILATION

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Objectives: This report is presenting the results of the clinical study for using EEG examination as a method of the evaluation of patients ability for weaning.

Methods: The study includes 42 EEG examinations with Fourier spectral analysis of 37 patients with respiratory insufficiency and prolonged control mechanical ventilation (CMV). All patients have had α-rhythm of EEG before weaning. We have followed respiratory rate, tidal volume, respiratory pattern, end-tidal CO_2 and blood gases during weaning.

Results: 13 patients had invariable EEG activity or short β-waves period (till one hour). The weaning of this patients was fast and sucsessful. Other 24 patients have had a decreasing of α-activity, an appearence of β-waves for an hour and more, a short episodes of Δ- and θ-activity. After that this patients had gas exchange and respiratory disorders with regression of the weaning right up to CMV.

Conclusion: EEG could be used as a method of the evaluation of patients ability for weaning from CMV. Some EEG signs shows the overstrain of compensatory systems before the change to the worse of gas exchange and respiratory pattern.

Influence of the triggering system on patient's effort during assisted ventilation.

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In Vitro Comparison of flow triggering (FT) systems demonstrated advantages compared to pressure triggering (PT) systems for some ventilators (Puritan Bennett 7 200) but not others (Siemens Servo 300). We studied the two types of systems in two groups of 8 patients mechanically assisted with pressure support ventilation (15 ± 6 cmH_2O). In the first group (PB 7 200) the effort of breathing, assessed by the esophageal pressure time index, was significantly lower with the FT than with the PT (139 ± 40 $cmH_2O.s/min^{-1}$ VS 158 ± 32, $p < 0.05$). By contrast no significant difference appeared in the second group (Servo 300), as predicted by the bench study despite marked interindividual differences (134 ± 55 $cmH_2O.s/min^{-1}$ VS 160 ± 61, $p = 0.1$). We conclude that 1) rigorously performed bench studies can predict *in vivo* effects, 2) mild advantages can be found for the new triggering systems on some ventilators.

PRESSURE-VOLUME CURVE OF THE RESPIRATORY SYSTEM IN ARDS: "OCCLUSION" *vs.* "AUTOMATED LOW FLOW INFLATION"

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Objectives: Pressure-volume curves (PV) of the respiratory system is of interest for the determination static compliance (Cst), lower (LIP) and upper (UIP) inflection points which indicate zones of airway recruitment and overdistension. This study aimed to compare an "automated low flow inflation" method (ALFI) to the reference occlusion (OC) method. The ability of the former method to identify Cst, LIP and UIP was tested in ICU patients.

Methods: 16 (8 ARF and 8 ARDS) sedated paralysed patients were studied using a Servo 900C ventilator linked to a computer which automatically forced the ventilator to insufflate at a low constant flow a volum up to 1500-2000 ml or a maximum Paw of 50 cm H2O (ALFI). The quasistatic elastic pressure (Pel,qst) was obtained by subtraction of the resistive pressure of tubing and patient and related to volume for calculation of compliance Cqst. For OC tidal volumes (Vt) from 50 up to 1500-2000 ml were followed by a 3 s post-inspiratory pause for determination of static Pel (Pel,st) in relation to volume. Compliance was defined from the linear part of the P/V curves. LIP and UIP were defined from the consistent deviation of P/V data from extrapolated the linear part.

Results: In ARDS, mean Cst was 27.9 ± 3.5 and Cqst 29.7 ± 3.9 ml/cm H2O (ns), LIPst 5.2 ± 5.0 and LIPqst 7.0 ± 4.6 cm H2O (ns), UIPst 23.1 ± 10.8 and UIPqst 26.0 ± 5.4 cm H2O (ns). Regression of Cqst vs Cst: $r=0.82$, ($p<0.01$), LIPqst vs LIPst: $r=0.86$, ($p<0.001$), UIPqst vs UIPst: $r=0.76$, ($p=0.02$). In ARF, there were no inflexion points. Cqst was 56.1 ± 7.7 and Cst 57.5 ± 7.82 ml/cm H2O, (ns), regression: $r=0.88$, ($p<0.001$). For the combined groups The regression of Cqst vs Cst showed: $r=0.97$, ($p<0.001$)

Conclusion: Small and non significant differences between data obtained with ALFI and OC indicates that automated ALFI may be an alternative to the less convenient method OC.

DIAGNOSIS OF NOSOCOMIAL PNEUMONIAS IN VENTILATED PATIENTS WITH SEVERE ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS).

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Nosocomial pneumonias (NP) are frequent and often unsuspected during ARDS (Bell, 1983). In the present study, we evaluated prospectively the onset of NP during severe ARDS (group B of the European Study).

Patients and methods: The charts of 15 patients with severe ARDS have been prospectively recorded. A plugged telescopic catheter (PTC) specimen has been systematically performed every 48 hours, for quantitative bacteriological analysis. The diagnosis of NP was defined by a number $\geq 10^3$ colony forming units / ml.

Results: For the 15 patients studied, the mean SAPS score (± SD) was 16±2, the initial PaO_2/FiO_2 ratio was 100±35, the duration of mechanical ventilation (MV) was 19±9 days. The mean delay before the onset of the first NP was 8.6±5.6 days (5-12), and the mean PaO_2/FiO_2 ratio was 110±28. Respiratory symptoms (purulent aspirates, new pulmonary infiltrates, or gazometric changes) were present in 80% of the patients studied. Alteration of gas exchange was present in 8 of the 15 patients (7 NP). A new pulmonary infiltrate was present in only 1 NP (10%). An increase of fever was noted in 6 patients, an increase of leukocytosis ≥ 20% in 8 patients, an increase of volume and purulence of sputum in 3 of the 10 patients with NP. The degree of gazometric worsening (PaO_2/FiO_2 before NP minus PaO_2/FiO_2 during NP) during the first episode of NP was 44±17 mmHg. Excluding the bacteriological criteria of NP, the number of criterias of NP present was 1 in 1/10 patients, 2 (5/10), 3 (2/10) or 4 (2/10). Two patients only had a pulmonary colonization (PTC: $\leq 10^2$ cfu / ml) before the first episode of NP.

Conclusions: The incidence of NP is high (53%) during severe ARDS. The first episode occurs in average at the 9th day, and is the cause of a severe hypoxemia (PaO_2/FiO_2 110). The onset of a NP may contribute to the high mortality rate observed in our patients (93%). Each worsening of hypoxemia during severe ARDS should induce to suspect a NP.

Quantifying Energy Consumption in the Respiratory System during Mechanical Ventilation

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Abstract— **We present a method of analysis of the respiratory system during mechanical ventilation. The method quantifies the dissipative energy consumption of the respiratory system in terms of energy loss ΔE_k, inefficiency ξ_k, and respiratory dissipative resistance R_k, over a given partition of the tidal volume.**

The method can be applied in intensive care units with no interference to ventilatory support. It allows for monitoring the combined effects of inhomogeneities, non-linearities and visco-elastic effects, that are subject to change in the respiratory system.

The method is studied on pigs, in the presence of a log-dose response curve of methacholine (MCh) induced disease. In healthy pigs, we find a mean value of energy loss, ΔE, of 0.27 ±0.08 J/l, a mean value of ineffiency, ξ, of 0.25 ±0.05 and a mean value of resistance, $\mathcal{R}$, of 4.40 ±1.24 cm H_2O s/l. The respiratory resistance, R_k, shows a variation over the partition of tidal volume with $\Delta R_{max} = 3.90 \pm 0.66$ cm H_2O s/l. During methacholine provocation, ΔE rises more than five-fold up to 1.48 ±0.55 J/l, ξ doubles to 0.54 ±0.08 and $\mathcal{R}$ increases to a maximum of 22 ±8 cm H_2O s/l, with $\Delta R_{max} = 15.1 \pm 7.0$ cm H_2O s/l. The variation in R_k becomes more pronounced with higher doses of methacholine.

EFFICACY OF MANDATORY RATE VENTILATION IN ARDS

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Methods: 10 ARDS patients were prospectively studied. Initially they were ventilated in the AMV (assist mechanical ventilation) mode with the settings prescribed by their primary physician. After stabilization, ventilatory gas exchange and hemodynamic variables were determined. Patients were then ventilated in the MRV (mandatory rate ventilation) mode with 20 breaths as the target rate. In MRV the target rate is set and the ventilator autoregulates the pressure support level delivered to achieve this rate. After stabilization, the measurements done on AMV were repeated. Finally, patients were sedated and paralyzed and ventilated in CMV (control mechanical ventilation) with the ventilatory variables they had during MRV. Measurements done in AMV and MRV were repeated and respiratory mechanics were assessed with the constant flow end inspiratory occlusion method.
Results: Two groups were recognized based on their response to MRV. In group 1 patients responded to MRV by decreasing their V and increasing the T_I/T_T ratio. V_E, VO_2, and $AaDO_2$ decreased while $PaCO_2$ increased and tidal volume and CO remained unchanged. On the contrary, in group 2 V, V_T and V_E increased; Ppeak and T_I/T_T remained unchanged. $PaCO_2$ decreased while VO_2 and $AaDO_2$ increased with constant CO. The pressure support level needed to achieve the target rate was much lower in group 1 than in group 2 (19.8±1.3 vs 29.4±2.0).

	AMV		MRV		CMV		
	GR1	GR2	GR1	GR2	GR1	GR2	pvalue*
T_I/T_T	0.39±0.03	0.48±0.24	0.52±0.03	0.47±0.03	0.52±0.03	0.48±0.04	0.94
V_T l/t	0.68±0.04	0.69±0.02	0.64±0.05	0.92±0.07	0.63±0.04	0.9±0.07	0.02*
V_E	14.9±1.2	16.9±1.4	13.2±1.0	18.0±1.4	13.0±0.9	17.5±1.3	0.04*
V_T lit/sec	0.64±0.04	0.57±0.04	0.42±0.03	0.64±0.05	0.42±0.04	0.62±0.04	0.06
$AaDO_2$	306±16	341±13	269±25	352±11	291±19	385±23	0.006*
$PaCO_2$	44.4±3.3	38.6±3.9	50±5.33	33.8±3.6	49.6±5.5	33.8±2.6	0.05
VO	244.3±26.3	243±27.4	205.2±10	259.2±22.8	173.4±14.5	213±17.2	0.26

Conclusion: MRV not only is tolerated in ARDS patients but also improves a subgroup of them (group 1).

*Two way ANOVA between groups.

PERCEPTION OF AUTOMATIC TUBE COMPENSATION (ATC)

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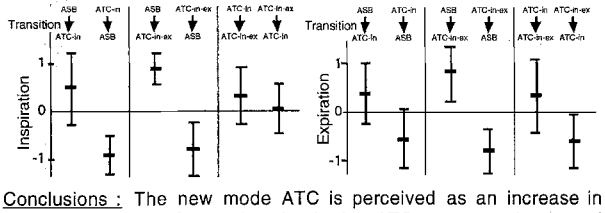
Objectives : In the newly developed mode of ventilatory support „Automatic Tube Compensation" (ATC) the ventilator compensates for the flow-dependent pressure drop across the endotracheal tube (ETT) thus allowing „electronic extubation". The aim of the study is to investigate whether healthy subjects perceive ATC in inspiration (ATC-in) and in expiration (ATC-in-ex) and whether ATC provides an increase in subjective comfort compared with the conventional assisted spontaneous breathing mode (ASB).
Methods : Healthy volunteers (no preceding lung disease, non-smokers, male, 20-40 years) breathed spontaneously through an uncut ETT of 7.5 mm ID via a mouthpiece. The ETT was connected with a prototype ventilator Evita 2 modified by the manufacturer (Dräger, Lübeck) for ATC. Flow and airway pressure were measured at the outer end of the ETT. Three ventilatory modes, (1) ASB (10 mbar over 5 mbar PEEP), (2) ATC-in, (3) ATC-in-ex were selected in random order. Immediately following the transition from one mode to another the volunteers answered by hand sign how they perceived the new mode compared with the preceding mode: „better" (+1), „equal" (0) or „worse" (-1). Inspiration and expiration were investigated separately by presenting 120 mode transitions (in total; including „placebo" transitions).
Results : The difference between ATC and conventional ASB is perceived in inspiration and in expiration. ATC is positively judged; ASB is negatively judged. The diagrams show mean values ± SD of five volunteers investigated up to now.



Conclusions : The new mode ATC is perceived as an increase in subjective comfort. Our explanation is that ATC preserves the natural breathing pattern better than conventional ASB.

10. CPR

CEREBRAL VASOCONSTRICTION IN COMATOSE PATIENTS AFTER CARDIAC ARREST.

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Objectives: To determine the role of cerebral vasoconstriction in the delayed hypoperfusion phase in comatose patients after cardiac arrest. To correlate the results with indices of cerebral oxygenation and the levels of several vasoactive hormones in the jugular bulb.
Methods: In comatose patients after cardiac arrest we measured the pulsatility index (PI) of the medial cerebral artery by Transcranial Doppler Sonography. The PI is a reliable indicator of cerebral vascular resistance. We also sampled blood from the jugular bulb and measured cerebral oxygen extraction ratio and jugular bulb levels of endothelin, nitrate and cGMP. The first measurement was done within 4 hours after cardiac arrest and repeated 3, 6, 9, 12, 18 and 24 hours later.
Results: We studied 10 patients, 6 females, mean age 64,1±13,7 years. The PI decreased significantly between the first and the last measurement from 1.86 ± 1.02 to 1.05 ± 0.22 (p = 0.03). Cerebral oxygen extraction ratio decreased also from 0.39± 0.13 to 0.24 ± 0.11 (p = 0.015). Endothelin levels were high, but didn't change during the studied period. Nitrate levels varied in a wide range, but didn't change significantly. However, cGMP levels increased significantly from very low levels in the first measurement to very high levels 24 hours later, resp. 2.95 pmol/mL (median; 25th 2.48-75th 5.43) and 7.5 pmol/mL (median; 25th 6.2-75th 14.00) (p = 0.02). Eighteen and 24 hours after the first measurement we found a strong correlation between PI and Cerebral Oxygen Extraction Ratio (r = 0.64, p = 0.05 and r = 0.76, p = 0.01). We also found 12 hours after the first measurement a significant correlation between PI and cGMP levels (r = 0.69, p = 0.03). We found no correlation between PI and endothelin or nitrate levels.
Conclusions: Our results show a high cerebral vascular resistance in the first few hours after cardiac arrest, gradually decreasing during the next 24 hours. This is accompanied by an initially high cerebral oxygen extraction ratio and low cGMP levels, suggesting that the cerebral vascular resistance is induced by active vasoconstriction because of insufficient cGMP levels, leading to a decrease in cerebral blood flow and a compensatory increase in cerebral oxygen extraction.

TREATMENT ON THE PATIENTS OF ACUTE MYOCARDIAL INFARCTION AFTER SUCCESSFUL CARDIOPULMONARY RESUSCITATION

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62 patients (age 25-65 years) of acute myocardial infarction (AMI) were studied after successful cardiopulmonary resuscitation (CPR) by coronary angiography. Multiple (2 or more) coronary artery (CA) stenosis >50% of diametre were investigated in 37 pts (60%) and acute CA occlusion in 51 (82%).
I gr - 40 pts had thrombolysis (TRL) with streptokinase after CPR (intracoronary TRL 27 and intravenous TRL 13) and CA recanalization achieved in 35 pts (effective TRL 88%).
II gr 22 pts had conventional medical therapy after CPR.
There were no significant differences in pts age, in multiple CA stenosis, in degrees of acute cardiac failure (by Killip) or ventricular arrhythmias (by Lown).

	Igr	II gr
Mean age	49±6	51±5
Multiple CA stenosis	60%	59%
Cardiac failure(Killip III-IV)	18%	18%
Ventricular arrhythmias(Lown 3-5)	47%	50%
Workload before disharge(W/kg)	0,9±0,3	*0,6±0,2 (* p>0.05)

All pts were disharged from the hospital without complications of reperfusion therapy, without remarkable symptoms of cardiac failure or arrhythmias. Results of exercise testing showed better physical rehabilitation in pts of I gr. Coronary artery recanalization methods after successful CPR were used with small risk to the pts and had benefit to physical rehabilitation after acute myocardial infarction.

CEREBRAL BLOODFLOW VELOCITY DURING THE FIRST PHASE OF CARDIOCIRCULATORY ARREST.

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Objectives: Sudden cardiac arrest is a major cause of mortality in western countries accounting for over half of all cardiovascular deaths. In most cases the mechanism of death is prolonged cardio-circulatory arrest due to ventricular fibrillation (VF) preceding final asystole. Recurrent syncopes due to idiopathic VF with good neurological prognosis have been reported in patients with and without cardiac etiology (1,2). In the past measurements of cerebral hemodynamics have been repeatedly done in humans during CPR, but until today no studies of cerebral blood flow velocity (CBFV) have been reported during controlled cardiac arrest in humans not under-going CPR. It was the purpose of our study to evaluate the acute hemodynamic effects of untreated VF on CBFV.
Methods: After approval by the local University Ethics Comittee, five male patients aged 34-48 years without evidence of cerebral disease were investigated during VF while undergoing implantation of a Pacer Cardioverter Defibrillator System (Model 7219D; Medtronic®). A standard anaesthetic regimen was used (propofol, fentanyl). After implantation of the automated cardiac defibrillator VF was induced by electrical countershock to test effective sensing, pacing, and defibrillation.
To measure cerebral blood flow velocities ($CBFV_{MCA}$) the Doppler probe was placed above the zygomatic arch between the lateral margin of the orbit and the ear and directed towards the M1 segment of the middle cerebral artery (MCA).
Results: A total of 12 phases of VF were investigated. Duration of VF ranged from 6 to 26 seconds, with $CBFV_{MCA}$ (mean±SD, cm sec^{-1}) flow pattern changing from pulsatile to laminar flow immediately after onset of VF.

Table:

CBFV (pre)	CBFV(arrest)	CBFV(post)
33.2±2.7	12.8±1.4	38.7± 8.3

Conclusions: The underlying mechanism of the laminar cerebral blood flow observed during VF in our patients is uncertain, but it may provide insight into the prognosis of patients with idiopathic VF. Theoretically, the laminar cerebral blood flow observed in our pulseless patients may provide a substantial amount of cerebral perfusion even during clinical cardiocirculatory arrest.
References: 1.) Viskin S, Belhassen B. Idiopathic ventricular fibrillation. Am Heart J 1990;120:661-7
2.) Masrani K, Cowley C, Bekheit S, El-Sherif N. Recurrent syncope for over a decade due to idiopathic ventricular fibrillation. Chest 1994;106:1601-3

THE ABILITY OF ICU NURSING STAFF TO INFLATE ACCURATE A SPECIFIC AIR VOLUME WITH THE LAERDAL RESUSCITATION BAG.

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Objective: To investigate whether the intensive care nursing staff can inflate more accurately a specific air volume with the laerdal resuscitation bag when they receive feedback after each inflation about the delivered volume compared to no feedback.
Method: 42 ICU nurses were asked to inflate a testlung model 10 times with a specific air volume (600 ml, 800,ml or 1000 ml) under three different conditions (normal, decreased compliance and increased resistance) without and with feedback. We measured the mean absolute difference from the specific airvolume after each ten inflations.
Results: The largest absolute difference was found when ICU nurses inflated 600 ml (250 ml). The mean inflated volume for this group was 843 ml. When the ICU nurses had to inflate 800 ml the mean absolute volume difference was 181 ml with a mean inflated volume of 913 ml. Inflating 1000 ml produced an absolute volume difference of 131 ml with an mean inflated volume of 1042 ml. The absolute volume difference decreased when the compliance of the testlung was decreased and even more when the resistance of the used endotracheal tube was increased. When the ICU nursing staff received volume feedback after each inflation the mean absolute volume difference was reduced between the 42 ml and 66 ml for all specific air volumes. 42% of the last 5 inflations with feedback were significantly smaller than 50 ml from the specific air volume ($P < 0.05$).
Conclusion: The majority of nurses overinflated the specific air volumes. The largest over inflation occurred when 600 ml and the smallest when inflating 1000 ml. When nurses were provided with volume feedback the performed significantly better. We concluded that ICU nurses are not able to inflate a specific air volume with the laerdal resuscitation bag without receiving volume feedback. Feedback is desirable in order to reduce the volume trauma.

MYOCARDIAL DYSFUNCTION AFTER CARDIAC RESUSCITATION

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Objectives: A profound impairment in systolic and diastolic myocardial function following successful cardiopulmonary resuscitation (CPR) has been demonstrated by using Langerdorff method in rats. In the present study we have investigated post resuscitation myocardial dysfunction in a porcine model of CPR.

Methods: Ventricular fibrillation (VF) was electrically induced by alternating current applied to the epicardium of the right ventricle in 11 domestic pigs. Following 4 min of untreated VF, precordial compression and mechanical ventilation was initiated and maintained for 8 min. Electrical defibrillation was then attempted and 6 of 11 animals were successfully resuscitated.

Results: Following successful cardiac resuscitation, stroke volume index (SVI) decreased from prearrest value of 1.13 ml/kg to 0.74 ml/kg ($p<0.05$), and left ventricular stroke work index (LVSWI) from 1.57 to 0.77 mmHg•ml/kg ($p<0.05$). Both SVI and LVSWI remained depressed for another 3 hours. These decreases were associated with increases in heart rate from 145 bpm to 185 bpm ($p<0.05$). No significant changes from baseline in mean arterial pressure, mean pulmonary pressure, right atrial pressure and pulmonary artery wedge pressure were observed.

Conclusion: These studies in pigs demonstrated impairment in left ventricular function after successful cardiac resuscitation and confirm previous investigations by Langerdorff method in rats.

SPONTANEOUS RESUMPTION OF RESPIRATION AND CIRCULATION AFTER TERMINATION OF FRUSTRANEOUS PREHOSPITAL RESUSCITATION EFFORTS

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Objective: The success rate of prehospital resuscitation in patients with cardiocirculatory arrest in an Emergency Medical System (EMS) may reach 30 - 40% depending on the time of calling the EMS, the distance to cover by the emergency ambulance and the training of the emergency physician and his staff. In the Berlin EMS, which is associated with the Berlin Fire Brigade, the time between alarm and arrival at the scene ranges from 2 - 31 min, mean 8 min. Resuscitation is based on the Advanced Cardiac Life Support (ACLS) according to the guidelines of the American Heart Association. If resuscitation efforts fail to restore circulation, they are terminated after 30 - 60 min, depending on duration of cardiocirculatory arrest, pre-existing disease, age, absence of an even transient response to CPR. However, there is a lack of practical criteria for termination of CPR in individual decision making.

Patients: We report 5 cases of prehospital CPR with primary asystolia terminated after 45 - 60 min of frustraneous CPR efforts including high-dose epinephrine and dopamine.

Results: After termination of CPR, the ECG monitor remained connected and showed permanent asystolia in all patients while the emergency physician completed his records. Spontaneous resumption of respiration and circulation was observed in these patients after 2 - 5 min and CPR efforts were immediately resumed. Nevertheless, 3 of the patients died at the scene, while 2 could be hospitalized with stable circulation. One of them died 3 hours after admission to the ICU, the other survived for 3 weeks in a vegetative state. Spontaneous resumption of circulation and respiration is most likely due to the development of extreme hypercapnia and acidosis, which - at least in some patients - seems to be a stronger stimulant of the circulatory and respiratory brainstem centers than CPR with high-dose catecholamines.

Conclusion: Because of the legal and ethical implications of this rare phenomenon, emergency physicians should continue ECG monitoring for at least 5 min. after termination of CPR efforts.

SUMMARY GAS PRESSURE (PO2+PCO2)IN HUMAN PULMONARY ARTERY BLOOD (DATA FOR CARDIAC-PULMONARY INSUFFICIENCY)

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Pulmonary artery catheterezation is used for patient's monitoring [1]. We reported our results on such monitoring in 1969 [Г.Соловьев,Г.Гебель,-Кардиология,1969,N7,p.28-39].However not all of the received criteria assessments meet demands that are necessary for early diagnosis of critical states.

Here we report the data on PO2,PCO2 (mm Hg),SO2,pH levels in femoral (aF) and pulmonary (aP) arteries blood, as well as on summary gas pressure (SGP) calculated from PE=(PO2+PCO2) in mm Hg in aP blood. These data were derived from:1)86 subjects free of cardiovascular pathology according to catheterization data during their spontaneous air breathing (N group).There were cases with PCO2 in aF from 30 to 45 mm Hg and PO2 in aF from 70 mm Hg and higher.2)45 persons without hemodinamic disorders during lung mechanical ventilation with gas mixture, contained increased O2 (LMV group).

		PO2	PCO2	PE	SO2	pH
N	aF	86,73±0,52	37,56±0,26	96,27±0,10	7,395±0,003	
	aP	42,96±0,40	41,86±0,30	84,80±0,50	76,80±0,42	7,372±0,003
LMV	aF	152,00±3,00	39,45±0,50	98,27±0,17	7,402±0,006	
	aP	41,50±0,50	45,69±0,60	86,69±0,63	67,60±1,10	7,367±0,050

The quantitative data analysis shows that some values for both groups vary but SGP values in aP blood are rather similar and correspond to PO2 in aF blood in control group during air breathing.

Gradient $\triangle$P"exchanged", equal to PO2 in aF blood minus (PO2+PCO2) in aP blood appears to be a measure of adequacy ratio between PO2 and SGP in aP blood during air breathing; partly its characteristics and variations ranges are presented earlier [2]. In control group it is equal to 1,91±0,50 mm Hg.

Tests on SGP neither exclude nor substitute conventional (PO2 and PCO2) tests, but rather include them as a part choosing only additive characteristic - pressure. They appear to be a part of general system of human metabolism regulation by pressure (arterial,venous,intracardiac, tissue,liquor,onco-osmotic,etc). The so called "mutual replacement acts" between PO2 and PCO2 minimize SGP variations during PO2,PCO2,SO2,pH shifts,and they become, contrary to gas volume tests (O2 vol%,CO2 vol%,etc),relatively "independent" on factors affecting O2 transport: cardiac output, hemoglobin, 2,3-DPG,cooperative system of SO2 dissociation regulation.

We suggest that these tests can be used in patients condition evaluation. The preliminary results of the tests on SGP are reported elsewhere [2-5].

References:1)M.Schieffer et al.,9th Europ.Congr.Anaesthes.,Jerusalem, 1994,368;2)Intern.Soc. Pathophysiol.Moscow,1991,318;3) Inten.Care Med., 1994,20,Suppl.2,S40;S140; 4)9th Europ.Congr. Anaesthes.,Jerusalem, 1994,218,476,513,514; 5)9th Intern. Hypoxia Sympos.,1995,27.

ABDOMINAL COMPARTMENT SYNDROME: DECOMPRESSION USING A TEMPORARY SUTURELESS TECHNIQUE

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Objectives: Abdominal Compartment Syndrome occurs when excessively high intraabdominal pressure produces perturbations of cardiac, pulmonary, and renal physiology. This most often occurs following celiotomy for peritonitis or intestinal obstruction; bowel edema and distention prevent wound closure without unacceptable compromise of blood pressure or pulmonary compliance. A variety of temporizing measures have been reported for managing wounds that cannot be closed: 1) using towel clips to reapproximate skin only, 2) sewing silastic, Marlex or other prosthetic grafts to the fascia to "enlarge" the peritoneal cavity, 3) using loosely tied retention sutures for partial closure, 4) simply packing the wound without attempts at closure. These techniques either traumatize the abdominal wall (complicating definitive closure), expose the bowel to damage, or allow excessive loss of fluid and heat. Since 1989 we have evolved a sutureless technique which permits the abdomen to be partially closed in a quick, safe, sterile, sealed, atraumatic fashion - while providing decompression of unphysiologic intraabdominal pressure.

Methods: Whenever possible omentum is interposed between bowel and the open incision. Viscera are covered by a layer of sterile, non-reactive plastic, placed deep to the fascia and extending well beneath the edges. Sump tubes are placed above the plastic and covered in turn by two layers of an adhesive plastic drape which sticks to the skin and seals the wound in all directions. The patients remain intubated and paralyzed.

Results: We have used this technique in a total of 27 patients, four of whom suffered from Compartment Syndrome. All of the latter were males and ranged in age from 19 to 51. All four showed immediate physiologic improvement. All four incisions were eventually closed without complication. One Compartment Syndrome patient died 41 days later of multiple organ failure. There were no complications related to the closure technique in any of the 27 patients.

Conclusions:

1. Selected patients with Abdominal Compartment Syndrome will benefit from decompression using this temporary sutureless technique.
2. The technique a) is quick, safe, sterile, sealed, and atraumatic, b) minimizes loss of fluid and heat, c) facilitates eventual definitive abdominal closure.
3. Although we have used this technique only following celiotomy for classic surgical indications, it may be applicable to selected patients in whom the only indication for operation is Abdominal Compartment Syndrome.

HEART COMPRESSION RATE DEPENDENCE OF CARDIAC OUTPUT AND ITS EFFECT ON OXYGEN EXTRACTION FRACTION.

(Preliminary results)

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In order to evaluate the changes of the oxygen extraction fraction, we studied 10 ICU patients experienced a heart attack.
Ten ICU patients, having a pulmonary artery catheter in place and a battery of tissue oxygenation and hemodynamic during the 12 hour period prior to heart attack, were studied.
All patients oxygenation and hemodynamic were performed when the heart compression rate was 60 and 80 compression per minute. All patients survived the heart attack episode of the study.
The CO, VO2 (oxygen consumrption) and the EF prior and at 60 and 80 compression rate were (mean +_SEM)

	prior	60	80
CO	7,09+-1,23	1,99+-0,28	2,99+-0,45
VO2	283,5+-106	76+-15,0	117+-26,9
EF	40,5+-13,9	58,5+-10,4	98,75+-10,5

Conclusion
Increase the compression heart rate, increases the CO and, as it is expected, decreases the EF. It is apparent that the EF decrease does not indicate DO2 (oxygen delivery) efficacy for all the body, but for the organs that are perfused during CPR (cardiopulmonary resuscitation).

UNEXPECTED CARDIAC ARREST IN THE IMMEDIATE POSTOPERATIVE PERIOD AFTER CARDIAC SURGERY: INCIDENCE AND PREDISPOSING FACTORS.

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Objectives: To determine incidence and predisposing factors for cardiac arrest occurring during the first 24 hours after open heart surgery.
Methods: The study included patients who, following open heart surgery, had adequate cardiac function and in whom cardiac arrest was not anticipated. All data were prospectively recorded and analyzed.
Results: From 12/1993 through 3/1995, 2140 pts underwent open heart surgery at our hospital. Of these, 23 pts (1%) (age 65±9 yrs) had a cardiac arrest during the first 24 hours after transfer to ICU. They were operated on for coronary artery bypass grafting (CABG) (17 pts), valve replacement (VR) (3 pts), CABG and VR (2 pts) and aortic aneurysm (1 pt). The preoperative ejection fraction was 44±12% whereas bypass and aortic cross-clamp time were 127±70 and 72±42 min, respectively. Prior to arrest, they had a cardiac index of 2.23± 0.5 L/min/m^2 and were receiving 1.3±1 inotropes. Arrythmias leading to cardiac arrest were ventricular tachycardia/fibrilation (10pts) and bradyarrythmia (9 pts). Closed-chest CPR was initially performed on all pts and was followed by open-chest CPR in 12 pts. Eighteen pts (78%) survived to ICU discharge. Causes of arrest included perioperative myocardial infarct (12 pts, 52%), tamponade (3 pts, 13%), rupture of the proximal vein graft anastomosis (1 pt, 4%), graft occlusion (2 pts, 9%); no cause was found in 5 pts (21%).
Conclusions: Postoperative cardiac arrest in stable cardiac surgery pts is relatively infrequent (~ 1% incidence) and is associated with a high survival rate following successful CPR. Perioperative myocardial infarct is the most common predisposing factor.

CREATINE-KINASE (CK) AND CREATINE-KINASE-MB (CK-MB) AFTER NON-TRAUMATIC CARDIAC ARREST.

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Objectives: To describe the time course of CK and CK-MB in patients surviving cardiac arrest and to identify factors affecting the release of these enzymes.
Methods: During a 46 months period cardiopulmonary resuscitation data of patients surviving a witnessed cardiac arrest for at least 24 hours were compared with their labratory blood analyses (on admission and after 6, 12 and 24 hours) of CK and the CK-MB isoenzyme. For statistical analysis a forward stepwise regression model was used.
Results: During the observation period 132 patients entered the study. CK was elevated in 87% and CK-MB was elevated in 74% of these patients within the first 24 hours. Stepwise multiple regression analysis detected cumulative energy administered during defibrillation (regression-coefficient(B)=0.4, $p<0.0007$) and electrocardiographical (ECG) evidence of acute myocardial infarction (AMI) (B=1026, $p<0.0002$) as the strongest predictors of CK release. Duration of chest trauma due to compressions and age also influenced the release of CK (B=8.3, $p<0.095$; B=-15, $p<0.099$ respectively).
For CK-MB release the strongest predictor was AMI-ECG (B=55, $p<0.00002$) and with less significance electrical injury (B=0.017, $p<0.002$) and duration of chest compression (B=0.4, $p<0.11$). Age had no significant influence on CK-MB. Duration without bloodflow and body-mass-index did not influence CK and CK-MB levels.
The CK/CK-MB ratio was elevated in 32% of all of our patients, and in 49% of the patients with AMI-ECG.
Conclusion: After non-traumatic cardiac arrest an elevation of CK and CK-MB is frequently found and it is associated with amount of administered energy during defibrillation, ischemic myocardial injury and duration of chest compression. Thus the diagnosis of AMI using serum CK and CK-MB levels is not reliable.

THE USE OF LARYNGEAL MASK FOR IN-HOSPITAL RESUSCITATION

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BACKGROUND: When a cardiac arrest occurs in-hospital, the outcome can be improved by a higher quality of basic life support provided by the witnessing health care workers until the code team arrives. This basic life support (BLS) should include the best available method for airway management as well. Since not all medical staff are ready for carrying out endotracheal intubation, we investigated the efficacy of the use of different airway management methods during BLS.
METHODS: We have investigated the efficacy of airway management of 25 doctors and 25 nurses from different hospital wards: internal medicine, department of surgery, trauma, urology and gynaecology. Comparing the bag-valve-mask, laryngeal mask and the endotracheal intubation, we have measured the following parameters: time needs for correct application (sec.), number of incorrect applications (out of ten trial), efficacy of artificial ventilation provided by the device. We used a computerised ALS trainer manikin for the evaluation of the performance. Total performance score was created after the measurement between 0-10. After the first screening we held a 2 x 2 hours training. 8 doctors and 8 nurses were trained for the endotracheal intubation (Group IT1, IT2), 8 doctors and 9 nurses were trained to use the laryngeal mask (Group LM1, LM2). All respondent were trained to use the bag-valve-mask device. 1 day, 1 month and 3 month after the training we have carried out retention study using the same method.
RESULTS: We have found that the efficacy of the artificial ventilation using the above mentioned devices were poor before the training. The average after-training performance scores of the groups are presented in the table below:

time/group	B-V-M1	B-V-M2	IT1	IT2	LM1	LM2
1 day	9.4	9.3	9.3	9.1	9.8	9.7
1 month	7.7	7.4	6.3	6.1	8.9	8.4
3 months	5.8	5.9	5.1	4.7	7.1	7.3

CONCLUSION: Our results confirm that the use of laryngeal mask for the in hospital basic life support is an applicable method of airway management. It is easy to apply, the effect of ventilation is better than with the bag-valve-mask.

THE TRAINING OF HEALTH CARE WORKERS FOR THE IN-HOSPITAL BASIC LIFE SUPPORT IN HUNGARY

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BACKGROUND: When cardiac arrest occurs in hospital, he basic life support (BLS) should be initiated by the witnessing health care professional. The CPR Study introduced a multi level Code system, which means BLS included sophisticated airway management, early defibrillation and early epinephrine administration provided before the Code Team arrives. Our previous studies confirmed a poor level of CPR performance and a high demand for CPR training among health care professionals.
METHOD: We established a CPR Training Course Centre, where doctors and nurses are being trained for in-hospital basic and advanced life support. 3 x 6 hours of training were held. After the theoretical introduction a step-by-step training method was used for trainees to be familiar with all sequences of basic and advanced life support. Then we synthetised all separated sequences. Afterwards, a role play of rescue groups was taken in simulated situations. We also trained the multi level alarm system for the in-hospital resuscitations. After the training all respondents had to sit for examination. The quality of performance was scored and compared to our previous results. Semi-structured interviews were carried out before and after the training among all respondents to collect information about the course.
RESULTS: We have found a remarkably high interest among doctors and nurses in our CPR Training Courses. It was very important to use proper equipment for the training: audio-visual training facilities, computerised ALS Trainer manikin, manual and automatic defibrillator units. The evaluation of the examination held immediately after the training course showed a significant higher quality of performance than before the training. The self-confidence of the trainees for initiating and carrying out resuscitation had increased. Their overall feeling about the course was positive and 100% responded the course "very useful". 73.6% of doctors and 79.4% of nurses claimed for regular training facilities with ALS trainers.
CONCLUSION: The CPR training for health care workers is mandatory including the training of sophisticated airway management and use of defibrillator. The use of proper equipment and the comprehensive method for training will improve the efficacy, the satisfaction of trainees, therefore their compliance for further co-operation will also increase.

11. Emergency Medicine/Trauma/Burns

The use of reinfusion in critical care

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Objectives: The effect of reinfusion in emergency surgery and gynecology.

Methods: We had an experience of autologous blood transfusion in 22 patients whom was producet an emergency surgical or gynecological interventions in occasion with break tubal pregnancies (45.5 %), penetrating abdominal wounds with injuries of mesenterial vessels (22.8 %), injuries of the liver (9.1 %), blunt abdominal trauma with lien ruption (22.8 %). In 27.3 % patients had the previous somatic pathology. Blood loss volume was 1500–4500 ml, & the reihfuside blood volume was 500–2000 ml, consisting 30–70 % of blood loss. It was needn't to fransuse donor blood in 18.2 % in further but 300–2500 ml of contanined erythrocytes were frasfused for supporting of Hb concentration on the 80 g/L (8 g/dL) rate at the other patients with isovolemie hemodiluttion.

Results: The Arterial Blood Pressure fast stabilisation on the perfusion level had noted after reinfusion, excluding the case, when the volume of reinfused blood had conisted just 40 % of blood loss at the patient with massive blood loss.

Complications have noted in two cases. One patient with slash wound, injury of arteria gastrica dextra and total blood loss of 4500 ml, has an episode of asystoly, DIC (Disseminated Intravascular Coagulation) syndrome, acute renal failure, and acute pancreatitis that we haven't connected to reinfusion. All the complications were successfully corrected and at thirty first day patient with subcapsular wound of the lien that has happened 14 days before complicated with external rupture of the capsull & massive intraabdominal bleeding, has the hemolytical shock, DIC Syndrome, Acute renal failure developed after reinfusion. He was died.

All another have no complications. Posthemorrhagic anemia had corrected rapidly than in case when hemorrange corrected exclusively by donor blood.

Conclusions: We consider that simplicity, accessibility, high effectiveness, quite well further results of blood reinfusion, except the case of blood reinfusing that was for time-expired out of blood vessels (more than 10 days in our case) will promote to the wide spreading of this method, especially in emergency surgery, in massive injuries, & in disarters, all the cases of insufficiently of time for selection of lot of donor blood.

The injury severity score (ISS) as a measure of severity of anatomic injuries

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Objectives: The injury severity score is a measure of severity of anatomic injuries. ISS is a sum of squares of the highest degrees of the Abbreviated Injury scale (AIS) for each of three most severity injured regions. The purpose of the study is to establish correlation between the ISS values and mortality rate in older, polytraumatized patients.

Methods and Results: ISS was determined for 214 patients. The mean ISS value was 27.65 ± 17.36 while the median value was 21. Minor injuries were present in 90 (42 %) patients with ISS less than 21, while 124 (58 %) patients with ISS more than 22 had severe injuries. Increased mortality of the older patients was noted in the range 21–30. All patients older than 50 died while 20 % of patients below 50 yrs of age survived, indicationg correlation between ISS and mortality rate in polytraumatized patients above 50 yrs of age.

Conclusions: this mode of evaluating severity of injuries may help in triage, determining appropriate level of care and as an indicator of future outcome of polytraumatized patients.

INTENSIVE THERAPY OF EPH-GESTOSIS WITH CLOPHELINUM /CLONIDINE/ TO IMPROVE CARDIORESPIRATORY SYSTEM FUNCTION

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Objectives: Study of a reaction of the cardiorespiratory system of pregnant women to i/v microperfusion of Clophelinum which is known to eliminate hemodynamic and endocrine nociceptive reactions and can be used for treating hypertensive syndrome in pregnancy and labor.
Methods: The following non-invasive methods were used: capnography, spirometry, oxygenography, indirect Fick principle based on the circle breathing, plethysmography and integral rheography. 52 functional indices of cardiorespiratory function were evaluated.
Results: 74 pregnant women with EPH-gestosis were examined before and after i/v infusion of 100 ml of 0.0001% Clophelin solution, 0.005 mg/kg/hour. Before the treatment intensification of carbohydrate metabolism, hyperventilation with moderate hypocapnia and complete respiratory compensation of metabolic acidosis, increased alveolar ventilation, decreased alveolar volume, predomination of perfusion over ventilation, hypokinetic type of circulation with dominated load by peripheral vascular resistance to the blood flow was observed in this group of patients. Microperfusion of Clophelin improved the ventilation/perfusion ratio, ventilatory and gaseous exchange efficiency, resulted in a decrease of congestion in the pulmonary circulation, possibly owing to a decrease of peripheral vascular resistance by 17%, of the heart rate by 10.5%, of the cardial output index by 9.5%.
Conclusions: The resulted type of circulation with a decreased load on the heart both by resistance and volume allowed to improve the cardiorespiratory system function in pregnant patients.

LACTATEMIA; A NEW NON SPECIALISED INDICATOR OF THE SEVERITY OF ILLNESS FOR PATIENTS IN AN EMERGENCY UNIT

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Objectives : Tissue hypoxia is a non exclusive cause of hyperlactatemia. Other serious medical situations induce hyperlactatemia. Therefore, lactatemia could be a non specific indicator of severity in patients admitted in emergency unit. The aims of this study were to examine the correlations between lactatemia with the short term survival course prognosis and the unit of hospitalisation; intensive care unit (ICU) or medicine unit, in patients admitted in our emergency department.
Methods : Lactatemia was measured as soon as the admittance, in arterial blood sample of patients which needed arterial blood gas. Sixty-one patients were included during 4 months. To assess the statistical performances of lactatemia, sensitivity (Se), specificity (Sp) and accuracy (Ac) were calculated for the threshold determined by the Youden's test (Se+Sp-1).
Results : Fifteen patients were admitted in ICU and 46 in a medical unit. Fifteen patients died. A group of 35 patients had a lactatemia up to 2 $mmol.l^{-1}$. In this group of patients, 3 had acidocetosis, 3 had asthma, 3 had cerebral vascular ischemia, 3 had neoplasia, 2 had cardiogenic shock, 1 was epileptic, 8 had congestive heart failure, 6 had acute respiratory failure, 2 had septicaemia, 2 had hyperosmolar status finally 3 had medicinal intoxication. Lactatemia was significantly higher in non survivor than survivor (5.5±4.2 vs. 2.3±1.0, $p<0.0001$, respectively), the cut point of lactatemia was 3.7 $mmol.l^{-1}$, Se was 60%, Sp was 91% and the accuracy was 83%. On the other hand lactatemia was higher in patients admitted in ICU than in medical unit (4.5±3.6 vs. 2.0±2.1, $p<0.01$, respectively).
Conclusions : This preliminary results suggest that lactatemia is a good indicator of the short term survival course in patients admitted in an emergency unit. Furthermore, hyperlactemia is present in several pathology seen in emergency.

PATTERNS OF INJURY AND WHITE CELL RESPONSES IN CRITICALLY ILL TRAUMA PATIENTS WHO PRESENT WITH LEUCOPAENIA: A POSSIBLE ROLE FOR G-CSF

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Objective: To determine the pattern of injury, total peripheral white cell, neutrophil, and lymphocyte responses, and the outcome of trauma patients who are leucopaenic on admission to the ICU.
Design: Prospective, descriptive study of consecutive admissions over 4 months.
Setting: A 16-bed Surgical Intensive Care in a teaching hospital.
Patients: Thirty consecutive adults admitted to the ICU following trauma. Leucopaenia was defined as a total peripheral white cell count of $< 4 \times 10^9$, neutropaenia $< 2 \times 10^9$, and lymphopaenia $< 1.5 \times 10^9$ cells per litre.
Measurement and Results: The total peripheral white cell count was documented daily and the neurtophil and lymphocyte counts and differential percentages on days 0, 5, and 10. The incidence of leucopaenia was significantly higher in patients with gunshot wounds ($p < 0.05$) and hollow visceral intra-abdominal injury ($p < 0.001$). Eight (27%) patients died. No significant differences were found in the initial mean total white cell, neutrophil, or lymphocyte counts nor in the differential percentages between survivors and non-survivors. The total peripheral white cell count increased significantly in survivors compared to those who died ($p < 0.001$) and significant differences were found in absolute neutrophil counts ($p < 0.02$) and differential percentages ($p < 0.01$) on days 5 and 10. No significant differences were found in lymphocyte counts or differential percentages.
Conclusions: There is a signficant association between leucopaenia, neutropaenia, and intra-abdominal hollow visceral injury and peritoneal contamination. Survival is related significantly to resolution of these white cell deficiencies. These findings suggest a possible role of granulocyte colony stimulating factor in the trauma patient with intra-abdominal infection and persistent neutropaenia.

Amelioration of organization emergency care team in order to improve caring for urgent cases.

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Objectives: Emergency care team (ECT), as integral part of health, respectively as activity of primary health protection care all acute difficult conditions which vitaly danger patients and distressed. The aim of our investigations was to indicate on the possibilities of amelioration of organization ECT in order to improve caring for urgent cases.
Methods: In our investigations we used epidemiological and statistical metods all informations and matherials from terrain ECTs.
Results: The number of traumatized in traffic accidents etc. have a epidemic character. It is well known that 58.1 % traumatized died in first two hours. ECT isn't enough qualified to care a traumatized on the place of accident and during transport. Because that medical personnel must have an education with solid qualities.
Conclusions: 1. Besides a physician specialized (VII → VII2 → VIII gradus) in urgent medicine, it's necessary to introduce two (2) medical technicians instead of one as is existing now (1 → 2). 2. The medical technicians can drive cars and one of them always, drives the ambulance car ("B" category). 3. The technicians have been specially educated for urgent cases (IV → V → VI). 4. Such a new team structure should be more capable in professional sense. 5. We can see an importance of team-work in ECTs. 6. Such teams should also be more economic in comparison with existing one. 7. We think, that on the general medical studies need to include a new discipline-urgent medicine!

Intensive medical aid using cellular-sorptional method of detoxication

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Objectives: To detoxicate an organism since 1983 we have used biological sorbents: isolated from liver and spleen of human or animal cells or tissue fragments.
Methods: Cellular dialysis (164 dialyses) in patients with an acute hepatic insufficiency poisoning by hepatotropic poisons: CCl_4, dichloethane, mushrooms – were conducted using "artificial kidney" apparatus, by means of arteriovenous shunt, formed at forearm with disposable dialyzers. Hepatocytes suspension was poured into dializing circuit of dialyzer at 5–10 mg of cells per 1 kg of patients weight. Dialysis was performed during 1–2 hrs.
168 patients with purulent-septic states were treated as for hemoperfusion through prepared sorptional column: 40.0 ml of hemosorbent and 30.0 ml of fragmented spleen or hepatocytes suspension with the help of roller pump with the rate of 80–120 ml/min, during 90–120 min. Average volume of hemoperfusion made 3.5l.
Conclusions: In all cases we used both native and cryopreserved biomaterial. Analysis of the dynamics of clinical, biochemical, scintigraphic and US-investigastions allows to conclude that application of cellular-sorptional method of detoxication enable to prolong life and reduce lethal outcome in some severe category of patients with endotoxicosis.

LATE EPILEPSY AFTER STEREOTACTIC RADIOSURGERY IN CEREBRAL ARTERIO-VENOUS MALFORMATION (A.V.M.)

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Stereotactic radiosurgery, conceptually, is an attractive alternative to microsurgical removal of selected cerebral AVM because it is associated with a very low short-time risks of conventional resection.
A 49 y.o, female was admitted at our institution in post ictal state with airway obstruction. Ten months before she was treated by gamma knife surgery guided with stereotactic angiography for a small AVM of the corpus callosum.
After infusion of diazepam (0.2mg/kg), thiopentone (4mg/kg) and vecuronium (1mg/kg), patient was intubated and mechanical ventilation was adjusted to mantain normocapnia.
CT scan showed left parieto-occipital hypodensity with brain swelling.
After admission in Neurological ICU, dexamethasone (24mg/kg/die), mannitol (0.5mg/kg) and diphenylydantoin (20mg/kg/die) were administred. Two hours later neurological status of the patient was normal and she was extubated.
The risks of stereotactic radiosurgery are related to: hemorrhage during the latency interval; transient radiation effects; permanent radiation-induced complications; radiation induced neoplasia.
No epilepsy is reported in pts with AVM and no seizure before radiosurgery.
In conclusion, epilepsy can be a possible delayed complication after radiosurgery for cerebral AVM.

SERUM POTASSIUM IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION UNDERGOING PRIMARY PTCA

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Serum potassium deficiency is a frequently reported finding in the time course of acute myocardial infarction (AMI). If this is also correct for patients with AMI undergoing primary percutaneous transluminal coronary angioplasty (PTCA) is unknown.For that reason we analysed in 20 patients (14 m.,6 f.,61 ± 10 y.) serum potassium concentrations on admission and directly after PTCA.The reference intervall for potassium in our clinical laboratory is 3,5 - 5,0 mmol/l.

Results (mean values ± standar error)

Potassium (n=20)	before PTCA	after PTCA
mmol/l	4,22 ±0,38	3,97 ±0,31
range	(n)	(n)
<3,5	1	3
3,5-4,0	4	6
4,0-4,5	13	11
4,5-5,0	2	/

Although more than 90 % of the patients with AMI undergoing PTCA showed normal potassium serum concentrations on admission a measurable decrease of potassium could be found in 65 % of patients (13/20) after PTCA.Therefore for the majority of patients with AMI potassium supplementation prior to PTCA can be justified to avoid electrolyte disturbances as a possible trigger factor for cardiac arrhythmias in the setting of AMI and acute reperfusion due to primary PTCA.

TIME COURSE OF SERUM ENZYMES IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION UNDERGOING PRIMARY PTCA

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Objective : To evaluate the time course of changes in serum enzymes in patients with acute myocardial infarction (AMI) undergoing primary PTCA.
Methods : In 65 patients (49 m.,16 f.,60 + 10 y.) with proven AMI undergoing primary PTCA serum enzymes (creatine phosphokinase =CK,CK-MB isoenzyme =CK-MB,aspartate-aminotransferase =AST and lactic dehydrogenase =LDH; Boehringer,FRG) were analysed before PTCA on admission, directly after PTCA and at 12,24 and 48 hours after PTCA. All patients had a complete opening of the occluded coronary artery after PTCA (TIMI Flow III).

		Results				
Serum enzymes (*Reference intervall)	before PTCA	after PTCA	12 h	24 h	48 h	
CK	47	355	**671**	440	216	U/l
(*<80 U/l)	±20	±337	**±419**	±288	±303	
CK-MB	/	36	**63**	34	16	U/l
(*<5 U/l)		±25	**±35**	±18	±10	
AST	13	38	**85**	67	37	U/l
(*<22 U/l)	± 8	±31	**±54**	±38	±20	
LDH	171	242	474	**534**	464	U/l
(*<240 U/l)	± 36	±112	±265	**±254**	±197	

Conclusion : Complete coronary artery reperfusion by primary PTCA leads to much earlier peaking and decrease of all heart enzymes -especially the LDH- than usually told in literature.This has important consequences for the patient management and allows a shorter duration of stay in the intensive care unit.

OUR EXPERIENCE WITH PERITONEAL LAVAGE AS DIAGNOSTIC APPROACH IN ABDOMINAL INJURES

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Objectives: Diagnostic procedures are very important in the management of abdominal injures in trauma. The aim of this paper is to present our experience with peritoneal lavage as diagnostic procedure in abdominal injury.

Methods: We analyzed patients to whom peritoneal lavage was applied in the Surgical Emergency from 1st of January 1991 till 31st of December 1994.

Results: In this four years period there were 250 abdominal injures. There were 110 blunt injures. Among them in 43 patients peritoneal lavage was applied. Results were positive in 28 patients and negative in 11 patients. False positive finding were in 2 patients and false negative in two patients. In patients with positive lavage there were more than 90,000/mm3 red blood cells, more than 1,000/mm3 white blood cells and the level of amylase was up to 8 U/l. The gall, urine and stool were positive as well. In patients with negative lavage there were less than 40,000/mm3 red blood cells, less than 500/mm3 white blood cells and amylase were negative.

Conclusion: Peritoneal lavage is useful and important diagnostic procedure in the management of abdominal injures in trauma.

OUR EXPERIENCE WITH URGENT SURGICAL MANAGEMENT OF THE ACUTE GASTRIC AND DUODENAL BLEEDING

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Objectives: Acute gastric and duodenal bleeding are very common complication of gastric and duodenal ulcer. The aim of this paper is to present efficiency of our surgical management of these acute conditions.
Methods: In this paper results of surgical management of patients with acute gastric and duodenal bleeding, treated in our Clinic from the 1st of January 1991 till 31st of December 1994, are presented.
Results: Among 92 operated patients there were 31 females (33.70%) and 61 males (66.30%). There were 52 patients (56.53%) with gastric bleeding and 40 patients (43.47%) with duodenal bleeding. Bleeding from gastric ulcer were treated with the following methods: excision of ulcer with suture in 23 patients (44.24%), ulcer suture in 12 patients (23.07%), Billroth I in 9 patients (17.31%) and Billroth II in 8 patients (15.38%). Heinecke-Mikulicz-Weinberger pyloroplastica was the most frequently used in the treatment of the duodenal ulcer bleeding. Bilateral truncal vagotomy was done in 34 patients (85%), duodenotomy with ulcer suture was done in three patients (7.5%) and three patients underwent Billroth II operation. We had three complications - duodenal dehiscence in pyloroplasty. There were no lethal complications.
Conclusions: Based on our own experience we conclude that acute bleeding from gastric and duodenal ulcer can be safely managed with urgent and modern operative techniques.

CPK-MB AND CARDIAC OUTPUT (CO) IN PROSPECTIVE EVALUATION OF MIOCARDIAL CONTUSION

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Objectives and methods: Cardiac contusion was evaluated by serial determination of CPK-MB fraction and CO using non-invasive Doppler technique in 60 patients with blunt trauma of the chest.
Results: Miocardial contusion was diagnosed in 34(57%) patients, while in 26 (43%) it appeared unaffected. CPK-MB of 3% and more in comparison to total CPK was 6.4+4,2% in 34 patients, and 1,9+0,6% in 26 pts ($p<0.01$).CO of 3.8+1.17 L/min in patients with cardiac contusion, measured 16 hrs after admission at the latest, was significantly lower than in group of 26 patients with CO of 4.8+0.86 L/min ($p<0.01$).
Conclusions: CO values were significantly lower in patients with cardiac contusion and correlated with pathological values of CPK-MB fraction.

INFLUENCE OF PLASMOPHORESIS ON BIOGENE AMINES IN PATIENTS WITH OBSTRUCTIVE JAUNDICE

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Objectives: Extracorporal plasmophoresis (PPh) was implemented by non-stop method in 28 patients with obstructive jaundice.
Methods: Changes of serotonin (S) and histamine (H) in arterial (Ab) and venous (Vb) blood were investigated before and after one-time session of PPh. S and H in blood serum were determined with fluorometric method.
Results: Before PPh the average S contents in Ab and Vb did not differ. After one-time PPh session S in the blood outflowing lungs was 23 % lower than in the blood inflowing. 24 hours after extracorporal detoxication implemented the indices kept the same level. Similar dynamics after PPh was observed in H. Before the session H contens was equal both in the blood inflowing and in the blood outflowing lungs. After PPh H contents in Ab was 18 % lower compared to the Vb and did not change for 24 hours.
Conclusions: Dynamics of changes of biogene amines shows that under the influence of PPh there takes place not only mechanical removal of their surpluses together with plasm, but there sharply grows inactivating role of lungs towards BA substances, which is confirmed by reduction of their concentration in the blood outflowing lungs. This effect is probably connected with the "deplasmation" of the lung cellular elements. Simultaneously lungs' cells are freed not only from plasm but from toxic adsorbents on their surface. As a result the lung cells activate absorption of the surplus number of amines from the vessel channel. It is not excluded that S inactivation is due to growing activity of monoaminooxidase resulting in deminishing of intoxication.

Acute pulmonary embolism: thrombolytic therapy or pulmonary embolectomy?

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Objectives: Pulmonary embolism (PE) remains a challenging problem for diagnosis and management for the emergency physician. The aim of this work is to identify the best treatment for massive pulmonary thromboembolism.

Methods: During recent 5 years 150 patients with symptomatic acute serious PE were reffered to our observations. Selective pulmonary arteriography confirmed this diagnosis in all cases. 4 (2.7 %) underwent urgent surgery, of them 2 (1.33 %) with cardiogenic shock and 2 (1.33 %) with massive pulmonary embolism. 146 patients (97.3 %) underwent thrombolytic therapy.

Results: In the patients who received thrombolytic therapy successful results were achieved in 133 cases (91.1 %), in 13 (8.9 %) patients subsequent pulmonary embolectomy was performed. Mortality rate was 2 (1.36 %) in the patients who underwent pulmonary embolectomy after unsuccessful thrombolytic therapy and 4 (100 %) in the patients with cardiogenic shock and massive PE. Lower extremity deep venous thrombosis caused PE in 89 % patients. PE mortality rate is repoted to be 4 %, but all patients with cardiogenic shock and massive PE died. This very high mortality rate related to the clinical status of the patients whose condition became worse despite intensive treatment.

Conclusions: The results of this study show that in most cases thrombolytic therapy is an effective rapid method of treating PE. However, surgical treatment is preferable when the patients reveal adverse effects to drug therapy, when medical therapy is unsuccessful or when the patients are seriously ill with reccurent cardiac arrest. High-quality pulmonary angiography remains the most accurate and reliable means of diagnosing PE.

SERUM THYROID HORMONE LEVELS IN TRAUMATIZED CRITICAL ILL PATIENTS AS A PREDICTOR OF MORTALITY

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This prospective study was conducted to investigate the serum thyroid hormone levels in traumatized critical ill patients.

Serum thyroid stimulating hormone(TSH),total thyroxine(TT4),free thyroxine(FT4),total tri-iodothyronine(TT3),free tri-iodothyronine (FT3) levels were measured within 24 hr.of intensive care unit admission(first day) in 17 multiple traumatized male patients(Injury Severity Score higher than 17). In fifth day the same hormone levels were repeated. TSH,TT4,FT4,TT3 and FT3 levels were determined by radioimmunoassay(RIA). The levels of TSH,TT4,FT4,TT3 and FT3 in survivors and nonsurvivors were compared with first and fifth days(Table). In conclusion, we are convinced that there was a high correlation between low serum thyroid hormone levels and mortality, serum thyroid hormone levels are prognostic value in traumatized critical ill patients.

Table: Serum Thyroid Hormone Levels (Mean ± SD)

	Hormone levels	First day	Fifth day	p Value
Survivors	TSH mU/L	0.67±0.43	1.14±0.25	< 0.02
	TT4 nmol/L	55.3 ±24.92	73.65±24.8	< 0.01
	FT4 pmol/L	8.2±4.61	10.38±3.2	< 0.05
	TT3 nmol/L	0.65±0.39	1.21±0.5	< 0.02
	FT3 pmol/L	1.56±1.26	2.28±1.3	< 0.02
Nonsurvivors	TSH mU/L	0.78±0.93	0.88±0.91	nonsignificant
	TT4 nmol/L	60.0±16.6	45.13±21.0	< 0.02
	FT4 pmol/L	8.3±2.1	6.41±4.23	< 0.05
	TT3 nmol/L	0.79±0.34	0.78±0.49	nonsignificant
	FT3 pmol/L	2.75±1.17	1.36±1.4	< 0.05

EFFECT OF GLUCAGON ON HEMODYNAMICS AND METABOLISM IN HYPOVOLEMIC SHOCK

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OBJECTIVES: Glucagon improves myokardium contractility,intensifies kidney blood flow, stops bronchospasm (1), these were the reasons of investigating its effect on hemodynamics and metabolism in hypovolemic shock expermentally and in clinic.
METHODS : In experiments on white rats with traumatic shock glucagon (Novo Nordisk) was injected intraperitoneally in dose 20 mcg/kg. Patients with hypovolemic shock (trauma, hemorrage) were injected glucagon intravenously in dose 1 mg on the background of infusion therapy.
RESULTS : Glucagon hightened recovery indexes of glucose in rats and patients with shock, whereas in groups without glucagon hyperglycemia devoloped.
Rats with glucagon injection had double times urea content than the norm (10,5+1,5 mmol/l, norm - 4,9+0,3 mmol/l), whereas rats without glucagon had urea content 30,3 +1,8 mmol/ l ($p < 0,001$). Osmolarity of blood plasma in rats having glucagon injections was 301,5 + 2,9 mosm/kg H2O, without the drug - 317,0 + 3,5 mosm/kg H2O ($p < 0,01$), LDH activity - 27,7 + 2.9 and 51,0 + 9,6 ($p < 0,01$) mcmol cec-1 accordingly. Lethality in the group of rats without glucagon was 70% /n=50/, with glucagon - 0 (n = 70).
In patients with hypovolemic shock in 15 minutes after glucagon administration stroke volume increased to 71% (SV), miocardium contractility - to 70% (MC), peripheral resistance of vessels (VR) decreased to 10%. In 1-1,5 hrs SV increased to 100%, MC - to 126%, PVR - decreased to 116%.
CONCLUSION : The study provides the evidence that glucagon has an anti-shock effect, improves hemodynamics and metabolism indexes in cases of hypovolemic shock.
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THE USING OF ISOLATED HEPATOCYTES IN ACUTE COMPLEX THERAPY OF HEPATIC FAILURE.

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Objectives: The Investigation of isolated hepatocytes using's efficacy in patients with acute hepatic failure.
Methods: Native and crioconsrved allo- and xenohepatocytes fixed on semipermeable membranes were used.
Results: The Artificial supporting system with isolated hepatocytes as metabolic units was applied in 85 patients. During the treatment with this cytotherapy an improvement of clinic state and biochemical rates were observed even in the first 8 weeks. For instance, the increasing of glutamin acid's level in blood up to normal value and decreasing of ammonies - concentration from 198#26 mmol/l down to 89#15 mmol/l were discovered. The diminution of encephalopathy was noted too. General lethality was equal 37 %, there of 21 % concerned acute hepatic failure (AHF).
Conclusions: The using of supporting hepatic system is able to cope the phenomenon of AHF.

TREATMENT OF SEVERE FORMS OF FAT EMBOLISM IN MULTIPLY INJURIED PATIENTS

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Objectives: Fat embolism (FE) is an important and insufficiently studied problem of the intensive care medicine. FE is clinically diagnosed in 25% and morphologically in 80-90% of the victims with severe multiple skeletal injury that is accompanied by the shock.
Methods: During the last 5 years 27 patients with the cerebropulmonary form of FE were treated in the ICU. The prognosis of the probability of FE development was done using the computer system "CITO-PROGNOSIS" in which the TRISS-method, dynamic and statistical prognosis of the injury outcome, and the values of the most severe injury in points were realized. The treatment consisted of the surgical stabilization of the fractures with the authors' design of the rod apparatus in the acute period, long-term mechanical ventilation with PEEP via tracheostomy, complex fluid therapy using perfluorochemical emulsions (PE), and electrochemically active solution of Na hypochlorite (SNH) via the central vein.
Results: The treatment of 27 patients with FE gave a good result that was manifested by the complete regression of psychoneurologic and respiratory disorders.
Conclusions:Taking into account the prognostic data, it is necessary to provide early complex of intensive care to the polytraumatized patients. It includes the surgical stabilization of fractures, fluid therapy using PE and SNH, early long-term mechanical ventilation.

The Necessity of the best Early Infusion of Nitroglycerin in the Paths with Myocardial Infarction.

Dr. Alexandr E. Poladko, Station of Medical Aid. Kiev Ukraine.

Objectives: The reason of investigation is to prove the necessity of beginning of the intravenous infusion of Nitroglycerin before the hospitalisation.

Methods: From January 1 to June 30 1994 protocols of treatment myocardial infarction patients in Kiev Medical Aid Station.

Results: The results of treatment are better if infusion began early or prolonged during hospitalisation.

Conclusions: There were 30 patients with acute myocardial infarction treated before hospital by the cardiological groups.

100 patients were treated with the early infusion of Nitroglycerin and 200 without.

The results of treatment were: in the group with infusion:
Mortality in the first hours 5 %
The full disappear of pain 90 %
In the group without infusions
Mortality in the first hours 8 %
The full disappear of pain 82 %

That's why our opinion is that infusion of N. is necessary in the treatment of the patients with myocardial infarction from the first minutes of illness.

About Sublingvalis Application of Prazosin Hydrochloride in the practice of Rescue Groups.

Dr. Gennady D. Kyrzhner, Station of Medical Aid, Kiev, Ukraine.

Object: Looking for safe medication which is good for the treatment of Arterial Hypertension and is simple for use.

We inspected the effect of Prazosin in the conditions of the call during the year.

Method: We used 1 mg Prazosin tablets sub lingua and measured blood pressure 4 ones during 2 hours. The parameters were registrated in protocol.

Result: One hundred patients took part in investigation. The middle age of patients was 69. The reason of hypertension was not taken into consideration. In two hours after beginning of the treatment we caught the reliable lowering of blood pressure in 90 % of patients.

The general condition of patients became better in 10–15 min.

It was only one accident of complication during the treatment – the orthostatic hypotension.

Conclusion: Prazosin hydrochloride in the dose 1 mg sub lingua is safe and simple for use in the urgent situations.

Some Results of the 23-years use of endocardial temporary pacemakers in the practice of cardiological brigades of Kiev. Medical Aid Station.

Dr. Alexander E. Poladko, Dr. Gennady D. Kyrzhner, Station of Medical Aid. Kiev, Ukraine

EXUDATIVE MAGNESIUM LOSSES AFTER MAJOR BURNS: A CUE TO THE HYPOMAGNESEMIA

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Objectives: Hypomagnesemia is frequently observed in severely burned patients during the early period after injury. Increased urinary excretion is insufficient to explain the magnitude of the magnesium (Mg) depletion. The possibility of exudative cutaneous Mg losses has been proposed, but not yet demonstrated. The study aimed at measuring the Mg content of the cutaneous exudates and urine during the first week after major burns.

Methods: 16 patients, aged 34±9 years (mean ± SD), and burnt 37±11 % of body surface, were studied from day 1 (D1) to D20. Serum samples were collected at D0, serum and urine from D1 to D7, and on D10, D15, D20. Cutaneous exudates were extracted from the textiles surrounding the patients, collected over 24h periods from D1 to D7, using bidistilled acidified water. Mg supplements (8.2 to 123 mmol/24h) were prescribed from D1 to D10 according to the severity of hypoMg (serum Mg < 0.7 mmol/l).

Results: Mg serum levels decreased below reference ranges in 12 patients between D1 and D4, and normalised thereafter during supplementation. Urinary Mg excretion was increased in 11 patients, mean excretion being 4.8±1.3 mmol/24h until D20. Mean daily Mg cutaneous losses, were 16 mmol/24h, i.e. 112 mmol in 7 days. Large inter- & intra-patient variability: the daily exudative losses ranged from 0 to 83 mmol/24h.

Conclusions: The mean daily Mg cutaneous losses after burns were larger than the urinary losses, and equivalent to the recommended intakes for Mg; the addition of the exudative and urinary losses largely explained the increased Mg requirements after burns.

The protective effect of C1-inhibitor on thermal trauma: first results from an animal study

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Complex immunologic alterations occur following thermal injury. The activation and consumption of the complement and clotting systems are suggested to play an important role in the development of the capillary leak syndrome. In burned patients, a generalized inflammatory reaction as well as the impairment of the host defense are considered to be the major reasons for complications, such as sepsis and multiple organ failure. In a pig model we investigated a possible protective effect of C1-inhibitor (Berinert, Behring). Before conducting the animal experiments the human C1-inhibitor concentrate was analyzed for its inhibitory capacity on purified pig C1s and its pharmacokinetic behaviour in pigs (T1/2,ID50). Pigs received anesthesia and analgesia and arterial, venous and pulmonary (Swan Ganz) katheters were placed into the carotis and jugular veins. The pigs were scalded for 25 seconds with 75°C hot water to achieve a 30% TBS partial-thickness burn. Blood samples were taken prior and after surgery as well as 15, 45 minutes, 4, 8, 12 and every further 12 hours after thermal trauma. Two control groups (each n=6) included animals which were either scalded or not scalded and treated only by resuscitation of Ringers Lactat solution. Besides various parameters blood samples were analyzed for Complement. The pigs (n=4) received C1-inhibitor concentrate at an initial dose of 100 U/kg body weight either immediately or 12 hours after thermal trauma (n=2), followed by three further applications (of reduced amounts) every 12 hours. The clinical outcome as indicated by vital parameters and as well as demonstrated by reduced edema and inflammatory tissue destruction suggested a protective effect of C1-inhibitor. Complement analysis revealed a faster recovery of the alternative and classical pathway activities in C1-inhibitor treated pigs as compared to the control group but only if the regulator was given immediately after thermal trauma. From these results a protective function of C1-inhibitor on thermal trauma can be assumed.

TUMOR NECROSIS FACTOR ALPHA AND INTERLEUKIN-6 IN MULTIPLE INJURED OR NOT INJURED CRITICALLY ILL PATIENTS

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Objectives: The aim of study was to characterise the pattern of secretion of interleukin-6 (IL-6) and tumor necrosis factor alpha (TNF alpha) in multiply injured or not injured critically ill patients and to relate these results to their outcome.
Methods: Blood samples of 12 multiply injured (7 survivors - MIS, 5 nonsurvivors - MIN) and 11 not injured critically ill patients (6 survivors - NIS, 5 nonsurvivors - NIN) were drawn at 0, 4, 8, 12, 24 and 48 hours after admission to intensive care unit. Cytokine levels were measured using enzyme-linked immunosorbent assays (ELISA).
Results: The selected results are presented as mean and SEM concentrations of TNF alpha and IL-6 (pg/ml). Statistical significance * $p < 0.05$.

Hrs after admission	0	12	24
TNF (MIS)	3.2 (1.7)	2.8 (1.9)	4.3 (2.0)
TNF (MIN)	17.9 (7.2)*	13.2 (4.8)*	17.6 (5.5)*
TNF (NIS)	13.5 (2.2)	11.5 (2.5)	12.5 (4.2)
TNF (NIN)	9.3 (0.8)	8.7 (2.7)	12.9 (3.0)
IL-6 (MIS)	177 (58)	95 (51)	75 (45)
IL-6 (MIN)	238 (73)	148 (46)	154 (57)
IL-6 (NIS)	156 (81)	88 (54)	65 (39)
IL-6 (NIN)	117 (68)	150 (76)	157 (94)

Conclusions: This data suggest TNF alpha is a better prognostic marker in patients with multiple injury, than in critically ill patients without injury. IL-6 is not significantly higher in nonsurvivors of both groups.

NITRIC OXIDE METABOLITES PLASMA LEVELS ARE INCREASED IN BURNED PATIENTS.

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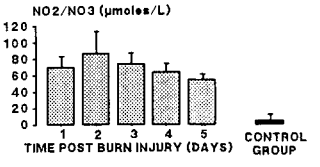
Sepsis is associated with an increased production of nitric oxide (NO), as reflected by a rise in plasma levels of nitrites (NO2) and nitrates (NO3). Severe burn injury is associated with similar symptoms of inflammation like hypotension, high cardiac output low vascular resistance and increased vascular permeability so that an increased NO production may be involved.
The present study included 16 patients admitted to the Intensive Care Unit of the Burn Center of Brussels (age 35 ± 18 years; burned surface area 37 ± 19 %), and 6 control (non-septic) patients hospitalized in the neurological rehabilitation unit of the Erasme Hospital (age 64 ± 18 years). The patients in both groups were fed enterally with 30 to 40 kcal/kg/day of a standard solution. In the burn group, during the study period, 6 patients were mechanically ventilated, 4 required vasopressor (dopamine) therapy, and 5 received antibiotics; 13 patients were discharged alive from the intensive care unit, and no patient died during the study period.
Plasma was sampled for NO2/NO3 determinations (Griess reaction) daily from day 1 to day 5 ($n=11$) or to discharge (day 3, $n=2$; day 4, $n=3$) in the burn group, and once the control group.
In the burn group, NO2/NO3 levels were elevated at day 1 (70 ± 12 μmoles/l), reached a maximal value on day 2 (87 ± 26 μmoles/l) and progressively decreased to day 5 (fig). These values were higher than in the control group (5.6 ± 7.6 μmoles/l, all differences $p < 0.01$). However, no correlation was found between the plasma NO2/NO3 levels and the age of the patient or the total burned surface area; burned patients who became infected tended to have higher plasma NO2/NO3 levels than those who did not (177 ± 131 vs 83 ± 48 μmoles/l, NS).
The present study indicates that burn injury is associated with increased NO2/NO3 plasma levels, which are consistent with an enhanced NO production.



INFLUENCE OF URAPIDIL ON CEREBROSPINAL FLUID PRESSURE IN HUMANS WITH UNCOMPROMISED INTRACRANIAL COMPLIANCE

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Objectives: Urapidil has been recommanded for therapy of hypotension in neurosurgical patients, because it was found not to increase intracranial pressure in patients with compromised intracranial dynamics (1). In contrast several authors reported an increase of ICP after urapidil administration in patients with head injury (2). Our study was designed to determin the influence of urapidil on mean lumbar cerebrospinal fluid pressure (CSFP) in awake humans with uncompromised intracranial compliance.
Methods: After approval by the local University Ethics Comittee, six volunteers (ASA 1, 4 male, 2 female) were studied in the lateral decubitusposition with the vertebral column positioned horizontally. A 25 gauge needle was inserted into the lumbar subarachnoid space at level L3/L4 and connected to a trancducer (MX860®, Medex Inc.) for CSFP measurements. The volunteers were advised to keep respiratory rate and ETCO2 constant. After a resting period of 10 minutes basline measurements were performed including CSFP, CVP, MAP, HR, ETCO2 (Cardiocap 2®, Datex). Then the volunteers were given urapidil 0.2mg/kg over a period of 1 minute. 5 minutes later measurements were repeated.
Results: Statistics: Wilcoxon signed rank test, $p<0.05$ significant; Values: mean±SD, SI = mmHg.

Time	CSFP	MAP	CPP	CVP	ETCO2
baseline	7±1	88±7	81±1	0±1	35±2
+ 5min	10±1*	74±5*	64±5*	-3±1*	35±2

CSFP: cerebrospinal fluid pressure, CPP: mean cerebral perfusion pressure.

Conclusions: During normoventilation urapidil leads to a decrease in MAP parallel by an increase in CSFP and therefore in ICP, most likley mediated by an autoregulatory dilatation of cerebral vessels. If this cerebrovascular response is suppressed by hyperventilation, no increase in ICP is found despite a uradipil induced drop in MAP (2). After longterm hyperventilation cerebralbloodflow is normalized. This might be the reason why the drop in bloodpressure following urapidil administration again led to an increase in ICP (3).
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ELEVATED PLASMA D(-)-LACTATE ASSOCIATED WITH INTESTINAL INJURY IN A RAT ISCHEMIA-REPERFUSION MODEL

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Background and objectives: The intestine is one of the most sensitive tissues to ischemia-reperfusion injury. Reperfusion of the intestine is often associated with increase in mucosal permeability and ulceration. D(-)-lactate is produced by indigenous bacteria found in the gastrointestinal tract and mammals do not possess the enzyme systems to rapidly metabolize it. The present study was designed to determine the kinetics of plasma D(-)-lactate alteration in rats caused by acute intestinal ischemia-reperfusion injury.
Methods: Following the anesthesia, the superior mesenteric artery (SMA) was exposed and it was occluded by a micro-bulldog clamp applied at its origin from the aorta. After 75 min of occlusion, the arterial clamp was removed and the supply area of the SMA was allowed to be reperfused (6 h). Plasma D(-)-lactate levels were measured by an enzymatic spectrophotometric assay. The endotoxin content of plasma sample was assayed by the limulus amebocyte lysate test with a kinetic modification of the test kit procedure.
Results: Intestinal ischemia for 75 min resulted in a significant increase in D(-)-lactate levels within the portal vein as compared to sham-operated animals. Plasma D(-)-lactate levels had a tendency to further increase after reperfusion up to 6 h. It was showed that significant elevation of endotoxin concentrations in portal vein was already detected at the end of 75-min ischemia, reaching peak at 0.5 h post-reperfusion and decreasing gradually throughout the study period. At the end of ischemia, marked mucosal damaged such as edema, hemorrhage and necrosis was observed. There was evidence of injury to the muscularis propria together with diffuse mucosal damage and destruction following reperfusion, particular at 6 h post-reperfusion. In addition, penetration of bacteria was commonly found in the intestinal wall at various time points following ischemia/reperfusion injury.
Conclusions: These data suggest that acute intestinal ischemia is associated with permeability change of mucosal barrier resulting in increased plasma D(-)-lactate, which is also remarkably influenced by subsequent reperfusion. Plasma D(-)-lactate may be a useful marker of intestinal injury following both ischemia and reperfusion insult.

EVALUATION OF TWO METHODS OF INTRACRANIAL PRESSURE MONITORING.

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Objective: to assess the clinical usefulness of two methods of intracranial pressure (ICP) monitoring: intraparenquimatous recording (ICPc) and epidural recording (ICPe), versus intraventricular ICP (ICPv) as a gold standard.

Methods: We prospectively studied 13 patients with severe head injury (Glasgow Coma Score < 8) admitted to our ICU between February 1990 and December 1993. ICPv was monitored in all patients by means of a multiperforated catheter connected to a water column. Six of 13 patients were additionally ICPc monitored by a fiber optic transducer (Camino 420®), and seven of 13 patients were ICPe monitored by a coupled fluid system (Plastimed®). ICPc was placed homolateral to the focal lesion in two cases and contralateral in three; ICPe was placed homolateral to the focal lesion in two cases and contralateral in three. All three systems were calibrated at the ear level. Statistics: correlation coefficient and lineal regression were done between ICPc and ICPv, and between ICPe and ICPv with the hourly pairs of values obtained during assistential period.

Results: Of the six ICPc - ICPv studied patients, we observed a correlation coefficient $r = 0.84$ ($P < 0.001$) with a regression line $y = 0.75 + 0.93x$. Four of six ICPc - ICPv patients had $r > 0.85$ when correlation coefficient was obtained individually. Of the seven ICPe - ICPv studied patients, we observed a correlation coefficient $r = 0.47$ ($P < 0.001$) with a regression line $y = 7.2 + 0.43x$. Correlation coefficient was lower than 0.5 in all seven patients. Correlation coefficients for levels of ICPv > 20 mm Hg, > 25 mm Hg and > 30 mm Hg with ICPc showed $r = 0.89$, $r = 0.91$ and $r = 0.97$ respectively; and with ICPe $r = 0.25$, $r = 0.13$ and $r = 0.09$. The obtained values did not change during the study.

Conclusions: In our study ICPc was considered a good type of ICP monitoring. ICPe significantly infravalorates ICP values. We observed a good correlation between ICPc and ICPv values in patients with high intracranial pressure.

ANALGESIC EFFECT OF MIDAZOLAM ON EXTREME VISCERAL PAIN IN PREHOSPITAL EMERGENCY MEDICINE

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Objective: Midazolam is a benzodiazepine agonist widely used for sedation in emergency medicine. Few studies in animals and humans point to a direct analgesic effect of midazolam probably mediated by spinal antinociceptive receptors and/or peripheral benzodiazepine receptors (1,2). In our experience in the Berlin Emergency Medical System (unpublished results) with anecdotal cases of extreme chest pain due to binge drinking but no evidence of acute myocardial infarction or extreme abdominal pain due to peritonitis, acute intermittent porphyria, Peutz-Jeghers syndrome or testicular torsion, we found that small doses of midazolam (2 - 5 mg i.v.) were much more effective in relieving pain than repeated administration of high doses of buprenorphine or morphine, which may be associated with a considerable respiratory depressant effect. The dose of midazolam required for pain relief in these patients is non-narcotic and allowed further communication on the character and localization of the residual pain, which might be very important for the further diagnostic procedure.
Patients: Ten patients with abdominal pain due to acute gastrointestinal bleeding, suspected pancreatitis, suspected acute porphyria, and chest pain with no evidence of acute myocardial infarction received first-line midazolam i.v. at an initial dose of 1 mg and were asked how it affected the intensity and character of pain.
Results: At the chosen dose of midazolam (2-8 mg), all patients were responsive to detailed questioning on basic orientation, the character, intensity and localization of the pain, and medical history. None of the patients required an additional opiate. All patients stated that the pain was tolerable after midazolam alone.
Conclusion: Our preliminary clinical observations suggest that low-dose midazolam might be an alternative to opiates in extreme pain of presumably visceral origin.

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INFLUENCE OF PREINJURY PATHOLOGY IN THE OUTCOME OF SEVERELY HEAD INJURED ELDERLY PATIENTS.

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Objectives: It is known that severe head injury in elderly patients is associated with higher mortality than in younger patients. It remains however to be clarified whether the preinjury pathology which is frequent among these patients, affects the outcome.
Methods: In an attempt to investigate this hypothesis, 79 patients aged over 60 years suffering from head injury, with Glasgow Coma Scale (GCS) of 8 or less, were studied retrospectively. Twenty-six patients (32.9%) had preinjury pathology i.e. diabetes mellitus, arterial hypertension, heart failure, alcoholism, Parkinson's disease etc. (group A) and fifty-three (67.1%) did not (group B). The following data were recorded: mortality in the I.C.U., duration of hospitalisation, incidence of infective complications and neurologic status at discharge.
Results: Groups were comparable in terms of mean GCS (6.57 vs. 6.56) and median age (67.5 vs. 67). The incidence of brain pathology in the two groups was the following: Epidural haematoma 7.69% vs. 11.32%, acute subdural haematoma 30.7% vs. 30.19%, intracerebral haematoma 19.23% vs. 5.66%, subarachnoid haemorrhage 38.46% vs. 39.62%, diffuse haemorrhage 11.54% vs. 13.21%, contusion 26.92% vs. 49.06% and non-visible pathology (normal CT) 3.85% vs. 1.89%. Unilateral pupilary dilatation was found to be 15.38% in group A and 18.87% in group B. The mortality during hospitalisation in the I.C.U. was almost the same: 50% in group A and 47.2% in group B patients. However, group A patients had significantly more infective complications, required longer hospitalisation and had lower GCS at discharge.
Conclusions: The results show that the existence of preinjury pathology does not seem to affect the short-term outcome of elderly patients with severe head injury. It has however an impact on morbidity and perhaps long-term survival of these patients.

IMPORTANCE OF ICP-MONITORING IN PATIENTS WITH SEVERE HEAD INJURY IN THE ICU OF A LEVEL 1 TRAUMA CENTER

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INTRODUCTION

The assessment of clinical development in intensive care patients with severe head injury still remains a problem. To optimize the monitoring of intracranial pressure (ICP) we routinarily implant an epidural measuring device in our hospital. The aim of this study was to prove the correlation of the ICP-values with CT findings and clinical development.

PATIENTS AND METHODS

During a 12 month period (1993 - 94), the ICP was monitored in 23 patients (14 male, 9 female) with severe head injury by an epidural measuring device (Epidyn®/Spiegelberg®). The mean age was 36.9 years (4 - 83). The Glasgow Coma Scale at admission was 6.9 (3 - 15). In all cases the device was placed within the first 10 hours after admission. The ICP was compared with physical examination, radiological or intraoperative findings and clinical outcome.

RESULTS

The average time of measuring was 7.2 days (1 - 19). The treatment depended on the ICP values recorded. Rising ICP-values led to radiological controls by CT-scan. In 1 case an intracranial hemorrhage was detected and drained. The overall survival rate was 78.3 %. 1/3 showed a complete resolution, in other 33.3 % psychological residuals like decreased mentation, in 17.4 % sensomotoric residuals like cerebral nerve dysfunction and aphasia, and 11.1 % of the injured remained in a comatous status. In 87 % of our cases the measured values correlated with clinical course and management.

In 2 cases (8.6 %) we observed a displacement of the ICP-device. There was no ICP induced infection.

CONCLUSION

Assessment of the ICP by epidural measurement is the only direct and minimal invasive method of monitoring the ICP with a low rate of complications. It is a helpful parameter for the clinical management of the severely head injured patient which may help to detect complications like hemorrhage earlier and to estimate the outcome. Furthermore it may help to reduce the necessity and number of CT-scans.

ACUTE RENAL FAILURE IN TRAUMATIZED PATIENTS

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Objectives: Acute renal failure (ARF) can be a severe complication of trauma. The current incidence of post-traumatic ARF is associated with high mortality[1]. Identification of risk factors and prevention of this complication could improve the outcome of trauma patients.

Methods: One hundred fifty three consecutive trauma patients (age 37.6 ± 19.6, Injury Severity Score 28.3 ±10.9) admitted to ICU were studied. Incidence of ARF was 31.4 % (48/153). ARF was defined as persistent plasma creatinine >2mg/dl with or without oligoanuria[2]. ARF was defined as early when occurring within the first 96 hours (EARF) and late when the onset was after the first four days (LARF).

Results: EARF occurred in 31 patients while LARF developed in 17 patients. Age, ISS, and incidence of rhabdomyolysis and acute respiratory failure were not different in the two groups. An higher incidence of Multiple Organ Failure (MOF) and sepsis (76.6% for both) were observed in LARF group, when compared to EARF (25% and 23% respectively). Abdominal trauma was more frequent in EARF group (32% Vs 18%). The GS for EARF and LARF were respectively 8±4.4 and 9±4.15 while in the group who not developed ARF (NARF) the GS was 10.5±3.7.

Conclusions: GS score difference seems suggestive and can be that an abnormal cerebral activity (hipofisary hormones?) may play a crucial role on onset of ARF in these patients. Moreover the frequency of Acute respiratory failure in the group of ARF was higher (91.7 versus 64.5) than NARF group. The early ipoxia in the early phase of trauma, then, may be another crucial point for development organ failure.
These are preliminary data. A more exact statistical analysis must be perform to have definitive conclusions.

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ACTIVE COMPRESSION - DECOMPRESSION CARDIOPULMONARY RESUSCITATION (ACD-CPR) VERSUS STANDARD MANUAL CARDIOPULMONARY RESUSCITATION (S-CPR)

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Objectives
To compare the Active Compression-Decompression Cardiopulmonary Resuscitation (ACD-CPR) with the Standard Cardiopulmonary Resuscitation (S-CPR) in out of hospital cardiac arrest patients.

Method
Is a controlled, randomized study. Two groups of patients with cardiac arrest out of the hospital were formed. Group I, (ACD-CPR) and group II (S-CPR). For the ACD-CPR group we used the cardio pump device of Ambu International. As for the rest, the ERC (1992) algorithms for ACLS were followed. The Utstein Style (for out of hospital cardiac arrest) was used for listing and evaluating all cases of the study. The CPR was contucted by the crew and the doctors of our Mobile Intensive Care Units (MICU).

Results
We studied 146 consequitive patients (75 in group I) and (71 in group II). Demographics pre-CPR characteristics (e.g. ECG form of cardiac arrest) and procedures (e.g. Bystanders or second tiers crew CPR, defibrillation, drugs) were quite similar for both groups. The mean arrival time of MICU was 9min. In Group I we recorded R.O.S.C. (Return of Spontaneous Circulation) 17,5%, death 73%, continuation of CPR efforts 9,5%. While in group II, 21%, 69%, and 9,9% respectively (recorded percentage until the admission to the hospital). No significant difference was found in any of the short term outcome parameters. No complications related to the ACD-CPR technique, were noted.

Conclusion
Not any significant difference between the two methods was proven (from this small evaluated sample). The results of previous clinical studies are controversial(1). More sophisticated studies proved the superiority , in a certain number of parameters (e.g pressures, flow, etc) of the new technique although there are many difficulties for establishing clinical results. In the pre-hospital setting that is related to many parameters (speed of the intervention, effectiveness of bystanders CPR , education of paramedics, etc.) the evaluation is even harder. The superiority of the ACD-CPR can be proven when it is performed in almost 0 times. Increased number of studied patients as well as improvement of the technique could lead us to more established results.

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A STUDY OF EFFICACY AND TOLERANCE OF PIPERACILLIN/TAZOBACTAM IN THE TREATMENT OF CRITICAL BURNED PATIENTS IN INTENSIVE CARE.

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Objectives: We evaluated the effectiveness of Piperacillin/Tazobactam only or in combination to Teicoplanin-Vancomycin, for the treatment of episodes of sepsis.

Methods:25 burned patients were included, 18 males and 7 females with an average age of 39 years and average burned size of 33.6 % of body surface area and a mean abreviated Burn Score Index (ABSI) was 6.7 at inclusion.

Results: Teicoplanin or Vancomycin+ Piperacillin/Tazobactam combination therapy was well tolerated. No serious toxicity or side effects were noted. The causative pathogens were representative usually isolated in Critical Burn Units.

Conclusions:Combinations therapy with Piperacillin/Tazobactam and anti-staphyloccocic antibiotic agent appears safe and effective for the treatment of episodes of sepsis in burn injuries. Pseudomona aeruginosa infections was erradicated in 60 % of the burned patients hospitalized in ICUs, and a mortality index was 20 %.

REDUCTION OF INFECTIOUS EPISODES WITH TRACE ELEMENT SUPPLEMENTS AFTER MAJOR BURNS - A randomized trial.

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Objectives: Infectious morbidity is the major cause of mortality after burn injury, and is due to multiple factors. Trace elements (TE), which are involved in both humoral and cellular immunity, exhibit severely altered status after burns. TE supplementation has been shown to be associated with increased leukocyte counts and shortened hospital stay. The trial aimed at studying the immune responses in severely burnt patients receiving normal TE supplies or early large supplements.

Methods: 12 patients, aged 40±16 yrs (mean±SD), with burns covering 49±18 % of body surface were studied from day 1 (D1) to D30 post-injury, were randomised in 2 groups (G): G1- control receiving recommended TE supplies + placebo; G2 - receiving in addition large supplements of Cu, Se and Zn from D1 to D8. Enteral nutrition was started within 12 hours of injury in all patients. Immunological parameters: peripheral leukocyte counts, proliferation of mononuclear cells to mitogens, cell surface molecule expression, and neutrophil chemotaxis at D10 and D20. Infectious episodes and micro-organisms were monitored until D30.

Results: The patients' characteristics were similar G1 & G2. The total leukocyte counts were higher in G2 between D10 and D20, due to increased neutrophils (significant from D13 to D15). Total CD3+ and CD19+ cells did not differ, whereas CD14+ (monocytes) were significantly increased at D20. Proliferation to mitogens was significantly depressed in all patients. Chimiotactism was not altered. The number of infectious episodes was significantly decreased in G2 with a mean of 2.0± 0.9 infections during the first 30 days versus 3.3± 0.8 in the control group ($p < 0.03$).

Conclusions: The large TE supplements for 8 days was associated with a significant decrease of the number of infectious episodes. Supplementation was associated with increases in total leukocyte, monocyte and neutrophil numbers. Further studies are required to determine the precise mechanism underlying the improved immune defences.

LOCAL ADSORPTION IN THE TREATMENT OF SEVERE BURNS

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Objectives: Evaluate the efficiency of local adsorption (LA) with the use of carbon adsorbents in case of severe burns in experiment and clinic.

Methods: *Experimental* studies on LA were performed on a model of 20% body surface area IIIb-IV burn in 335 rats. A burn eschar was excised on the 3rd day after burn, the wounds were dressed with the gauze bandages (control) or with adsorptive dressings (LA), dressings were regularly changed. *Clinical* investigations were carried out in the course treatment of 78 patients with severe thermal and radiation IIIa-IV burn. In the dynamics of burn disease some indices of proteometabolism and intoxication criteria were evaluated.

Results: The experiments have demonstrated that the application of LA after early excision of a burn eschar exerts a pronounced normalizing effect on a protein electrophoregram and the activity of proteases and their inhibitors in burned tissues preserving vitality. Thus, by the 14th day after burn infliction the activity of cathepsin D in injured muscles is 6 times lower under an adsorptive dressing than under a gauze bandage (control) ($p<0,05$), the activity of trypsin-like proteases is 1.5 - 3.4 times lower and the antitryptic activity does not differ significantly from the normal level. The cytotoxicity of extracts of burned tissues after the adsorptive dressing application *in vivo* and adsorption *in vitro* is 25-35% and 7-20%, respectively, of the toxicity of control extracts. A similar normalizing effect of LA is observed for an intact muscular tissue and blood serum. The electron-spin-resonance studies have demonstrated that LA allows to normalize antitoxic activity of liver and functional activity of kidneys. The application of LA in the treatment of patients with severe burns have been shown to localize a region of irreversible tissue changes, accelerate rejection of a burn eschar, attenuate an endogenous intoxication level and, as a result, shorten the time for grafting of a burn wound and accelerate wound healing.

Conclusions: Proceeding from the obtained results, we can consider LA as an effective method of localization of a region of irreversible tissue changes as well as of correction of local and general metabolism failures and overcoming burn autointoxication during burn disease.

IMPLICATIONS OF VERY EARLY JUGULAR BULB OXIMETRY DATA FOR THE EMERGENCY MANAGEMENT OF SEVERE HEAD INJURY.

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Jugular bulb oximetry is the first bedside available cerebral monitoring technique providing an estimation of the adequacy of cerebral perfusion. Its routine use in all patients suffering from severe head injury admitted to our IC unit enabled an extensive analysis of all very early cerebral perfusion data in order to evaluate the incidence of abnormal SjO_2 data (and their possible causes) in this very early period after traumatic insult and to search for possible implications as to the emergency management. These very early data were defined as the first 6 hours ICU data and ICU admission had to occur within 12h of traumatic insult. Over the last 2 years, 150 pts with severe head injury (GCS<8) were monitored by jugular bulb oximetry, starting immediately after their arrival at the ICU (mean of 4.8h after trauma, range between 2-9h). In a total of 85 pts (=56.6%), jugular bulb desaturations (<55%) were noticed during this early 6h period. In 24 pts (=16%), jugular bulb saturations higher than 75% were observed, whereas 41 pts (=27.4%) revealed no abnormal SjO_2 data (55-75%) during these first 6h.
Concerning the periods with too low jugular bulb saturations (n:85), we found the following correlation ; in 49 pts (=57.6%) cerebral perfusion pressure (CPP) was below 70 mmHg, in 36 pts (=42.3%) $PaCO_2$ was below 30 mmHg and finally in 6 pts (=7%) we found primary intracranial hypertension. For the high jugular saturations (n:24) we found a primary intracranial hypertension in 10 pts (=41%), and a $PaCO_2$ level above 40 mmHg in 6 pts (=25%). In all patients we could restore jugular bulb saturation within normal range (55-75%) with the correction of the presumed causative factor.
We can conclude that ultra early jugular bulb saturation data revealed a high incidence of abnormal values, with a predominance of jugular bulb desaturations, confirming once again the high incidence of disturbed and too low cerebral perfusion within the first hours after severe head injury. These jugular bulb desaturations were especially correlated to systemic causes, as a too low CPP (caused in the vast majority by primary MAP insufficiency, and not by intracranial hypertension) and hyperventilation were the 2 major causes of the desaturation periods. As jugular bulb desaturations are known to be significantly correlated to a worse neurological outcome after severe head injury, one might improve outcome by an emergency management avoiding these possible causes of jugular desaturation. Therefore, extreme attention should be paid to the maintenance of an adequate mean arterial blood pressure (above 90 mmHg?) even during the few time spent at the emergency department. One should be as attentive to the maintenance of normoventilation during this very early period of admission and hyperventilation without any knowledge of ICP or SjO_2 should be abandonned.

USE OF INDOMETHACINE FOR THE TREATMENT OF INTRACRANIAL HYPERTENSION IN SEVERE HEAD INJURY.

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Recently, indomethacine has been proposed for the treatment of therapy refractory intracranial hypertension in pts suffering from severe head injury (1). Indomethacine, a cyclo-oxygenase inhibitor, gives rise to a significant fall in cerebral blood flow by inducing cerebral vasoconstriction. Therefore, its use could result in a drastic lowering of the intracranial pressure (ICP) in pts suffering from intracranial hypertension secondary to cerebral hyperaemia and in whom the use of other cerebral vasoconstrictive drugs (barbiturates or hyperventilation) appears insufficient to control ICP.
For the last 18 months, we included the use of indomethacine in our therapeutic flow chart for severe head injury management. Pts revealing intracranial hypertension (ICP>20 mmHg) and cerebral hyperaemia (SjO_2>75%) and in whom ICP was not efficiently controlled by the combined use of hyperventilation and barbiturates were given indomethacine in a trial to control ICP.
A total of 98 head injured pts received treatment for intracranial hypertension over the last 18 months. Six of them met the criteria set for the administration of indomethacine. In 2 pts, no decrease in ICP or in SJO_2 was observed and both pts died due to therapy refractory intracranial hypertension. In the other 4 pts, a significant fall in ICP and in SjO_2 was observed shortly after indomethacine administration. In 2 pts we observed a catastrophic fall of SjO_2 even below 55%, indicating an extreme cerebral vasoconstriction with the possible risk of inducing cerebral ischaemia.
In one of the 4 pts, ICP remained under control without further administration of indomethacine, but he died 3 days later in multiple organ failure. The other 3 pts, needed multiple indomethacine administrations (for 1 pt even during 4 consecutive days) to finally control ICP. In all 3 pts, ICP was finally controlled, but only 1 pt survived. Both other pts died from systemic causes (multiple organ failure in 1 pt, massive gut infarction in the other pt, possibly due to the systemic vasoconstrictive effects of the indomethacine administration).
In conclusion, indomethacine might have a role in the treatment of intracranial hypertension, especially when caused by cerebral hyperaemia. We observed however a poor final outcome and a threatening high incidence of systemic events (multiple organ failure, gut infarction) in those pts receiving indomethacine for ICP control. Therefore, indomethacine in the treatment of intracranial hypertension should be reevaluated in controlled study settings, before its routine use can be considered.

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IMPLEMENTATION OF JUGULAR BULB OXIMETRY IN THE MANAGEMENT OF INTRACRANIAL HYPERTENSION.

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Untill recently, intracranial hypertension (ICH) in pts suffering from severe head injury was managed in a staircase approach, with CSF drainage as first therapeutic step, mannitol as second step, hyperventilation as third step, and finally, barbiturates as the last rescue step for therapy refractory ICH. This staircase approach for the treatment of ICH was only guided by the intracranial pressure, and not by other parameters such as e.g. the actual state of cerebral perfusion of the concerned pt. Jugular bulb oximetry provides us with the first, bedside and continuous available, estimation of cerebral perfusion. Its implementation in a rigourous flow chart, based on as well ICP- as jugular bulb oximetry-data might result in an altered strategy for ICH management.
We adopted a "jugular bulb saturation (SjO_2)-guided approach" for ICH management in 86 consecutive pts, suffering from severe head injury (GCS<8). We maintained CSF drainage as first therapeutic step, but the decision for the second step was guided by SjO2 information. Pts revealing ICH and SjO_2 values above 75%, were treated with hyperventilation, and did not receive mannitol. If ICH persisted, barbiturates were added as a third step. On the other hand, pts with ICH and SjO_2 vales less than 75%, received mannitol administration as second step. Hyperventilation and/or barbiturates were only added if ICH persisted and if no cerebral hypoperfusion was discerned (SjO_2>55%). Our objectives were to prospectively analyze this new therapeuticstrategy, as compared to the formerly used staircase approach of ICH.
We managed 86 pts with ICH, with an overall mortality of 13.7% due to therapy refractory ICH. All pts received standard primary care with head elevation, full sedation and normoventilation. For 16 pts, CSF drainage alone was sufficient to control ICP. Of the remaining 70 pts, 38 pts received mannitol and 32 pts were hyperventilated as second approach. In the third line, 14 pts were managed with barbiturates, 12 with mannitol and 10 pts with hyperventilation. Finally, barbiturates were used as the final rescue in 14 pts. These results reveal a less frequent use of mannitol as only 50 pts received mannitol, compared to the 70 pts that would have received mannitol using the former staircase approach. Hyperventilation was used much earlier in the treatment course, as 32 pts were already hyperventilated in the second line approach, were this was formerly exclusively reserved for the third line approach. Finally, also barbiturates were used much earlier (14 pts received barbiturates as third approach).
We may therefore conclude to a important change in the management of ICH, induced by a SjO_2-guided flowchart. However, future studies will have to elucidate if this new strategy for the intensive care management of severe head injury will also result in an improved outcome.

BRAIN TISSUE OXYGEN TENSION AND CEREBRAL BLOOD FLOW AFTER TRAUMATIC BRAIN INJURY

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Objectives: In a first series of experimental brain injury we investigated the course of brain pO_2, ICP and cerebral blood flow after traumatic brain injury (TBI), whilst accordingly there are very few data available and the mechanisms leading to secondary brain damage are poorly understood.
Methods: In 6 piglets (14 days old, 3,3-5 kg) of either sex we produced a moderate brain injury (1,5 atm., 20 msec.) using a lateral fluid percussion (FP) device. Complete measurements were made before and 5 min. after brain trauma and after 3, 6 and 24 hours including blood gases, cardiac output (htermodilution), heart rate, EEG, laser doppler flow probe (LDF) and ICP values (Camino), brain temp., pO_2 by a clake type oxygen electrode (Licox) and coloured microspheres for regional blood flow.
Results: Immediately after the trauma a typical "Cushing"-response to the ICP peak up to 130 mm Hg being highly significant (before mean 10 mm Hg, range 4-12 mm Hg) could be observed: mean arterial blood pressure rose from appr. 85 mm Hg to 110 mm Hg for 3-5 min. In two animals this was followed by an ischemic period lasting 15 min. Accordingly ICP values gradually returned to starting measures within 3 hours; in the ischemic animals they remained at a level of about 30 mm Hg.- No secondary increase of ICP could be observed, once ICP dropped to starting values within 24 hours. Cerebral blood flow (LDF) fell from mean values being 100 before trauma to appr. zero and recovered to around 50. Brain pO_2 started at mean values of 20 mm Hg (range 15-30 mm Hg) and fell to around zero depending upon the severity of the ischemic reaction. On average values of 15 mm Hg were reached over the time course.
Conclusions: With our FP trauma model we can reproduce the well known "Cushing"-response after brain injury; secondary ICP elevations cannot be achieved, although local edema is observed. Direct brain pO_2 measurement seems to be a very sensitive variable for detection of cerebral ischemia and anticipates eventually following ICP elevations by far.

THE INFLUENCE OF PREEXISTING DISEASE IN OUTCOME OF PULMONARY ASPIRATION

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Objectives: The reported mortality rate after pulmonary aspiration is variable in several series. The purpose of this study was to find out the influence of preexisting disease or situation on morbidity and mortality of Intensive Care Unit (ICU) patients with pulmonary aspiration.
Methods: Patients who were treated in ICU and had pulmonary aspiration, were studied. Entrance's criteria in the study , all of them obliged, were: 1) Suction of gastric contents from trachea during intubation. 2) Presense of a predisposing factor. e.g. coma. 3) Recent hypoxaemia or new infiltrates in x-ray. Preexisting disease was recorded and correlated with complications and outcome . Patients with Glasgow Coma Scale 3, because of cerebral injury, and patients who died within 3 days from cause other than aspiration, were excluded from the study. Method of statistical analysis: Chi-square test.
Results: One hundred forty five patients were studied. The trauma patients were 96 and the non trauma patients 49. From the trauma patients, 77 had cerebral injury and 19 were polytraumatized without cerebral damage. From the non trauma patients, 13 had malignant neoplasms, 14 neurological diseases in terminal stage, 7 old age, 10 drug overdose, and 5 several diseases. Eighty seven from 96 trauma patients (91%) and 45 from 49 non trauma patients (92%) manifested several complications (pneumonia, ARDS, etc), so there was no statistical difference in complications' frequency between the 2 groups ($p>0,1$). The severity of complications was also proportional in the 2 groups. Eighteen deaths were recorded in the trauma patients (mortality 19%). Only 7 deaths correlated directly or indirectly with the aspiration (7%). In non trauma patients, 32 deaths were recorded (71%). Twelve deaths were recorded in 13 patients with neoplasms, 12 deaths in 14 patients with neurological diseases, 6 deaths in 7 aged patients, 1 death in 10 drug overdose patients, and 1 death in 5 patients with several diseases. The mortality difference in trauma and non trauma patients was statistically significant ($p< 0,001$). In patients with drug overdose the mortality was significantly lower from the other non trauma patients and the difference was statistically significant ($p<0,001$).
Conclusion: The preexisting disease or situation plays a major role in the outcome of the patients with pulmonary aspiration. The mortality of patients with aspiration seems to be caused by severe preexisting situations rather, that lead to death, than from the pulmonary aspiration per se, which may be a final happening in a predetermined course.

COMPARATIVE STUDY OF FLUCONAZOLE AND AMFOTERICIN-B IN TREATMENT OF FUNGAL INFECTIONS IN SEVERE TRAUMA PATIENTS

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Objectives: The purpose of this study was to compare fluconazole and amfotericin-B in the treatment of fungal infections in severe trauma patients.
Methods: Thirty five severe trauma patients who were treated in Intensive Care Unit (ICU), were studied prospectively. They all developed fungal infections, prooved with blood positive cultures and at least one of the following: fever, positive urine or bronchial secretions cultures, infiltrates in x-rays. The patients were separated randomly in 2 groups. The patients of group A (15 patients) received fluconazole 200 mg/day for 15 days, and the patients of group B (20 patients) amfotericin-B 50 mg/day for also 15 days. Comparison's criteria were the clinical responce to treatment (fever etc), the fungal elimination (blood and other cultures), the relapses of the disease, the side effects of drug, and the outcome of the patients. As method of statistical analysis was used the Chi-square test.
Results: Nine patients from 15 of the group A (60%), and 18 from 20 of the group B (90%) , presented remission of fever (patients of group B had better clinical responce than patients of group A, and the difference was statistically significant, $p<0,05$). All the patients before treatment had positive for fungi blood cultures. After 10 days of treatment, 3 patients of group A and none of group B had positive cultures. Eight patients (from 13 who had positive cultures of bronchial secretions before treatment) of group A, and 5 (from 17) of group B, had positive cultures of bronchial secretions after 10 days of treatment, so positive bronchial secretions were fewer in group B than in group A, but this difference wasn't statistically significant, ($p<0,1$ and $p>0,05$). Ten patients (from 12) of group A and 7 patients (from 16) of group B had positive urine cultures, after 10 days of treatment (positive urine cultures were fewer in group B than in group A and this difference was statistically significant. ($p<0,05$). Two patients of group A and none of group B had a relapse of fungal disease. In group A , no side effects were observed, while in group B were observed only minor side effects (small increase of serum creatinine in 2 patients, chills and fever during infusion in 3 patients, and hypokalemia in 12 patients). Three patients of group A and 1 patient of group B died, because of sepsis.
Conclusion: Amfotericin-B (even in short regimen of 15 days), is superior to fluconazole in the clinical and laboratory responce and also in the relapse of fungal disease. Fluconazole is superior to amfotericin-B as it has no side effects.

FLAIL CHEST IN MULTIPLE RIB FRACTURES - PROGNOSTIC INTRATHORACIC FACTORS.

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Objectives: Flail chest after thoracic trauma is a serious injury. It is controversial if flail chest by itself or the concomitant intrathoracic injuries e.g. pulmonary contusion, is the cause of the reported significant morbidity and mortality. In this study we searched the influence of concomitant thoracic injuries in the course and outcome of patients with flail chest.
Methods: Eighty five patients with flail chest after isolated chest injuries were studied. For the purpose of analysis, we separated the patients into 4 groups. Patients with isolated flail chest were included in group A, patients with flail chest and hemo-pneumothorax in group B, patients with flail chest and pulmonary contusion in group C, and patients with flail chest and hemo-pneumothorax and pulmonary contusion in group D. Complications from the chest, duration of mechanical ventilation and mortality were compared in the 4 groups. Statistical comparison of results between groups was made using Chi-square and T-studend tests.
Results: The patients were 85. All patients received mechanical ventilation. Twenty eight patients were included in group A, 19 in group B, 20 in group C, and 18 in group D. Seventy three patients manifested complications from the chest, especially pulmonary infections. There was no statistical difference among the 4 groups as to number of complications (twenty four patients had chest complications in group A, 16 in group B, 17 in group C, and 16 in group D, $p>0,1$). The duration of mechanical ventilation was not statistically different among the 4 groups (the mean duration was 15,9 days in group A, 16,8 in group B, 16,5 in group C, and 17,5 in group D, $p>0,1$). There was also no statistical difference in mortality among the groups (six patients died in group A, 4 in group B, 4 in group C, and 5 in group D, $p>0,1$).
Conclusion: Flail chest by itself is a serious thoracic damage with many complications, regardless of the presense of other thoracic injuries, which don't contribute to greater morbidity and mortality.

SERIAL BLOOD LACTATE LEVELS ARE CORRELATED TO ORGAN FAILURE AND MORTALITY FOLLOWING TRAUMA.

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The present study investigated the correlation between blood lactate mortality and organ failure in 129 trauma patients admitting between December 1, 1992 and July 31,1993 in the ICU.
Road traffic accidents were the most common cause of trauma in this studded population. Brain damage was the main cause of mortality .Nevertheless, 29 of patients died from sepsis and multiple organ failure without significant brain damage and these deaths were potentially preventable.
Respiratory failure was the most common complication and was developed in 44 (44%) of survivors and in 25 (86%) of non survivors .We noted low incidence 5 of renal failure may be do to the early and aggressive invasive hemodynamic monitoring and cardiopulmonary support.
As part of our routine case protocol serial blood lactate levels were measured in each patient at least 3 times a day until the values returned within the normal range or until death. We analysed the blood lactate levels on admission, the highest value and the number of days until the first normal value (<1.5mEq/l).
Initial lactate and highest lactate levels were significantly higher in patients with than without organ failure.(3.4 Vs 2.4, 4.1 Vs 2.8mEq/L, p<0.01)The duration of hyperlactemia also was higher in the patients with organ complications. (2.2 Vs 1.0 days, p<0.01). Both initial lactate and highest lactate levels were higher in the non survivors than in the survivors.(4.0 Vs 2.8,4.6 Vs 3.4mEq/L, p<0.01)
The present study demonstrated that not only the degree but also the duration of hyperlactemia can be related to the development of post-traumatic complications.
Serial blood lactate measurements are reliable indicators of morbidity and mortality following trauma.

CEREBRAL METABOLISM AND INTRACRANIAL PRESSURE IN RESPONSE TO MECHANICAL VENTILATION WITH PEEP IN SEVERE HEAD-INJURED PATIENTS.

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Current evidence suggest that PEEP only affects intracranial pressure (ICP) when it interferes with systemic arterial pressure, although the effects of PEEP over cerebral oxygenation remains unknown.
Objective: Determine the effects of PEEP over ICP and cerebral metabolism measured by SJO_2, $AJDO_2$ and CEO_2 in severe head injured patients.
Material & Methods: patients with Glasgow coma scale < 8 at arrival, with difusse brain injury in the first CT, according to Marshall criteria,ICP and SJO_2 monitored, under analgesia and sedation, normoventilated with ZEEP, without mannitol treatment in the previous 4 hours, normal X Ray Chest and within the first 48 hours from injury, were considered candidates. PEEP value where increased from zero to 15 cmH20, in three different steps, each one with 20 min of duration. All data were analized on line, P_{max}, $P_{plateau}$, P_{mean}, from the ventilator, systemic haemodynamic data, cerebral perfusion pressure (CPP), ICP and SJO_2. In the case of hemodynamic deterioration, during the study, PPC < 60mmHg, extra-volume were administered. If persistence, Dopamine were begun or increased dosage. If no good response were obtained, patients were retired from the study.
Results. 40 patients were candidates, 15 of them were excluded due to haemodynamic instability. A total of 25 completed all steps and were examined, 22 men and 3 women, age 32±7.9 yrs. At hospital arrival, Glasgow were < 5 in 18 patients, and >5 in the rest 7. 15 patients showed Intracranial hypertension > 20 mmHg at the beginning.

	ZEEP	PEEP 5	PEEP 10	PEEP 15
P_{max}	29±14	34±11	39±13	46±14
$P_{plateau}$	18±7	22±9	29±10	33±11
P_{mean}	7±3	12±5	18±6	22±9
ICP	26±12	28±15	34±21	36±20
MABP	104±21	98±12	105±11	103±21
CPP	78±11	71±8	70±14	67±17
SJO_2	85±24	83±18	70±21	68±19
$AJDO_2$	1.8±0.7	1.9±1.1	2.6±1.6	3.1±2.3

Conclusions: There is not a uniform effect of PEEP over ICP and SJO_2. In patients with normal ICP PEEP does not increase ICP and brain metabolism turns dependent of MABP. In those with ICP > 20 mmHg, PEEP > 10 cmH_2O induces a encephalic risk situation due lowering MABP, which always reduces SJO_2.

CRITICALLY ILL PATIENTS: TRANSPORTATION AND CONDITION UPON ADMISSION TO THE INTENSIVE CARE UNIT.

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Objectives. Critically ill patients are transported to an Intensive Care Unit(ICU), under conditions, which have not been systematically evaluated. Therefore, we set out to investigate transportation and admission condition of these patients to our department. *Methods.* We studied 36 patients(16 females), aged(mean±sd)56.2±17.3yrs, which were consecutively (from August 1994 to March 1995) admitted to the ICU, through the Greek National Emergency Transportation Service. APACHE II severity score upon admission was 17.4±6.8 (range 4-31). The following data were evaluated: 1) Number of medical departments, where health care was provided until final admission to the ICU, 2) ambulance transportation conditions, 3) catheters and tubes inserted before admission, 4) vital signs upon admission 5) information provided by referring physician (scored on a 1 to 5 scale: History, electrocardiogram, chest x-ray, laboratory data, drug therapy already administered), 6) comparison of the state of the patient described by referring physicians, to the actual state upon admission. *Results.* One to four medical departments had provided health care before the patient was admitted the ICU (1:22.2%, 2:47.2%, 3:27.7%, 4:4%). Thirty/36 (83.4%) patients were escorted by a physician. Twenty-six/36 (72.2%) were transported on oxygen, FIO_2(mean±sd): 46±3%, PaO_2: 78.6±35.2mmHg. Five of the remaining 10, for whom no oxygen was provided, had PaO_2: 46.2±7mmHg. Twelve/36 (33.3%) were intubated and ventilated during transportation. Thirty-four/36 had a peripheral venous line, 5/36 had an arterial line, 13/36 had a nasogastric tube, 20/36 had a urinary catheter. Eleven/36 were sedated and 2/36 were paralysed. Three/36 were on inotropes. Vital signs upon admission were: arterial blood pressure, systolic 100.6±44mmHg, diastolic 57±23mmHg, heart rate 104±22 bpm, temperature 36.3±2°C. Patient information score was 2.7±1.7. The actual state upon admission was found substantially different, as compared to the description of the referring physician, in 28/36(77.7%) patients. *Conclusions.* We conclude that several aspects of the Greek National Emergency Transportation Service to an ICU should be reevaluated and further improved, i. e. ventilatory support, adequacy of information provided and accuracy of prior description of the patient's state. A new perspective must be applied for critically ill patients transportation since 78.8% of the patients were evaluated and treated in more than one, medical departments, mostly primary care, before they were finally admitted to our ICU.

CLINICAL UPDATE ON DIASPIRIN CROSS-LINKED HEMOGLOBIN, (DCLHb)

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DCLHb is a human derived hemoglobin molecule that has been cross-linked to stabilize and permit heat pasteurization to remove residual proteins and inactivate viruses. DCLHb is mixed with a lactated electrolyte solution to yield a total hemoglobin concentration of 10g/dl.
Objective: To present an overview of four recently completed clinical safety studies of DCLHb in the U.S. and Europe, and to discuss the properties, actions and potential indications for DCLHb.
Method: Patient populations in the four studies included males and females ranging in age from 18 to 84 years. Dosing ranged from 25mg/kg to 300mg/kg. The controlled randomized safety studies were conducted in chronic renal failure patients, surgical patients undergoing total hip replacement or abdominal aorta repair and in hemorrhagic hypovolemic shock patients. These very diverse patient populations allowed safety evaluation of the product in patients who were generally elderly, often hypertensive with some degree of cardiovascular disease, and receiving medications for treatment of other conditions.
Results: Over 150 patients received DCLHb in the four studies. No product related serious adverse events occurred during the clinical trials.
Conclusion: Results from Phase I/II safety studies of DCLHb in patients undergoing chronic renal dialysis, abdominal aorta repair, or total hip replacement and in patients in hemorrhagic hypovolemic shock, indicate that the product was well tolerated in these distinct populations. Although these studies were designed to evaluate safety, the data suggest clinical benefit. Follow-up efficacy trials are indicated.

EVALUATION OF CRITERIA FOR THE USE OF PREHOSPITAL EMERGERCY SERVICE SYSTEMS

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Prehospital emergency services represent the extension of emergency care into the community and constitutes the manpower, communications, transportations and facilities used to provide care for patients outside hospital. One of the main points of the system is how to decide the hospitalization of patients and what kind of facilities to provide : emergency medical service, fire brigade, local general practitionner or ambulance officers.

Objectives : to realize guidelines for using the prehospital emergency medical service in case of patient'calls outside hospital.

Methods : from 1st June 1994 to 14 July 1994, all the calls for emergency care were analysed using a questionnaire of 114 items (origin of the call, responses to the questions of an emergency practitionner, kind of emergency service provided and the issue of the patient). After taking account of the appropriatness of the decision, statistical method used was a logistic regression.

Results : 996 calls were analysed. The criteria, for prehospital emergency medical service using, given by the logistic regression were as following : existence of a call for emergency, thoracic pain , dyspnea, seizures, cyanosis, drug intoxication, fall of the patient, fracture, age, the state of consciousness and the neurologic reactivity.
The minimal and maximal predictive values of the model given by the logistic regression are respectively 2% and 100%. The performance of the model is 88 %.

Conclusion : It seems possible to help medical decision of emergency medicine by using only some easy criteria and a predictive model.

BLUNT CERVICAL VASCULAR INJURY: 4-YEARS EXPERIENCE

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Objective: To evaluate the incidence of blunt carotideal injury (BCI) in patients admitted to our ICU after head injury.
Methods: We reviewed the medical records of all patients diagnosed to have a BCI. At admission, the severity of trauma was assessed either with Glasgow Coma Scale (GCS) and with CT scan. BCI was demostrated by Doppler ultrasography (US) and by angiography (ANG).
Results: Since May 1991 to April 1995, 4 patients were admitted to our ICU with BCI (2m,2f, age 29±13). A history of direct trauma was present in 2 patients. Admission GCS was 15 in all patients, and was associated with hemiparesis in 3 of them; the last became paretic 48 hours thereafter. Two patients had concomitant injuries (a homolateral clavicular and a controlateral zygomatic fracture, respectively). The initial CT scan was negative in every patient, and showed signs of ischemia after a variable timespan (2-4 days) after the onset of the symptoms. The BCI was diagnosed with US and ANG, which demonstrated a thrombosis of the internal carotid artery (IC). In two patients, an intimal dissection was also present. Three patients were treated with heparin associated with antiaggregating agents and were discharged alive. The last patient was referred to our ICU after the development of a massive hemispheric infarction, and died three days after the admission. At necropsy, the IC thrombosis was associated to an extensive homolateral extra and intracranial venous thrombosis.
Conclusions: The presence of focal neurological signs despite a negative CT scan should address the diagnosis toward a BCI, thus implementing the diagnostic workup with US and/or ANG.

V_4R: A LIFESAVING LEAD IN ACUTE INFERIOR MYOCARDIAL INFARCTION

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Objectives: During acute inferior myocardial infarction (AMI) the incidence of bradyarrythmias is 10-15% up to 50% in patients with right ventricle (RV) involvement. The ST segment elevation of 1 mm or more in V_4R-lead within 10 hours after the onset of pain could point out the proximal occlusion of right coronary artery and the RV infarction.
Methods: In the last year 43 inferior AMI were treated in our ICU; for all the patients V_4R-lead was recorded on admission and for the first 12 hours. The patients were divided in 3 groups on the basis of V_4R shape: A) ST segment elevation. B) negative T wave C) none of previous. The clinical course and the outcome were monitored. Results were submitted to statistical analysis using a continence table 3X2 in χ^2 test.

Groups	# (% tot)	Lysis	Bradya	Br after Lys	PMtemp	PMdef	Exitus
A	14 (32)	10 (71)	9 (64)	6 (43)	6 (43)	2 (14)	1 (7)
B	15 (34)	11 (73)	4 (26)	4 (26)	0	0	1 (6)
C	14 (32)	13 (93)	0	0	0	0	1 (7)

Tab I: Distribution of patients (%) in the 3 groups.

Results: Of 43 patients 34 were submitted to thrombolysis and 3 died. The higher incidence of bradyarrythmias (II degree type 1 and 2 AV block, III degree AV block, sinus arrest) that required the insertion of temporary pace-maker was recorded in group A in 64% of the cases.

	χ^2	p
A vs B	6.141	<0.05
A vs C	11.121	<0.005
B vs C	0.004	NS

Tab II: χ^2 test.

Conclusions: The rapid recognition of life threatening conditions suggests the monitoring of V_4R-lead early in the course of inferior AMI.

7,5% Sodium Chloride/6% Dextran 70 in Preoperative Volume replacement Therapy of Haemorrhagic Shock in Polytrauamtized Patients

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Objectives:The authors report their own expirience in application of Ringer lact.(RL)and 7,5%NaCl/6%Dextran 70.
Methods:In 40 polytraumatized patients with developed haemorrhagic shock,injures of the chest(19)and abdomen(12) prevalid.Replacement of the volume loss began in institutions of general medicine,frequently by RL and 6%Dextran 70 or Haemaccel.After receiving necessary medical aid,polytraumatized patients wer transported to MMA by helicopter,continuing replacing of circulation volume by the same solution.
Results:Average quantities of the solution administered to the injured were2375-2550ml.A group of the injured which,after the admission to MMA was resuscitated by administration of the 7,5%NaCl/6%Dextran 70(groupII)(4-5ml/kg observed to the final surgical management,had statistically higher MAP(increase of 58% in relation to admission), CVP(average increase of 8,25cmH_2O),diuresis(averagely 350ml after 30min.),better gas analyses and acid-base status in relation to the group which was administered only RL(groupI)(increase of the MAP of 18%,average increase of CVP 2,5cmH_2O and average diuresis 200ml after 30min). Total quantity of the administered solutions was significantly smaller in the groupII(2800ml:4925ml).The only observed complication was hypernatremia and moderate hyperosmolarity of plasma which disappeared within 32hours. The quantity of replaced blodd was considerably smaller in the groupII(1000ml:2000ml).In the group I interstitial pulmonary oedema was observed in two patients(10%),while in the group II no complication was observed.Coagulation disorder and hypotension were not recorded because of the fast infusion of hypertonic/hyperoncotic solution in the groupII as the infusion of 7,5%NaCl/6%Dextran 70 lasted 5 minutes.
Conclusions: The results show the efficacy of resuscitation volume by hypertonic/hyperoncotic solution.

STARTING REHABILITATION OF SEVERE HEAD INJURY PATIENTS IN THE ACUTE PHASE - DOES IT MAKE SENSE OR NOT?

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What we usually call"unconcious" means only that the Patient is not able to interact in any kind of way.Experiences in intensive care medicine(ROBINSON,1975),in general anaesthesia(BENNET,1985) and with evoked potentials show,that unconcious patients are not automatically unable to process and recall information.This implicates a challenge to start the efforts to restore the traumatically desintegrated brain function as early as possible in the acute phase Ia(ZIEGER,1992).We present a method to prepare the patient for the rehabilitation goals of the postacute phase Ib,the phase of stabilisation II and of rehabilitation III within one concept.
To achieve sensory stimulation in phase Ia we use: attempt at some kind of dialogue by speaking to and touching the patient,to make him experience his body limits, facio-oral therapy by ice application,tast and smell provocations and trials of feeding,early adaption to circadian rhythm and guiding the patient in every-day-life-activities e.g.:in the brushing of teeth,washing etc.
To achieve motor stimulation and orientation in terms of space,time and gravity in phase Ia we use:
Avoidance of perceptual impairment as produced by air-sack-beds or habituation to supine position,using methods according to AFFOLTER(1980),basal stimulation(BIENSTEIN, 1991),BOBATH-therapy(1966)and facilitation of a physiological moving pattern(PNF)according to KNOTT(1968).
Conclusions: by integrating all these measures in the therapy and nursing even in the acute phase Ia one prepares the comatose patient for multisensory stimulation and motor training and all other rehabilitation activities in the following phases of therapy.

COMPARISON OF INVASIVE AND NON-INVASIVE MEASUREMENT OF STROKE VOLUME AND CARDIAC OUTPUT IN CRITICALLY ILL PATIENTS

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Objectives: Measurement of cardiac output (CO) and stroke volume (SV) requires insertion of a central venous catheter and is associated with a considerable risk for complications. Non-invasive methods for determination of hemodynamic parameters have been introduced recently. One of these methods is the aortic Modelflow program, which provides CO and SV continously using a three-element Windkessel model. The aim of the study was to evaluate the accuracy of the aortic Modelflow program in critically ill patients.
Methods: 21 patients (mean age: 69) admitted to the emergency department after cardiopulmonary resuscitation (n=11) and for myocardial infaction (n=5), acute congestive heart failure (n=4) and anaphylactic shock (n=1) were included to the study protocol. After stabilization all patients received a Swan-Ganz catheter (Baxter™; Edwards Swan-Ganz) via a central vein. CO and SV were measured by the use of a cardiac output catheter and injection of 10ml ice-cold glucose 5%. Non-invasive cardiac output measurement was done by using the continuous cardiac output software package Modelflow (TNO; Portapres®).
Results: Overall, 159 paired measurements were used for the evaluation of the accuracy of non-invasive obstained SV and CO. Mean values, standard deviation and range of CO and SV evaluated by invasive and non-invasive methods are summarized in the table with their regression coefficient (r).

	THERMODILUTION	AORTIC MODELFLOW	r =
SV	61 ±18 (29-106)	59 ±18 (26-99)	0.92
CO	5.71 ±1.36 (2.21-10.3)	5.4 ±1.31 (2.13-8.94)	0.88

Conclusion: Aortic Modelflow provides reliable hemodynamic data in critically ill patients. It may be a useful alternative due to its non-invasive approach and continous measurement.

BRONCHOSCOPIC FINDINGS IN SEVERE BLUNT CHEST INJURIES

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Objectives: The purpose of this study was the evaluation of bronchoscopic findings in ICU patients with severe blunt chest trauma.
Methods: Flexible fiberoptic bronchoscopy was performed within the first three days of trauma. The bronchoscopy was repeated when the clinical situation e.g. a persistent pneumothorax, suggested that a lesion might be present. Physical and radiological findings were recorded.
Results: Ninety seven bronchoscopic examinations were performed in 76 chest trauma patients. Physical and radiographic findings in the 76 patients were as follows: Multiple rib fractures in 63 patients, hemothorax in 49, pulmonary contusion in 47, pneumothorax in 42, subcutaneous emphysema in 40, flail chest in 30, sternal fracture in10, mediastinal empysema in 6, and mediastinal hematoma in 3. The bronchoscopy revealed mucosal redness or edema in 60 patients, several secretions in 42, distal hemorrhage in 9, aspirated material in 6, mucosal ulcerations in 4, mucosal spotted hemorrhage in 4, mucosal hematoma in 3, complete bronchial obstruction by secretions in 3, and bronchial narrowing by external pressure due to traumatic dissecting aneurysm of thoracic aorta in 1 patient. Tracheobronchial transections or lacerations were not fount in any patient.
Conclusion: Bronchoscopic findings in severe blunt chest trauma are relatively poor and don't correlate with the severe clinical and radiological findings. Tracheobronchial tree is less damaged than other thoracic structures, probably because the lungs act as an air-bag protecting the airways.

CLINICAL EVALUATION OF A RAPID SCREENING TEST FOR DRUGS OF ABUSE IN AN EMERGENCY DEPARTMENT

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Objectives: To determine the feasability and accuracy of a rapid urine screening test (Triage™, Merck-Diagnostika) in an emergency department.
Methods: Prospective analysis of the Triage™ testkit (TT) in patients admitted because of suspected drug abuse during an observational period of 6 months. The TT is a competitve immunoassay which gives qualitative results within 10 minutes for methadone, benzodiazepines, cocaine, amphetamine, opiates, barbiturates and cannabis. Urine samples were analysed with the TT and compared to the results of a enzyme-linked immuno-assay (EIA) in our labratory (gold standard).
Results: During the study 25 patients were enrolled, in 19 of these patients substance abuse was proven by TT and verified by EIA. We recorded no false positive or false negative results for benzodiazepines, barbiturates, opiates, cocaine and cannabis. Two results were false positive and one false negative for methadone; one result was false negative for amphetamines.
The Triage-testkit had an overall sensitivity of 0.94 and specificity of 0.94.
Conclusions: The Triage™ testkit seems to be a a useful rapid test device in addition to quantitative tests for drugs of abuse in an emergency department.

IMPACT OF THE RENIN-ANGIOTENSIN-SYSTEM ON BLOOD PRESSURE RESPONSE IN PATIENTS RECEIVING ENALAPRILAT

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Objectives: The purpose of this study was to evaluate the influence of several factors of the renin-angiotensin-aldosterone system on blood pressure response in patients with hypertensive crises.

Methods: Patients with systolic blood pressure >210 mmHg and diastolic blood pressure > 110 mmHg were included into the study. Prior to treatment blood samples for determination of plasma renin activity (PRA), angiotensin converting enzyme (ACE), angiotensin II (ANG II) and aldosterone (ALDO) were collected. All patients received 5 mg enalaprilat intravenously. Success of treatment was defined as a reduction of systolic blood pressure below 180 mmHg and diastolic blood pressure below 95 mmHg within 75 minutes after start of treatment.

Results: 35 patients were included in our study, 20 (57%) patients responded successfully to treatment. Mean arterial pressure decreased in responders by 36.5 mmHg and in non-responders by 12.7 mmHg ($p<0.001$). Responders and non-responders differed significantly concerning PRA ($p=0.001$), ACE ($p=0.003$) and ANG II ($p=0.04$).

	RESPONDERS	*NON-RESPONDERS*	*p=*
delta (MAP) (mmHg)	36.5 ±1.8	12.7 ±2.5	0.001
PRA (ng/ml/h)	5.5 ±3.7	1.1 ±2.2	0.001
ACE (U/L)	12.8 ±3.5	8.2 ±4.8	0.003
ANG II	8.7 ±6.2	5.0 ±3.8	0.04

The extent of blood pressure reduction correlated positively with the pretreatment PRA and ANG II concentrations (correlation coefficient for PRA: r=0.43; ANG II: r=0.66).

Conclusion: Our data confirm that in patients with hypertensive crises blood pressure response to ACE inhibition is mainly determined by circulatory PRA, ACE and ANG II. As the extent of blood pressure reduction correlates with PRA, ACE-inhibitors in patients with suspected high renin status cannot be recommended, as excessive blood pressure reduction, which carries a considerable risk for further organ damage, may occur.

ACUTE INTENTIONAL SELF MEDICATIONS-POISONING IN A MEDICAL EMERGENCY DEPARTMENT (MED)

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Epidemiology of acute intentional self medications-poisoning (SMP) in France is especially known by data of Poison Control Centers and Intensive Care Units (ICU). The purpose of this study is provided characteristics of this problem in a MED for adults.

Method: July 1992 to June 1993, files of patients consulting to the ED for SMP have been retrospectively analyzed.

Results: 727 patients, 482 women and 245 men, 33.3 ± 12 years old (range 15-92) have been admitted for 804 episodes of SMP (4% of all consultations) whose 77 relapses during the period of study. Psychiatric disorders, drug addiction or HIV patients was found for respectively 42.6%, 9.1% and 2,9% of patients. The interval of time between the ingestion and emergency consultation was noted for 43% of SMP (332 ± 532 min, ranges 15-4320). The involved products name was known in totality in 89% of cases with an average number by episode of 1.7 ± 1 drugs (ranges 1-8). The most often, 1 (52%) or 2 (21%) different products were interfered. The nonbarbiturate psychotropic drugs accounted for 76.7% of the products (benzodiazepines 67%, antidepressants 9.5%, neuroleptics 8%, carbamates 5.8%, imidazopyridines 5.1%, cyclopyrrolones 2.7%). Analgesics and nonsteroidal antiinflammatories represented 6.8% of all drugs, anticonvulsants 3.4%, cardiovascular drugs 2%, antiinfective agents 1.9%, drugs against cough 0.86%, muscle relaxants 0.86% and antihistamines H_1 0.5%. The benzodiazépines were present in 531 episodes, alone in 316 episodes. In 36.5% of cases, there was a simultaneous intoxication with alcohol. The processing consisted of gastric lavage in 32.5% of cases, activated charcoal in 16.7% of cases, flumazenil in 16.9% of cases, naloxone and acetylcysteine in 3.4% of cases; orotracheal intubation was performed in 12 patients. Admission in hospital was effective for 280 patients, in medical ward (n = 156), psychiatry (n = 63) or ICU (n = 62); no fatal case was recorded.

Conclusion : SMP to ED are often benign. The benzodiazépines are the most often incriminated but the new anxiolytics and hypnotics (imidazopyridines and cyclopyrrolones) take a growing place.

The latsion burn center of athens. Its planning constructive and functional refinements

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A 18 bed Burns Unit is under construction following a donation to the General Hospital of Athens.

The plan of the Unit, covering a surface of approximately 3.500 m2 is based on the principle of three identical 6 bed satelites which may function totally independent from each other. In the center of the Unit the common facilities are installed, like operation theatres, storage rooms etc.

This new modification in the plan of a Burn Unit is presented in this paper. The advantages from the fucntional, administrative and medical point of view are discussed.

EPICARDIAL MAPPING DURING EXPERIMENTAL INTOXICATION BY CLOMIPRAMINE IN DOGS. EFFECT OF SODIUM BICARBONATE ON VENTRICULAR CONDUCTION VELOCITIES

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The anisotropy is one of the important myocardial electrophysiologic properties; the electrical impulse does not displace to the same velocity (V) in all directions. This anisotropic conduction could favour the occurence of a circular movement of the impulse that leads to tachycardias by reentry. Purposes of this work were to study, with the help of epicardial mapping, the influence of a tricyclic antidepressant, clomipramine (C), on the conduction velocity longitudinal (V_L) and transverse (V_T) to myocardial fiber orientation and on anisotropy (A = ratio V_L/V_T), and their modifications by the sodium bicarbonate (B).

Method: a plaque of 64 electrodes, positioned on the left anterior ventricular wall of 9 anesthetized dogs, allowed to deliver, thanks to central electrodes, programmed electrical stimulations inducing ventricular complexes, and to collect them. Each entailed unipolar electrogram was processed by a computer system that drew the isochrones and a map of activation allowing the calculation of V. The C was infused (0.5 mg/kg/min iv) during 75 min; at T60, dogs received the B until the return of QRS to its initial value (T0). A lengthening of QRS of at least 30% of its value at T0 was demanded before the administration of B.

Results: 1 dog was excluded because of an insufficient prolongation of QRS before the administration of B. All values (MAP : mean arterial pressure, HR : heart rate, QRS and QT intervals, V) differed significatively ($p<0.05$) compared to values control (T0) except QRS at T65. The B (7 ± 6 ml/kg; ranges 2.8 and 20.5 ml/kg) modified no studied elements outside of the QRS.

	T0	T15	T30	T45	T60	T65	T75
MAP mm Hg	115,8 ± 13,6	99,5 ± 19,4	98,8 ± 16,4	92,6 ± 7,5	92,5 ± 13,3	82,7 ± 18,5	88,2 ± 25,6
HR cycl/min	389 ± 59,4	497,5 ± 95	546 ± 80	575 ± 77,6	611,2 ± 80,6	587,5 ± 88,7	595 ± 87,4
QRSmsec	49 ± 6,4	59 ± 9,5	65 ± 10,3	67,5 ± 10	70 ± 10,3	51 ± 6,5	64,4 ± 9
QT msec	188 ± 32	217 ± 39	247 ± 34	257 ± 36	261 ± 22	265 ± 36	272 ± 36
V_L cm/sec	57,4 ±19	47,6 ±14	38,6 ± 11	38,3 ± 11	33,4 ± 11	32,8 ±15	34,9 ±11
V_T cm/sec	28,2 ± 8	22,4 ± 7	18,8 ± 4	19,1 ± 6	15,8 ± 4	15,6 ± 4	17,5 ± 5
A	2,1 ± 0,6	2,1 ± 0,5	2,1 ± 0,4	2,1 ± 0,4	2,1 ± 0,7	2,1 ± 0,7	2,1 ± 0,5

Conclusion : the C slowed V_L and V_T without modify the anisotropy. The B did not modify the V of conduction while the QRS prolongation was corrected. The C acts as a class I antiarrythmic drug on the inward sodium current during the phase 0 of action potential; the gap junctions have shown to be important in the conduction and an action on the gap junctions such as a modulation of the junctional resistivity, can not be rule out.

A HELICOPTER BASED EMERGENCY SERVICE IS THE DOCTOR A HEROE ?

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Objectives: Helicopter Emergency Services (HES) are getting popular more and more. The results concerning outcome are encouraging. However, some recent accidents with dead or badly wounded HES-crew-members have shown the relatively high risk for the crews. Therefore we were interested to evaluate the motivation of physicians to participate in a HES. This survey was designed to investigate current concerns about safety and motivation of doctors on emergency call.

Methods: A questionnaire was sent to 205 doctors of the Austrian emergency system. The survey consisted of multiple choice questions and subjective scoring tables from 1 (=full agreement) to 5 (=disagreement). Overall, 64% of the active emergency physicians participated in the survey.

Results: 61.1% of the doctors assume the system is basically safe, experienced doctors tended to have less trust in safety. Only 13% would not hesitate to go into action by dark. 14.8 % strictly refuse night flights to accidents outdoors.
Although defibrillations are assumed to be safe during flight, only 29% would do it.
52.8% of the doctors would rather stop flying. The most common reasons for quitting were wish of family and fear of an accident.

Table: answers (scores)	yes (1)	(2-4)	no(5)
questions:			
Is the HES safe enough?	61.6%		38.4%
Emergency call by night	13.8%	71.6%	14.6%
Defibrillation in the air	29.0%		71.0%
Would you like to quit HES	52.8%		47.2%

Conclusion: Short transportation times help to avoid trauma related stress, pain and shock-induced organ complications. Therefore the physiologic and economic advantages of HES are undebatable. However, the survey data indicate a considerable concern about safety of the medical personal in a HES. 14 crash landings within less than 10 years with 15 deadcases and 17 badly wounded crew members in a small country like Austria make desire for safe flying conditions understandable.

ENOXAPARIN ANTICOAGULATION AS COMPARED TO STANDARD HEPARIN IN CONTINUOUS ARTERIO-VENOUS HAEMODIALYSIS

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Objectives: To compare enoxaparin and standard heparin in CAVHD and calculate the value of laboratory controls in the treatment.
Patients and methods: Twenty patients needing dialysis for acute renal failure participated in the study. The main exclusion criteria were massive bleeding or a thrombocyte level < 50 x E9/l. In each treatment the same type (AV-400, Fresenius Ag, Germany) of a polysulfone capillary haemofilter was used. The study scheme consisted of two consecutive four-day CAVHD treatments, one course for each type of heparin. The order of heparin administration was counterbalanced between patients. The standard heparin was given as a continuous infusion aiming at an activated coagulation time between 200 and 250 s. The initial enoxaparin dose was 80 mg every 8:th hour intravenously, but was modified by any signs of coagulation in the dialysis blood lines or bleeding complications.
Results: The dialysis treatment was adequate in both treatment modes, with mean blood urea levels 24.3 and 25.2 mmol/l respectively (NS). The bleeding complications were moderate and similar in both treatment modes. The mean life-span of haemofilter using enoxaparin as an anticoagulant was some longer than using heparin (35.7±31.6 h versus 22.3±26 h , NS). The mean APTT-level during heparin treatment was 79s and during enoxaparin treatment 54s (ref. 24 - 34s). The mean daily dose of heparin was 422 mg, that of enoxaparin 187mg. The mean anti-Xa activities were 0.40 U/ml and 0.47 U/ml, respectively, reflecting a better bioavailability of enoxaparin.
Conclusions: Both anticoagulation modes were equally effective and well tolerated. The amount of enoxaparin needed for a proper anticoagulation was, however, less than half of that of standard heparin. The changes in APTT level were too slight to make its use possible in controlling the dose of enoxaparin. The use of enoxaparin seems to be rather safe in CAVHD even without laboratory controls.

CLINICAL EXPERIENCE WITH TRACHLIGHT® - A DEVICE FOR LIGHTGUIDED INTUBATION

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Objectives: To evaluate the clinical usefulness of Trachlight.
Methods: Trachlight is a new device facilitating endotracheal intubation. A stylet with a lightprobe is inserted into the endotracheal tube. Intubation is guided by the light glowing through the neck tissues, thus rendering direct laryngoscopy unnecessary. Intubation using Trachlight was studied in 37 patients (age 21-68 years). The indication for intubation was elective surgery in 21 patients (ASA I-II) and emergency intubation in 16 patients. In the elective patients, anaesthesia was induced with thiopentone supplemented with fentanyl, and intubation was facilitated with vecuronium. The cause for intubation in the 16 emergency patients was dyspnea in 8, cardiac arrest in 2, trauma in 2 and unconsciousness due to drug overdose or seizures in 4 patients. Intubation was facilitated with medication in 12 patients.
Results: Of the elective 21 patients, 19 (91 %) were successfully intubated. Six patients (29 %) needed two attempts before successful intubation. The duration of intubation exceeded 30 seconds in 8 patients (38 %). Of the emergency patients, 14 (88%) were successfully intubated. Six patients (38%) needed two attempts, and the duration of intubation was more than 30 seconds in 9 patients (56 %). In 54 % of all 37 patients, intubation was assessed as easy. No or insufficient glow, prolonging intubation or necessitating two attempts, was noted in 11 patients (30 %). Oesophageal intubation occurred in 2 patients.
Conclusions: Trachlight may be a valuable adjunct for intubation in varoius settings provided that adequate training is provided. A learning curve was found to exist.

SOFTWARE FOR HEMODYNAMIC PROFILE

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ARGENTINA.

The advances in the management of computarized data of an intensive care unit have been paralled to the clinical advances and the increasing sophistication of methods of diagnosis for the clinical application an therapy. This has led our Unit to design and develop a computational system called TIMBU which is used to help physicians assist patients. Among its various uses, this system has a software for the hemodynamic control of a critic patient. This program was carried out to get as fast as possible the hemodynamic data of the patients in an intensive care unit. As an example, we can mention that when we load 17 data obtained through direct measurement from the monitors and the lab, the program calculates 18 parameters that guide, intelligently, to the diagnosis and therapeutic behaviour of the hemodynamic problem through screen messages.
The validation of this program in the unit of intensive care has demonstrated that its use allows a more efficient handling of the patient with serious hemodynamics and respiratory disorders.

CALIBRATION OF A MULTIPURPOSE SEVERITY SCORE (SAPS) FOR TRAUMA PATIENTS.

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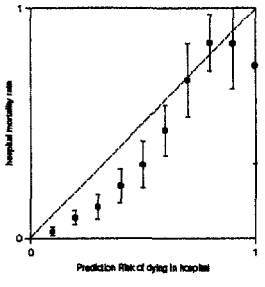
Objective: Trauma is a heterogeneous 'disease' that occurs across all age groups with varying degrees of severity. This heterogeneity has made the disease, trauma, difficult to characterize. The aim of this study was to assess the fitness of SAPS in this population.
Methods: In order to compute the SAPS probability, a model derived from logistic regression was developed. Measures of calibration (goodness-of-fit statistics) and discrimination (ROC curve) were adopted in development and validation set randomly taken from a database of 10065 pts consecutively admitted in ICU (Archidia). Pts without SAPS, pts younger than 18 years, pts with LOS shorter than 24 hours were excluded from this analysis. This model was then evaluated on the specific subgroup (i.e., trauma pts). If it did not fit the data well a new model was developed recalculating the logit only on trauma pts.



Results: Data were available for 8059 pts during a period of three years (1990-1992), trauma pts were 1156 (14.3%). Tests of calibration indicated that probability model did not provide an adequate reflection of the mortality experience in pts with trauma, being the observed mortality lower than the expected (figure). A new model was then generated using SAPS as independent variable. This customized model fits the data of trauma pts very well (χ^2= 8.47 p>0.25; ROC= 0,94). The differences between the two models were evident.
Conclusion: This study shows that mortality in trauma pts is over predicted when assessed by means of SAPS. However the customized model meets high standard in terms of calibration and discrimination. The advantage of customized models means the collection of the same set of variables for all pts admitted in ICU against the use of disease specific scoring systems.

TREATMENT OF HEMORRHAGIC SHOCK (HS) IN DOGS BY NEW HYPEROSMOLAR SOLUTION (HOS) "SORBI-LACT" ("SL"): EFFECTS ON CARDIOVASCULAR AND HEMOSTASIS SYSTEMS (CVS, HSS)

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Objectives: Great interest has been shown recently in the use of HOSs for the initial resuscitation of hypovolemic shock.
Methods: The study was carried out in 6 dogs in which HS was induced by jet momentary hemorrhage (H) from a. femoralis (the bloodloss volume made 29.8+1.9 ml/kg). The treatment was begun after 7.0+0.2 hrs of H. "SL", created on the basis of sorbit and natrium lactate (1800 mOsm/L) was injected into v. femoralis at the dose of 10.0 ml/kg.
Results: It is established that before treatment arterial blood and central venous pressures (ABP, CVP) diminished to 30.0 mm Hg and -0.6+0.2 cm H2O (P<.001), while heart rate (HR) increased to 190.0+9.6 per min (P<.001). By this the indices of platelet counts (PlC) and plasma fibrinogen (PF) lowered by 42.2% (P<.1) and 6.4% (P<.05), while fibrin degradation products (FDP) enlarged by 215.6% (P<.001). After 30-40 min of treatment termination ABP and CVP increased to 98.3+6.1 mm Hg and 4.1+0.2 cm H2O (P<.001), and HR diminished to 180.0+6.3 per min (P>.5). At the same time the indices of PlC and PF enlarged by 36.4% and 2.6% (P>.1), while FDP diminished by 8.2% (P>.1). One of 6 dogs survived. Life duration of the other 5 dogs was 3.9+1.2 hrs.
Conclusions: The obtained data are the evidence of normalizing influence of "SL" on CVS and HSS, and allow to recommend it as a mean of initial resuscitation of HS in clinic.

CONTINUOUS JUGULAR OXIGEN SATURATION AND TRANSCRANIAL DOPPLER IN HEAD INJURY WITH GCS ≤ 8.

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Objectives: We prospectively studied 64 ICU patients with severe head injury (HI), which cerebral lesions monitorized with SjO_2 through optical fiber and the cerebral flux with TCD.
Methods: since january 1990 until june 1994, we collected 152 HI admitted to the ICU, and 64 of them monitorized with optical fiber in the right jugular bulb and TCD. All patients needed mechanical ventilation related to GCS ≤ 8, with CT in admission (classifing lesions according to Marshall and al.). We related the final results to the evolution of SjO_2 and TCD, with other monitorizing methods like GCS, CT and ICP.
Results:

EVOLUTION	BRAIN DEATH (22 patients)*	VEGET STATE (6 patients)	NEUROL.RECUP. (35 patients)	
GCS	6.2 ± 3	4.8 ± 2	6.7 ± 3	---
CT adm.	t. III (45.5 %) (10 p.)	t. II (50 %) (3 p.)	t II (45.7 %) (16 p.)	---
SjO_2 max	94.2 ± 8*	79.5 ± 17	89.7 ± 6*	* p = 0.023
SjO_2 min.	58.7 ± 22*	31.8 ± 14*/**	53.1 ± 11**	* p = 0.01 **p < 0.0001
ICP max.	62.1 ± 56*/** (18 p.)	16 ± 15* (6 p.)	22.8 ±14** (31 p.)	* p = 0.005 **p= 0.009
ACMD MEAN	9.9 ± 12*/**	22 ± 6*	34 ± 17**	* p =0.021 **p < 0.0001
ACMD PI	5.6 ± 5*/**	1.5 ± 0.4*	1.2 ± 0.5**	* p = 0.044 **p < 0.0001
ACMD PRT	59.1 ± 32*/**	133 ± 37*	122.3 ± 44**	* p < 0.0001 **p < 0.0001
APACHE III	87.9 ± 24*	80.5 ± 13**	59.4 ± 18*/**	* p < 0.0001 **p = 0.011

*We excluded one patient without neurologic death (sepsis).
Conclusions: In patients with GCS ≤ 8, SjO2 is useful to evaluate the evolution towards vegetative state, still more in cases with CT type II in admission and higher Apache III. Elevation of ICP implies an evolutive risk to brain death and data of TCD is a good indicator of brain death. The complete monitorization of these patients can improve the therapeutic control of this neurologic problem.

A PROSPECTIVE STUDY CONCERNING THE SERUM LEVELS OF CYTOKINES IN MULTI-INJURED PATIENTS ON ADMISSION IN THE ICU (preliminary report).

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Objectives : Evaluate the levels of proinflamatory cytokines (IL-1α, IL-1β, IL-2,TNF-α), IL-6 and G-CSF in multi-injured patients.
Methods : From June 1994 till April 1995, twenty-two patients were studied, (16m,6f), (m. age: 39±4 years), divided in two groups (A and B) under specific criteria(tremor and/or fever during admission in I.C.U., or not). The Injury Severity Score was >25 in all studied patients. The group A (9 m, 4f) had no tremor and/or fever on admission, while on group B (7m, 2f) the above criteria were positive. Blood samplings were taken 2-9 hours after accident and 10-25 min. after admission in I.C.U. Micro-Elisa method was used for measuring cytokine-levels. Statistic analysis was performed by Student-T test. As control group, 25 healthy people were examined .
Results : IL-1α, IL-1β, IL-2 and TNF-α levels were similar to control group levels in both groups A and B . IL-6 and G-CSF levels were found increased in both groups (p<0,001), while IL-6 levels were statistically significant comparing to group A.
In conclusion, during immediate post-traumatic period,proinflamatory cytokines IL-1α, IL-1β and TNF-α, produced in an earlier stage than IL-6, cannot be detected,whereas IL-6 was increased significantly, especially in group B. G-CSF was found in increased levels in both groups, without statistically significant difference between groups A and B .

CORRECTION OF BLOOD PROTEOLITIC ACTIVITY WITH BURNS COMPLICATED BY BLOODSHED

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Objectives: Evaluate proteolitic activity disorders in early period after combined trauma and possibility of their correction by injection of proteolysis inhibitors contrycal and S-ftoruracil in combination with driving an isotonic solution of sodium chloride and poliglucine.

Methods: Biochemical studies of proteolitic activity in dogs with limited deep burn and acute bloodloss.

Results: In case of deep 5% burn, complicated by bloodshed the of blood grows at 6-7 times. It is the result of the pancreas glandischemi demage, caused by the centralised circulation of blood and intensifies the deviations of haemodinamics and albumin exchange. The degree of endogene intoxication by mean molecular peptides which are the products of albumin decay reses to 30%, and 77% in 3 hours.

In 3 hours after the trauma the process is accompanied by 59,6% lower inhibitory activity of blood, where as at the peak of the trauma it was 14,5% higher. That proves the unfavourable process of the shock in case a combined trauma.

Conclusion: The vein injection of proteolysis inhibitors contrycal and 5-ftoruracil in combination with driving an isotonic solution of sodium chloride and poliglucine to refill the loss of blood helps to lower at 2 times the proteolitic activity of blood. But it still remains above the initial level. The degree of endogene intoxication lowers at 2 times; haemodinamics and albumin exchange stabilised.

EFFECTS OF NIMODIPINE ON THE HISTOPATHOLOGIC CHANGES FOLLOWING AN EXPERIMENTAL INTRACEREBRAL HAEMATOMA

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Objectives: Nimodipine, a known calcium antagonist, has been shown to dispose a beneficial effect on patients with subarachnoid hemorrhage, but its efficacy on traumatic or spontaneous intracerebral hematoma has not been justified. Therefore, we studied the effect of nimodipine on the histopathological changes following an experimental intracerebral haematoma in rabbits.

Methods: Twenty-three New Zealand albin rabbits of both sexes, weighing 2-3,5 kgr and at age of 4-6 months were anesthetized and a small burr hole in the left parietal aerea was carried out under aseptic conditions. The dura was opened and 0.1 ml (this volume assuring a normal incranial pressure after Kaufman 1985) of autologous blood was injected into a depth of 3 mm via a needle of 0.36 mm bore. The wound was closed and the animals were left to recover. Nimodipine, of 2,1 mg/kgr of by weight per day was given via a nasogastric tube to fifteen animals for a period of time of fifteen days (GROUP B). Six rabbits were given water and served as control (GROUP A). Both groups of animals were sacrified on the fifteenth day, their brains were removed and immersed into 10% formalin solution. Tissue sections of 5 μ were embedded into paraphin and stained with haematoxyline and eosin, Mason and GFAP stain for gliac cells.

Results: Two animals died after the surgical procedure, because they developed large intracerebral hematoma. No animal developed neurological deficit except one of group A which manifested a right side hemiparesis. The results of the histopathological changes are the following: i) the mean ± SD diameter of the lesions in the group A was 260 ± 26 μ while that of group B was 76 ± 12 μ ($p<0,01$) ii) secondary ischaemic neural tissue changes, characterized by the extravasation of red cells, the presence of haemosiderin-containing macrophages and signs of low grade inflammation zpredominated in the specimens of group A and were totaly absent from those of group B. iii) A ring of gliac hyperplasia and a low grade local fibrosis was found, encircling the lesions in the specimens of group A in contrast to those of group B.

Conclusions: Nimodipine when administered in rabbits following the development of a non increasing the ICP experimental intracerebral haematoma, prevents the extention and the severity of the lesion.

CLONIDINE FOR PAIN RELIEF AND SEDATION OF PATIENT WITH BURNS.

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Objectives: To study the efficacy and side effects of adding intramuscular Clonidine (Clophelinum) to analgesic regimen in early management of patients with serious burn injury.

Methods: 20 pts with 20-40% BSA second to third degree flame burns (respiratory tact injury excluded) 19 to 61 yrs of age were randomised to study (n=10) and control (n=10) groups. Burn shock was treated with hypertonic saline - bicarbonate solutions (250 mmol/L Na^+) 2ml/kg/%BSA for the first 24 hours and 1 ml/kg/%BSA for second day. Analgesia in control group for the first 48 hours was provided by regular 6 hourly intramuscular administration of 20 mg of Morphine sulphate and 500 mg of analgesic - antipyretic Analgin with 10 mg of Diphenhydramine (Dimedrol). From the 3rd day regular administration of Morphine was finished. In the study group 100 μg of Clonidine was added 8-hourly for 72 hours and dose of Morphine halved. VAS, Verbal rating scale for sedation (VRS, 1 - 5), sleeping time, SpO_2, HR, BP, diuresis, vomiting and other complications were comparatively evaluated during patients' stay in ICU.

Results: Addition of 300 μg of intramuscular Clonidine daily allowed to achieve better analgesia and sedation with halved consumption of Morphine. Mean VRS in study group for the first 3 days was 3.1 - 3.3 vs 1.3 - 1.7 in control group with twice longer sleeping time. There was significantly less tachycardia in study group; dynamics of BP for the first 24 hours did not differ considerably; later, there, was tendency for hypotension in study group without adverse effects on diuresis or other indices of tissue perfusion. Because of high incidence of chronic ethanol abuse among study population 7 pts of control group suffered from psychomotor agitation or delirium, probably as a sign of alcohol withdrawal syndrome (AWS). This made regular evaluation of VAS impossible. In the study group only 1 pt showed sign of AWS. Mean VAS score was in 2.4 - 2.9 range for first 3 postburn days. 7 pts appeared excessively drowsy due to Clonidine, but it had no adverse effect on their overall clinical course. Mean SpO_2 values in study group were in 95 - 98 % range, among controls 90 - 95 %; vomiting was absent in. Clonidine group vs 4 cases among controls

Conclusions: Clonidine could be a valuable addition to analgesic - sedative regimen in burns, especially for prevention of AWS and deserves further study in this regard.

RESPIRATORY SUPPORT IN EXPERIMENTAL ACUTE LUNG INJURY (ALI) WITH MODIFIED HEMOFILTRATION (CAVH.M) AND INTRATRACHEAL GAS INSUFLATION (IGI)

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Hemodialysis - Hemofiltration modifications and/or Intratracheal Gas Insuflation have been recently used for blood gas exchange in several models of respiratory failure.

Objectives: Evaluate the combination of CAVH-M and IGI for respiratory support in experimental Acute Lung Injury.

Methods: Five mongrel dogs (22±4Kgr) were Mechanically Ventilated inroom air, Paralysed, Heparinized, Connected with a CAVH-M system (Diafilter-30 polysulphone membrane) and remained stable for one hour (PaO_2= 98.8±8.4mmHg, $PaCO_2$=34±8mmHg, PH=7.37±0.07, BP=137±12mmHg and PAP=15±2mmHg). ALI was induced two hours after oleic acid infusion (0.07ml/Kgr) into the Pulmonary Artery (Pao_2=46.6±6 - $P<0.001$, $PaCO_2$=50.2±10 - $P<0.05$, PH=7.10±0.10 - $P<0.01$, BP=158±25 - P=NS, and PAP=29±5 - $P<0.01$). FiO_2 70% for the next 30 minutes did not significantly altered the blood gas abnormalities. Afterwards, pure oxygen applied simultaneously a) through the inlet of the filtrate's compartment of the hemofilter (2L/min) while filtrate and gas were removed from the outlet port (bypass flow 220 ml/min) b) through a thin Intratracheal catheter positioned 2cm above the carina (4L/min). The FIO_2 given through the Ventilator readjusted to 21%.

Results Replacement fluids/filtrate during the next four hours were not exceed 0.7L/hour, whilst the blood gases and pressures were improved as follow: CAVH-inlet:PaO_2=88.5±11-$P<0.001$, $PaCO_2$=33.4±15-$P<0.05$, PH=7.20±0.02-P=NS, BP=128±10 P=NS, PAP=18±1.6-$P<0.01$. CAVH-outlet: PaO_2=420±90 $P<0.001$, $PaCO_2$=30±12-$P<0.01$, PH=7.26±0.03- $P<0.05$.

Conclusion: A simple hemofiltration technique combined with intratracheal oxygen Insuflation may provide respiratory support in dogs with oleic acid induced Acute Respiratory Failure.

COMPARATIVE ANALYSIS OF THE CHANGES IN THE HUMORAL IMMUNITY FOLLOWING TRAUMA AND MASSIVE TRANSFUSION OF AUUTOLOGOUS AND HOMOLOGOUS BLOOD

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OBJECTIVE. To compare the changes in humoral immunity in trauma patients following massive transfusion of autologous and homologous blood.
METHODS. We studied 3 randomised clinical groups of patients each containing 24 patients with trauma and operation of large arterial vessels. The amount of autologous or homologous blood transfused to the patients was exceeding 1 500 ml, while the patients in the control group did not recieve blood or blood products.
RESULTS. We recorded most pronounced and characteristic changes on the 1-st and on the 7-th day in the group of patients recieving homologous blood transfusion, i.e. decreased amount of IgG,IgA,IgM,C5 and C4 fractions of the complement system, haptoglobin and significant and sustained rise of circulating immune complexes up to the end of the study period. In the control group of patients the decrease was weaker and lasted only during the 1-st post-operative day; the dynamics of the circulating immune complexes level were almost the same as in the first group of patients. In the group of patients recieving autologous blood transfusion, the parameter values did not change significantly from preexisting levels after the 1-st day, while on the 7-th and on the 30-th day showed a tendency towards aslight rise.
CONCLUSIONS. Autologous blood has a favourable effect upon humoral immunity and should be the transfusion medium of choice in cases where autologous blood reinfusion is technically possible.

THE AUTOLOGOUS BLOOD AS A LIFE - SAVING TRANSFUSION MEDIUM IN SEVERE TRAUMA AND HAEMORRHAGE

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OBJECTIVE. The amount of blood lost during trauma and operation could hardly be forseen and donor blood supplies are not always available in sufficient amounts. Rare blood group types and/or unexpected haemorrhage pose a great challenge to the transfusion therapy and the methods of intraoperative autologous blood transfusion.
METHODS. We report a case of a 18-year old male patient with extremely massive intraabdominal haemorrhage (7 300 ml blood loss) during an abdominal aorta reconstruction following a traumatic injury of the abdominal aorta. We achieved a successful reinfusion of 6 600 ml of autologous blood using an original autotransfusion system developed by us (pat. No 95311/ 11.10.1991).
RESULTS AND CONCLUSIONS. The autologous blood in the case reported here was the only and the most suitable transfusion medium for the rapid intraoperative compensation of the acute haemorrhage and the favourable outcome of the patient. The post-operative period was smooth and no significant disorders in the clinical course as well as in the laboratory tests (morphological,biochemical,coagulation and immunological) were recorded. There were no complications during the post-operative period despite the fact that the amount of blood reinfused to the patient was slightly exceeding his own volume of circulating blood.

BLOOD OXYGENATION, OXYGEN TRANSPORT AND TISSUE PERFUSION DURING THE EARLY POSTTRAUMATIC PERIOD

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OBJECTIVE. The haemoglobin concentration and the perfusion pressure value could not be the only criteria for the early signs of tissue and organ dysfunction. Because of this, we employed the extensive monitoring of oxygen transport during severe trauma in order to achieve dynamic evaluation of physiologic compensatory mechanisms and to assess the efficacy of intensive care management.
METHODS. We conducted a prospective controlled trial on the blood oxygenation, oxygen transport and tissue perfusion during the first 3 days after the trauma in 20 patients with polytrauma. We used a Swan - Ganz pulmonary artery catheter (Beckton - Dickinson, U.S.A.), Deseret 1000 Cardiac Output Computer (Medical Inc., U.S.A.) and Hewlett - Packard Monitor (Hewlett - Packard, Germany) to measure and calculate all the parameter values. The severity of the injury was assessed using the APACHE II score system. All the patients had scores over 18.
RESULTS. The results show a significant decrease in the arterial blood oxygen content and in the arterio-venous difference, as well as an increase in alveolo-arterial oxygen difference and in the transpulmonary right-to-left shunt. The tissue oxygen supply and the tissue oxygen consumption reveal a tendency towards a decrease below the physiologic minimum of adeqate values. The erythrocyte current velocity and the ratio between oxygen transport and erythrocyte current velocity also decrease inspite of the optimal blood rheology.
CONCLUSIONS. The dynamics in the parameters values are most pronounced between the 2-nd and the 18-th hr after trauma, which predisposes patients to the risk of developing stable hypoxemia and characterizes this period as the most critical for tissue metabolism and organ dysfunction.

BURNED CHILDREN ADMITTED TO THE PAEDIATRIC INTENSIVE CARE UNIT IN NOVI SAD, YUGOSLAVIA

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Objectives: Retrospective epidemiological analysis of the patients with burns admitted to the paediatric intensive care unit in Novi Sad,SR Jugoslavija.
Method: 48 case hystories were reviewed corresponding to patients aged o-15 years between 1 Jan.1991 and 31 Dec.1994,initially treated in our intensive care unit.
Results: Male to female ratio in the sample was almost 2:1.There were predomination of the children under 3 years of age(6o,42%)as well as patients who suffered burns that affected less than 2o% TBSA(7o,83%).The most frequently factor as the cause of burns was scalding by hot water or hot liquids(68,75%). 31,11% of the patients recieved at least one skin graft operation.Wound cultures were sterile in 7o,83% The most frequent isolated micro-organisms were Gram positive bacterias(Staphylococcus epidermidis and Streptococcus gr.D in 78,57%). Gram negative bacterias showed low incidence (Pseudomonas aeruginosa was isolated in only two cases-we have used polyvalent Pseudomonas vaccine).There were two letal outcomes.
Conclusions: According to our data,there are no general tendency in the reduction of paediatric burn injuries.We emphasize need for improved injury prevention programmes.

POSTTRAUMATIC CHANGES IN LUNG COMPARTMENT IN TWO INBREI STRAINS OF RATS: EVALUATION BY ISOLATED RAT LUNGS IN SHORT-TERM CULTURE

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Objectives: Posttraumatic changes in immune mechanisms in lung compartment in trauma were analyzed in AO and DA inbred strains of rats which differ in their immunological reactivity: the former being low responder and latter hiperresponsive. Methods: The levels of TNF-alpha activity in the 24 supernatants of cultured lung lobes and dynamics of cells migration from tissue explants in 6h lung cultures were assessed in AO and DA rats subjected to severe burn trauma. Results: Increased levels of TNF activity (160+3 pg/ml compared to 50+4.9 pg/ml in control) were found od day 3 following trauma in lung sups of AO rats while no changes in the levels of activity of this cytokine were found in lung-sups od DA rats. More pronounced extent and dynamics of cell emigration were noted in DA rats, while almost unchanged in AO rats. Sharp rise in PMN percentages 3h following trauma (60-70% compared to rare PMNs in control), followed by increase in lymphocyte numbers at later time points among lung cell emigrants was detected in AO rats. Slower but persistent increase (25%, 3h following trauma and 60% and 50% on days 1 and 3 after trauma infliction, respectively) in PMN numbers among DA lung cell emigrants was detected, which appeared to be activated, as judged by their NBT reduction capacity. Increased percentages of peripheral blood PMNs and increased state of leukocyte aggregation/adhesion were detected in both strains, but different levels of plasma TNF: increased levels in AO rats on days 1 and 3 following trauma, and initially but persistently high levels of plasma TNF alpha in DA rats (4-5 fold higher compared to initial levels in AO rats). Conclusions:Different patterns of local (lung) and systemic changes in cell numbers and cytokine levels implicate differential posttraumatic migratory capacity of PMNs vs. lymphocytes in lungs in AO and DA rats.

EARLY DIAGNOSIS OF ACUTE INTESTINAL ISCHEMIA BY COLOR DOPPLER SONOGRAPHY

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Objectives : Acute intestinal ischemia is often a late diagnosis and is associated with high morbidity and mortality rate. Usefullness of abdominal sonography for detection of acute intestinal ischemic disorders was evaluated as well as its influence on management and outcome.

Materials and methods : A color Doppler abdominal sonography (CDS) was performed in all patients admitted for acute abdominal pain in emergency room. A final diagnosis was obtained in all patients either by clinical evolution (107), surgery (126), computed tomography (225), endoscopy (81) or other X-rays explorations (arteriography (6), barium enema (15), or intravenous urography (19)).

Results :

From 09/93 to 03/95, 579 patients (pts) were admitted at our emergency room for acute abdominal pain. For 258 pts a diagnosis of urinary (230) or gynecologycal (28) pathology was concluded. For 4 patients, a symptomatic aortic abdominal aneuvrysm was surgically treated. For 317 pts. the final diagnosis was a gastrointestinal disorder (72 appendicites, 62 inflammatory bowel diseases, 45 colonic diverticulites, 4 pseudomembranous colites, 45 gastro-duodenal ulcus, 18 acute pancreatites, 55 mecanichal obstructions and 16 acute intestinal ischemic disorders (5 ischemic colitis, 11 small bowell ischemia [6 due to thrombosis of superior mesenteric artery, 4 with superior mesenteric venous thrombosis and one low flow status])). In 15 of those 16 cases, the correct diagnosis was suggested by CDS. There was one false positive result of CDS (one perforated Meckel diverticulum) and one false negative result (distal arterial thromboembolism of superior mesenteric artery). The diagnosis was clinically suspected at admission in only 6 of the 16 pts. Four patients were treated by "in situ" thrombolysis (2 with complete lysis at 48 hours, 1 unsuccesfull lysis[death], 1 partial lysis). Two were treated by systemic heparin and 10 by surgery. The survival rate was 13/16 (81 %).

Conclusion : Color Doppler sonography appears to be usefull for detection of acute intestinal ischemia. In our experience, it lead to reduction in morbidity and mortality rate . In selected cases of early diagnosis, it allowed a non-surgical approach of treatment .

INTEREST OF MONITORING SYSTEMIC FIBRINOLYSIS [LYSIS ONSET TIME (L.O.T.)] DURING THROMBOLYTIC THERAPY OF PERIPHERAL THROMBOSIS

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The guidelines and medication dosages for the lytic therapy of peripheral thrombosis (arterious or venous) are not clearly defined. Risks and benefits of a thrombolytic therapy are unpredictable.

A new method for monitoring of the systemic lytic state after thrombolytic agent : L.O.T. (Lysis Onset Time) can potentially improve thrombolytic management.

The method uses reagents on a test card. The reagents convert fibrinogen of citrated whole blood into a fibrin clot. Time for clot to be lysed is related to the lytic activity of the sample. As an indicator of global lytic state, L.O.T. is sensitive to levels of lytic agent, fibrinogen, functionnal plasminogen and plasminogen activator inhibitors. A major advantage of the method is its bedside use.

In a control sample of blood without any lytic activity, the L.O.T. is superior to 1 200 seconds. In a systemic lytic state, such as in acute myocardial infarction after 15 mg of tpA, the L.O.T. is inferior to 200 seconds.

In four cases of venous and arterial embolism, fibrinolytic therapy was tailored by the L.O.T. monitoring :

Case 1 : Woman (21 y.; massive pulmonary embolism). Systemic lytic response (L.O.T. < 200 sec.) and clinical recovery after 67,5 mg of r-tpA.

Case 2 : Woman (19 y.; metrorrhagia, brachial artery occlusion). Local infusion of urokinase. Total reperfusion and no systemic lysis (L.O.T. >1200 sec.)

Case 3 : Woman (65 y.;mesenteric artery occlusion). Local prolonged r-tpA infusion (r-tpA 88 mg/16 hours). Complete reperfusion, no systemic lysis (L.O.T.>1200 sec.), no bleeding.

Case 4 : Woman (35 y.; portal vein thrombosis). Transhepatic portal vein lysis r-tpA 31 mg/17 hours) . L.O.T. showed systemic lysis (L.O.T. : 775 sec.) before clinical haemorrhage.

Absence of systemic lytic state during local infusion allows to prolonge fibrinolytic therapy and increase the dosage of medication. On the other hand, early systemic lytic state allows a reduction in initial dosage.

Conclusion : In our experience, thrombolysis tailored with L.O.T. extends the indication of thrombolytic therapy in patients with high risk of bleeding.

Vehicle for the mass accidents/ medical and technical characteristics

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Emergeny medical squad service is the most important segment in the process of saving the people, in the cases of mass accidents, like industrial accidents caused by the: explosion, fire, chemical poisoning, traffic accident, elemental catastrophes and the war. Because of that, each Emergency medical squad service needs to have in its motor-pool vehicle for the mass accidents/ for provoding at least 100 people, wounded as well as the people became ill/.

Objectives: Presentation of such special vehicle, produced by "Zastava-Kamioni" and it's medical-technical equipment.

Methods: Descriptive and comparative analysis of the medical and technical characteristics, based on the actual norms/ din, 75080, ISO 9001, YUS .../

Results: On the base of doctrinaired requirements of the emergency medical squad in the case of mass accidents, our researches resulted in the following medical and technical characteristics

- The vehicles for mass accidents are GVW/ with a payload off cca 5–8t, with the fixed, closed body, type: universal van,
- Technical equipment aggregates, stretches, anti-fire device, equipment for pitching the tent and for maintaing technical conditions of the work
- Medical equipment: Linen bags with complete sets of bandage material, means for the reanimation and immobilization, for the infusion, medical instruments and remedies as well as the tent for lodging at least 50 wounded and sik people.

In Federal Republic Yugoslavia, it was proposed 24 such vehicles for the emergency medical squad needs.

Conclusion: We suggest to introduce this vehicle in the production range of the ambulance vehicles for saving, especially in the circles where can occur serious accidents.

REVERSIBLE CARDIAC FAILURE IN AN ADOLESCENT AFTER PROLONGED CO EXPOSURE

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Introduction : Carbon monoxide (CO) poisoning commonly generates central nervous system abnormalities though an important cardiac morbidity and mortality must be considered. Long-term exposure to CO with COHb levels < 30% may be more dangerous than short-term levels of 45-50%. We report a case of an adolescent who after prolonged exposure to CO developed a severe reversible cardiac dysfunction with low levels of blood COHb.

Case History : A 15 year old boy was found comatose at home. His mother in the neighbouring bathroom died several hours earlier of what was later proven to be a CO intoxication. On arrival the GCS was 8/15 and the patient was breathing spontaneously. A postictal status with eventual postanoxic encephalopathy was suspected. A COHb level of 10% was objectivated. The cardiorespiratory situation quickly deteriorated requiring mechanical ventilation. Chest X-ray showed diffuse bilateral patchy infiltrates. ECG revealed signs of ischemia. Severe left ventricular dysfunction was evidenced by pulmonary artery catheterisation and echocardiography and later by isotopic angiography (LVEF 20%). Treatment was intensified with inotropic support, intra-aortic balloon counterpulsation and oxygen therapy. The clinical course was further complicated by a crush syndrome and renal failure. The patient's condition gradually improved and he fully recovered without any residual lesions (LVEF 80 %)

Conclusion : Even after prolonged exposure COHb levels can be misleadingly low. High tissue levels of accumulated CO can be associated with coma and fulminant cardiorespiratory failure requiring advanced life support facilities.

DIABETES INSIPIDUS: A PROGNOSTIC SIGN OF BRAIN DEATH IN BRAIN INJURED PATIENTS

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Objectives: The development of diabetes insipidus (DI) in patients with brain injury is a known negative prognostic sign. The aim of this study was to investigate whether this is also a reliable early prognostic sign of brain death.
Methods: This is a retrospective study of 85 patients treated during a two year period (1-3-1992 to 1-3-1995) in our I.C.U who meeted the following criteria: (1) coma score ≤ 8 GCS within the first 24 hours, (2) positive brain CT scan on admission classified according to Marshall's diagnostic classification (classes 1-6), (3) normal renal function during the entire ICU stay. For the definition of DI were used the usual DI criteria plus hypernatriaemia (serum $Na^+ \geq 155$ mEq/L). Survival was defined up to the 30th postadmission day.
Results: From the 23 patients (27% of the total) who developed DI (group A) 22 were diagnosed as brain dead (specificity = 0,98) and had a mortality rate of 100%. From the other 52 patients (group B) who were normonatriaemic (serum $Na^+ \leq 155$ mEq/L), 44 had a mortality rate of 25% (group B_1) and 8 patients (group B_2) had brain death (sensitivity = 0,74). Both groups A and B_2 (with mortality 100%) differed according to age (32,17 ± 12 vs 57,1 ± 14,1 respectively, $p \leq 0,01$), the cause of injury (65% with head injury in group A vs 12% in group B_2) and the Marshall brain CT classification (47% with class 3 in group A vs 36% ingroup B_2).
Conclusions: According to the findings of this study, the development of Diabetes Insipidus in brain injured patients seems to be a highly specific index for brain death (positive predictive value = 0.95). However, further prospective studies are needed for the definitive evaluation of these findings in such patients.

COMBINED INTOXICATION WITH TRICYCLIC ANTIDEPRESSIVE AND NEUROLEPTIC AGENTS.

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Introduction : Both neuroleptics (NLP) and tricyclic antidepressive agents (TCA) can induce arrhythmias, prolongation of the QT segment and the PR interval and hypotension. We report a case illustrating that combined overdose of these agents increases the toxicity of each compound and the risk for adverse cardiac events.

Case History : A 44 year old male ingested 2500 mg doxepin (Sinequan^R), a TCA and 3500 mg prothipendyl (Dominal^R), a potent NLP in an attempted suicide. Upon arrival in the Emergency Department the patient was unconscious (GCS 6/15), breathing superficially, and presenting signs of recent vomiting. Physical examination revealed a tachycardia of 140 b.p.m., an arterial blood pressure of 90/70 mmHg. ECG showed a broad QRS complex tachycardia. A chest X-ray revealed the presence of an aspiration pneumonia. Laboratory investigation demonstrated increased levels of creatine phosphokinase, lactate dehydrogenase and aspartate transaminase ; hyperglycemia and leucocytosis were present. The plasma concentrations of doxepin and prothipendyl were respectively 410 µg/L (toxic level 500 µg/L) and 3900 µg/L (no reference). Treatment consisted of mechanical ventilation, gastric lavage and administration of activated charcoal and IV fluids and antibiotics. A hemodynamically well tolerated ventricular tachycardia developed 1 1/2 h later. $NaHCO_3$ (250 mEq/24 h) was administrated inducing an ectopic atrial tachycardia with a normal QRS complex and prolonged QT. 8 h after admission a normal sinus rhythm was present; the prolongation of the QT segment persisted for 2 days. The patient fully recovered.

Conclusion : The treatment with $NaHCO_3$, alkalizing the blood and thus increasing the protein binding of the tricyclic antidepressant molecule, can readily correct the potentially life-threatening cardiac arrhythmias and therefore should be part of the routine treatment of combined TCA-NLP overdose.

EXPERIMENTAL IMPLEMENTATION OF AN EMERGENCY MEDICAL SERVICE SYSTEM IN A SMALL COMUNITY IN ITALY

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Emergency care in Italy, despite all efforts, is still lacking a nationwide organized prehospital care system and, until today, there are only different regional solutions. The majority of these realities imply rather simple ambulance first-aid services without attending emergency physicians and without resuscitation equipment. The emergency medical service (EMS) system in Falconara M., Italy, was implemented in august 1994 by a collaboration between the School of Anesthesiology and Intensive Care of the University of Ancona and the, already existing, volunteer rescuer organisation "Yellow Cross". According to the guidelines pubblished in 1992 [1] the pre-existing equipment of the volunteers was completed with type A ambulances and 1 special equiped motorcar (patient monitor, defibrillator) for ambulance indipendent physician transport. A special data collecting schedule was created to memorise every emergency intervention in a computerised data-base. The in-training members of the School of Anesthesiology and Intensive Care provide 24 hour ready intervention.

In this report the Authors describe their experience concerning primary first-aid medical interventions. For a preliminary evaluation we considered, retrospectively, 300 consecutive emergency interventions in the time period from novembre 1, 1994 to april 30, 1995. The emergency physicians treated 131 male (44 %) and 169 female (56%) patients, 15 patients died before hospital admission and 75 patients (25%) were treated at home by the ambulance indipendent physician and did not need any further medical treatment. In the same time period 1 year earlier (november 1993 to april 1994) without attending physician the volunteer rescuers transferred all 257 first-aid interventions to near-by hospitals.

We conclude that the presence of an attending, indipendently motorised physician in emergency interventions is essential for the establishment of precise priorities and may be helpful to reduce hospital admissions by ambulance intervention, though reducing primary health care costs.

[1] - JAMA 1992, 268:16

LIQUOR FILTRATION IN THE TREATMENT OF SUBARACHNOID BLOODSTROKE

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We have developed the method of liquor filtration which allows to purify the cerebrospinal liquor from blood and its decay products in the subarachnoid bloodstroke. The hemipermeable dialysis membrane was used as a filter, which lets only in water, electrolytes and substances with small molecular weight.

The liquor filtration was used for the treatment of 19 patients with the subarachnoid bloodstrokes of different etiology.

The perfusion of liquor was performed at the rate 3 ml/min in the recirculatory mode. Its duration was 180 - 240 min depending on the bloodstroke intensity. The filtration makes possible the most completely purifying of the hemorragic liquor, the reducing of the content of blood cells and its decay products 80 - 300 times as less.

The monitoring of the patient's state during the perfusion didn't revealed the departure from the norm of the main vital part.

The liquor filtration technique compares favorably with the routine method of cleaning by the absence of toxical effect of heterogenous solutions on the central nervous system.

The filtration of the cerebrospinal liquor in the subarachnoid bloodstroke allows to provide the the early cleaning of liqour, the regression of meningeal syndrome and to improve the patient's state of health.

ESTABLISHMENT AND MANAGEMENT OF REGIONAL MEDICAL FIRST-AID NETWORK

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Objectives: The medical first-aid is the most important task of the public health department. In general, single hospital model couldn't fully, effectively rescue many severe patients who need emergent treatment in the scene. But, establishing the medical first-aid network, the severe patients can be given the most timely and the most scientific emergent treatment. So that, the successful rate of the saving will be greatly increased.

Methods: Our hospital is a general big hospital. Through developing and constructing for more than ten years, the medical first-aid network distributed all over the area under our jurisdiction has been set up. It consists of three units: the medical first-aid unit, center command and management unit, communication and liaison unit. The principle of the network operation is without having to go far to emergency, specialized emergency and the best emergency.

Results: The results of the network operation were notable. Comparing the total successful rate of the saving (91.6%), the successful rate of saving trauma (93.0%), the successful rate of saving shock (98.2%) and the successful rate of cardiopulmonary resuscitation (52.4%) during the three years after the network operated with these before (86.6%), (90.4%), (92.2%) and (40.5%), the successful rates after operating were remarkably higher ($P<0.05$).

Conclusions: The above results showed establishment and management of regional medical first-aid network had very significant action during emergently saving the severe patients. Moreover, the regional medical first-aid network also take an important part in prevention and health protection of the mass.

EFFICACY OF ANTIVENOM THERAPY IN SCORPION ENVENOMATION (SE): A CASE-CONTROL STUDY.

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Objectives: SE related mortality is due to the occurrence of both RV and LV dysfunction evoking cardiogenic shock and pulmonary edema *(F. Abroug, Intensive Care Med 1995; S. Nouira. Chest 1995).* Prospective evaluation of Scorpion antivenon (SAV), the only available specific treatment, is lacking. The aim of this study is to assess the effects of SAV on the basis of a case-control study.

Methods:Among 600 consecutive victims of SE presenting to the emergency department, 135 were managed using SAV (group SAV+). These patients were matched to 135 envenomated patients who did not receive SAV (group SAV-). Matching individual cases was based on age, sex and severity of disease. The latter was assessed according to three severity grades: *Grade I*: local signs; *Grade II*: systemic response to envenomation; *Grade III*: failure of a vital system. Outcome including recovery and mortality rates, duration of stay and incidence of side effects was compared between both groups.

Results: Matching was effective in more than 92% of case-control pairs yielding similar severity in groups. No statistically significant difference was observed in the outcome of both treatment groups (table).

	SAV (+)	SAV (-)
Grade I (%)	85,2	84
Grade II (%)	12,6	13
Grade III (%)	2,2	3
Full recovery	135	134
Death (n)	0	1
Anaphylaxis	3	0
Duration of stay (days)	0,37	0,57

Conclusion: These data don't support the systematic administration of SAV to envenomated patients regardless of disease severity. A prospective evaluation is warranted in severely symptomatic patients.

Incidence of pneumothorax after severe blunt thoracic trauma. Importance of Early CTscan.

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Chest injuries are the cause of death in 25% of trauma fatalities and a major contributing factor in an additional 50%. Pneumothorax is a major complication of chest injuries and can be initially overlooked bringing to additional morbidity and mortality especially in patients who require mechanical ventilation. The real incidence of pneumothorax in severe blunt chest trauma hasn't yet been established, as many pneumothorax can be missed on the initial chest x-ray (CXR) and computed tomography (CT) has not been routinely used.

Objectives: To evaluate the incidence of pneumothorax in patients with severe blunt chest trauma.

Methods: a prospective study. From January 1 1993 to December 31 1994, all trauma patients with one of the followings conditions: fractures of four or more ribs, signs of lung contusion on the initial CXR or presenting a severe hypoxemia on admission ($PaO_2/FiO_2 < 200$) in the absence of pre-existing pathologies, were evaluated by initial CXR and subsequently submitted routinely to a CT.

Results: 52 severe trauma patients were considered. 8 of them, presenting a severe hypoxemia on admission, had no evidence of major chest trauma (AIS<3). Hypoxemia was the consequence of severe trauma in other districts; these patients were therefore excluded. 44 patients with severe thoracic trauma (AIS>=3) were admitted into the study. The mean ISS was 36.2 (16-75). Thirty-six patients required artificial ventilation for at least 24 hours during the ICU stay. Three of them, who had a tension pneumothorax, were submitted to an emergency thoracic decompression on the field by the Emergency Helicopter team. In 7 cases pneumothorax was diagnosed an the initial CXR 14 more patients had a pnx which was identified only on the CT. In 4 cases a large pnx with lung collapse was missed on the CXR.

In our group of severe blunt trauma patients, 54% (24/44) presented a pnx that required the insertion of a thoracic drainage. Only one third (7/21) of the pneumothorax could be recognised on the initial CXR, while other 3 were decompressed before performing the CXR. As many as 58% of the cases of clinically significant pnx were missed on the CXR, and a CT performed soon after admission allowed an early diagnosis bringing to changes in the treatment. (As the patients were mechanically ventilated a chest tube was inserted in all these cases). In 4 cases, the initial CXR overlooked a huge tended pnx which was the cause of hemodynamic instability.

Conclusion: in patients with severe blunt chest trauma even large pnx can be missed on the initial CXR. Moreover due to the non compliant compressible lung, a 20% pneumothorax which can be recognised only on a CT, can bring to high intrapleural pressure altering cardiopulmonary function.

ANALYSIS OF ANAESTHESIA WITH PROPOFOL/KETAMINE FERSUS PROPOFOL/ FENTANYL

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Objectives:This study comared the use of propofol combined with ketamine (an anesthetic agent with intrinsic analgesic properities) or with fentanyl,with partial emphasis on haemodynamic changes during mainteranee and recovery from anaesthesia in both groups of patients.
Methods: Matherial and method:30 adult patients ASA I-II were included in this study. Patients were randomly dieided in two groups. All patients were given 3-5 propofol bolus doses (o,5 mg/kg) for induction of anaesthesia. Anaesthesia was maintained with an infusion 6 mg/kg/h propofol. As additional were given fentanyl (o,2 mg) immediately before laryngoskopy and tracheal intubation followed by repeated bolus of o,1 mg in group 1.Patients in group 2 received ketamine (an initial bolus dose of 35 mg slowly intravenous and 25 mg as infusion over 30 min).Infusions of propofol or propofol with ketamine were stopped 10-15 min before extubation.Arterial blood preassure (sistolic arterial blood preassure-SAP,mean arterial blood preassure-MAP,dyastolic arterial preassure-DAP and heart rate-HR) were measered before induction of anaesthesia 10, 30 and 60 min after tracheal intubation.
Results: Arterial blood preassure was decreases during induction of anaesthesia in both groups,but more in the group who received fentanyl.There was statistically sifnificantly diference during maintanance of anaesthesia. Arterial blood preassure and heart rate were stable in the ketamin group. All thought,the ketamine group had early recovery time.
Conclusions: The combination of propofol with ketamine for induction and maintanance of anaesthesia was vell accepted by patients and could be recomended as an alternative to conventional anaesthesia.

OXYGEN FREE RADICALS PRODUCTION AFTER MULTIPLE TRAUMA INJURY IN A PRE-HOSPITAL SETTING

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Objectives : Evaluate the oxygen free radicals production after multiple trauma injury on the scene and upon admission in the intensive care unit of a teaching hospital.
Methods : From December 1, 1993 to June 1, 1994, all patients enrolled in the study were assessed for catalase, glutathione peroxidase and superoxide dismutase activities, reduced glutathione, malonyldialdehyde, vitamine E and selenium concentrations.
Results : 10 patients were admitted during the study period; there were 7 men, 3 women, aged 25 to 75, only 3 of them survived at the time of discharge; the laboratory findings showed dramatic changes in both free and total vitamine E concentrations, 5.6 mg/l and 6.5 mg/l respectively (normal values above 8 mg/l) as well as selenium concentration in plasma, 52 mcg/l (normal values 60-83 mcg/l). When blood samples were repeated from day 0 to day 4, the drop was more pronounced 24 hours after the trauma (3.1 mg/l, 4.4 mg/l, 51 mcg/l respectively) and was corrected spontaneously on day 3.
Conclusions : In patients with sustained multiple trauma injury, as far as oxygen free radicals production was concerned, no major changes were observed save plasmatic values such as vitamine E or selenium, the results of which could be related to dilution after massive colloïd infusion and fluid administration at the time of early resuscitation. Therefore, this preliminary study does not suggest the need for early supplementation of free radical scavengers even in case of severe haemorrhagic or traumatic shock.

CYTOKINE OR ENDOTOXIN RELEASE AND SPLANCHNIC PERFUSION DURING HEMORRAGIC SHOCK IN MULTIPLE TRAUMA PATIENTS

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Objectives : Assess the relation between cytokine or endotoxin release and indices of splanchnic malperfusion after hemorragic shock in multiple trauma patients.
Methods :The study was approved by the local ethical committee. Trauma patients admitted to the emergency room who met the entrance criteria of more than 1 hour MAP < 60 mmHg or use of vasoactive agents or blood lactates > 5 mmol/l were selected for study. A nasogastric tonometer (Tonometrics, Inc, Plastimed, France) and a Swan Ganz catheter were placed on admission. PHi, lactates, hemodynamics, plasma cytokine and endotoxin concentrations were measured on admission and at 3, 6, 12, 24, 48 hrs. An immunoradiometric assay was used to determine plasma concentrations of IL6 (N<0.03ng/ml) and TNFα (N<5pg/ml). Plasma endotoxin concentrations were measured using a chromogenic limulus assay (N<0.1EU/ml)(1 Endotoxine Unit=100pg).
Results : 9 severe multiple trauma patients (Age = 42±18 yrs, ISS = 40±15, SAPS = 19±2, mean±SD) were studied. They received 15±6 packed red cells during the first 24h. Mean duration of collapsus before inclusion was 5.1±2.9 hrs. Death occurred in 5 patients.

	Ho	H3	H12	H24	H48
Etox	2.25±2.03	1.15±0.94	1.95±2.19	0.87±0.82	0.90±0.81
TNF°	39.8±27.4	43.5±33.9	48.9±29.1	56.3±37.4	44.3±25.7
IL6*	4.30±3.30	4.78±3.35	4.50±3.87	4.51±4.13	1.92±3.15
pHi	7.17±0.21	7.16±0.18	7.12±0.48	7.24±0.18	7.35±0.17
Lact	8.04±2.30	7.92±2.32	7.03±5.98	5.96±4.36	4.54±2.63

*mean±SD, °: pg/ml, *: ng/ml, Etox : endotoxin(EU/ml), Lact: lactate (mmol/l)*

A significant correlation between initial IL6 level and SAPS was observed. In the early post-injury period pHi, SaO2, SvO2, VO2 were significantly associated with IL6 release (p<0.05 at Ho, H3, H6). Later a significant correlation existed between lactates and IL6 (H6, H24). A peak of TNF was detected at 24 and 48 hrs. It was associated with low pHi and low arterial pH of the early post-injury period (p<0.05 at Ho, H3, H6 ,H12, H24) and with high lactate levels of later period (≥H12). Only the late release of endotoxins (H48) was correlated significantly with initial oxygen-delivered parameters.
Conclusion : There was a marked increase in IL6 in the early phase of trauma whereas TNF increased later (24-48 hr). Il6 and TNF release after major trauma with hemorragic shock is associated with splanchnic malperfusion, as assess by the very low values of pHi. Lactates seem to be a later indice.

OVER THE COUNTER PRODUCTS CONTAINING THEOPHYLLINE CAN CAUSE THEOPHYLLINE TOXICITY

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Introduction:
Toxic effects are a well-known complication of an overdosage of prescription theophylline. What is less known is that over-the-counter (OTC) asthma medications contain theophylline, and that in some cases this might cause toxic effects. A case seen by us involved toxic effects from theophylline in an OTC medication and to date is the only published case in the English literature[1]. The rationale for this study was to delineate the OTC products containing theophylline from whatever data sources available.

Methods:
Multiple computer searches via MEDLINE were done. A Freedom of Information Act request was sent to the Food & Drug Administration on adverse reports and reactions associated with the use of theophylline. The American Assoc. of Poison Control Centers was contacted.

Results:
The MEDLINE computer searches failed to reveal any previous reports of toxic effects of theophylline from an OTC medications. The Freedom of Information response from the FDA stated that, since companies that marketed OTC medications are not required to keep a record of adverse effects, there were none reported to the FDA. The American Association of Poison Control Centers recorded 5,735 cases of unintentional theophylline exposure in 1992. These were not coded as OTC vs. prescription, so the incidence of unintentional OTC exposure is unknown. Perusing several pharmacology texts and the Physician's Desk Reference, 15 OTC products contain theophylline in ranges of 45 mg - 177 mg.

Conclusions:
OTC products containing theophylline can cause theophylline toxicity, but no reporting mechanism exists. There are minimal publications documenting this. Information is not readily available on this topic. At least one documented case has been published.

1. Scarpinato L & Purdom D. Arch Fam Med '93;2:1081-1083.

THE VEHICLE FOR HOUSE TREATMENT AND CARE

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ZAVOD ZA ZDRAVSTVENU ZAŠTITU RADNIKA - KRAGUJEVAC
ZASTAVA AUTOMOBILI - KRAGUJEVAC - S.R. - JUGOSLAVIA

House treatment and care is the imperative of the modern medicine in the world, from one side, for taking care of the nation, and from the other, because of the reducing the costs of the Funds for health insurance.

Objectives: Presentation of the ambulance vehicle for giving the house treatment and care, as well as rehabilitation of the patients who needs such kind of treatment as necessary but not as urgent. Up today, such vehicle hasn`t been introduced in the ambulance vehicle range.

Methods: Descriptive and comparative analysis of the medical-technical requirement, collected during questionnaire, in the sense of producing this kind of the vehicle which would be complied with norms YUS-ISO 9000...

Results: This category of the ambulance vehicles is realized with superstructure of the passenger car. The most suitable are the vehicles with smaller dimensions, like "ZASTAVA-YUGO"-45/55 which are reliable and rational for the exploatation and, at the same time, they have very good maneuver capabilities.

- Medical equipment: oxygen device - portable, complete set for the reanimation, EKG apparatus-portable, equipment for the simple operations, bandaging, ampulled remedies, complete set for infusion...
- Adequate space for the patient: there is no patient space in the vehicle, nor the stretcher and in the rear part of the vehicle, there are /with supports/ portable devices, doctor`s and nurse`s bag and the other necessary equipment.

Also, there is accessory seat within the space, in addition to the front seats for driver and medical staff.

Conclusion: We suggest to introduce this vehicle in the ambulance vehicle production range and to prepare appropriate norms.

12. Sedation/Analgesia

COST-BENEFIT RELATION IN PROLONGUED SEDATION WITH MIDAZOLAM vs PROPOFOL

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OBJECTIVE: Suprosing that both drugs are efficient as prolongued action sedatives we tried to test if the different awakening-times justified the costs differences between midazolam (MDZ) and propofol (PPF).

PATIENTS AND METHODOLOGY: On a medical-surgical ICU in the group of patients who required mechanical ventilation (MV), we assigned to 40 patients MDZ and to 40 patients PPF, on a randomized way. Sedation's level was adjusted on physicians indication, considering therapeutical failure levels over 0,5 mg/kg/h of MDZ and over 6 mg/kg/h of PPF. On relation with PPF, tryglicerid levels of 500 mg were considered therapeutical failure (lipids were reduced in parenteral nutrition)

To those patients who were susceptible of extubation, sedation was supressed and the time till extubation was measured. Meanwhile drug-cost and ICU's permanence time costs were calculated in patients with MV.

RESULTS: 40 patients sedated with MDZ at doses of 0,27 mg/kg/h during 149±88h
40 patients sedated with PPF at doses of 3,7 mg/kg/h during 142±79 h.

Table 1: Sedation's outcome

	MDZ (n=40)	PPF (n=40)
Death	11 (27,5%)	10 (25%)
Extubation	22 (55%)	17 (42,5%)
Failure	7 (17,5%)	3 (7,5%)
Failure due to HTG		10 (25%)

On tabla 2: Evolution after sedation's supression in extubation patients. Sedation hours of patients who were extubated.

	MDZ (n=22)	PPF (n=17)	
Sedation's hours	144,0±57,6	140,5±79,2	N S
Awakening hours	52,1±53,2	4,1±4,2	p<0,001
Weaning's hours	48,5±30,6	29,0±38,2	p<0,05

One hour of ICU stay costs: 7.025 pts (54 USD, 130 pts=1 USD). The cost of sedation of 40 patients during 149 hours with MDZ was 1.841.241 pts (14.163 USD), the cost of sedation of 40 patients with PPF was 5.362.080 pts (41.246 USD). Sedation with PPF was 3.520.800 pts more expansive, 88.620 pts/patient (677 USD). Echonomical benefit of reducing the permanence 67 h to the 17 patients who were extubated was= 67x17x7.025 pts=8.001.475 pts, this value divided between the 40 patients (including death and fracase), offers a benefit of 200.036 pts/patients (1.538 USD) if we take up this value from the cost-excess of the drug it offers a benefit of 861 USD/patient.

CONCLUSSIONS: Sedation with PPF supposes a triplication of the costs of sedation with MDZ; but the reduction of ICU admission's time of 63 hours in those sedated with PPF vs MDZ supposes a global benefit of 861 USD/patient.

HAEMODYNAMIC EFFECTS OF ANAESTHETICS IN HYPERTHERMIC RATS

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Objectives: Hyperthermia frequently occurs in intensive care treated patients and intentional application of whole body hyperthermia together with chemotherapy is a therapeutical access to treatment of malignant disorders. Anaesthetic support is required in either condition. Due to the marked decrease in systemic vascular resistance seen in hyperthermia an additional vasodilatory effect of the anaesthetic is unwanted. The vascular effects of anaesthetics in hypertherm organisms is not known in detail. Therefore, we performed an experimental study to detect the effects of inhalational anaesthetics in whole body hyperthermia.

Methods: In 30 Sprague-Dawley-rats katheters were inserted into trachea, jugular vein, and carotid artery. For continuous monitoring of cardiac output a flow probe was placed around the aortic arch. The rats were mechanically ventilated with different concentrations of inhalational agents in oxygen. We compared the effects of enflurane, isoflurane, and halothane in stepwise increased body temperature by submerging in a temperature controlled water bath.

Results: Isoflurane lowers arterial pressure more than halothane or enflurane. The inhalational anaesthetics lower the cardiac output similarily and independently of temperature. Isoflurane decreases systemic vascular resistance independently of core temperature and the decreasing effect of halothane on the resistance is completely abolished in hyperthermia.

Conclusions: The influence of hyperthermia on the systemic vascular resistance is dangerous. This allows no additional effect of the anaesthetic management. In spite of the vasodilating effect of inhalational agents in normotherm subjects, this effect is abolished in hypertherms using halothane. The condition of management of analgosedation in hyperthermia is different from normothermia.

CEREBRAL FUNCTION MONITORING ACCURATELY ASSESSES RESPONSE TO SEDATION DURING THERAPEUTIC NEUROMUSCULAR BLOCKADE

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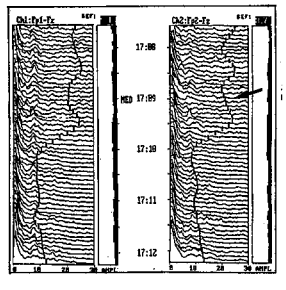
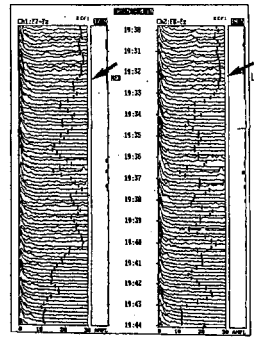
Objectives: To evaluate a bedside computer processed cerebral function monitor for assessment of brain wave activity when clinical/visual clues are not present.

Methods: Ten ICU patients undergoing neuromuscular blockade monitored with the Aspect 1000 brain wave monitor from January 1 to June 1, 1995.

Results: Time to onset and depth of sedation were readily apparent to ICU physicians not specifically trained in EEG reading. 2 mg Midazolam given in IV bolus produced tracings compatible with sedation in under two minutes (left fig). Injection of 2 mg lorazepam IV bolus produced tracings c/w sedation after 12 minutes (right fig). During sedation, neurologic response to painful stimuli could be assessed by brain wave activity even when patient was paralyzed.

Conclusions: For therapeutically paralyzed or obtunded patients, computer processed cerebral function monitors accurately display brain wave function without significant artifact. Depth of sedation and response to external stimulation can be assessed when clinical clues are not present.





NEUROMUSCULAR BLOCKADE DOES NOT REDUCE OXYGEN CONSUMPTION IN SEDATED, APNOEIC PATIENTS

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Objectives: To determine whether non-depolarising neuromuscular blockade reduces oxygen consumption (VO_2) in sedated, apnoeic patients.

Methods: Haemodynamic, metabolic and oxygen transport variables were determined in 5 sedated, apnoeic patients with severe acute lung injury. All patients were ventilated using a Puritan-Bennett 7200ae ventilator with integrated 7250 metabolic monitor. Inclusion criteria were; 1) stable cardio-respiratory status; 2) systemic and pulmonary artery catheters already in situ; 3) inspired oxygen < 80%. Patients were sedated with midazolam or propofol to abolish response to verbal stimuli, and sufficient morphine or alfentanil to abolish all spontaneous respiratory efforts. Following baseline measurements, neuromuscular blockade was induced with intravenous vecuronium, 150 ug/kg, followed by an infusion of 80 ug/kg/h to maintain the train-of-four ratio at 0. A further four sets of measured and calculated variables were obtained at 20 min intervals.

Results: Statistical analysis was by repeated measures ANOVA. There were no significant changes in any variable over time. The changes in calculated oxygen consumption (VO_{2FICK}), and measured oxygen consumption (VO_{2GAS}), and in energy expenditure (EE), are shown in the table.

Table : Effect of neuromuscular blockade on calculated and measured VO_2 and energy expenditure. Data are means (standard deviation).

Time (min)	-20	0	20	40	60	80
VO_{2FICK} (ml/min/m^2)	312 (97)	299 (82)	292 (92)	299 (78)	309 (109)	317 (113)
VO_{2GAS} (ml/min/m^2)	295 (63)	290 (68)	289 (66)	284 (58)	287 (71)	290 (64)
EE (kcal/day)	2065 (451)	2030 (474)	2027 (463)	1995 (412)	2012 (487)	2033 (455)

Conclusion: These results suggest that in patients sedated to the point of abolition of spontaneous respiratory effort, attempts to reduce VO_2 by neuromuscular blockade will not be of benefit.

EFFECTS OF PROPOFOL ON CARDIOVASCULAR DYNAMICS AND CORONARY BLOOD FLOW IN THE POSTOPERATIVE PERIOD OF PATIENTS UNDERGOING CARDIAC SURGERY

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Objetive: To study the effects on coronary hemodynamics and myocardial metabolism of administering propofol during postoperation sedation of patients with normal coronary circulation and good ventricular function undergoing cardiac surgery.
Patients and methods: 18 patients (12 women and 6 men) undergoing aortic and/or mitral valvular cardiac surgery were selected, with an ejection fraction greater than 0.5 and normal coronary circulation. For postoperation sedation propofol was administered in 0.5 mg/kg i.v. bolus, followed by a 2.2 mg/kg/h perfusion. All data were registered before administering propofol and after 20 minutes, the patients being hemodynamically stable and a rectal temperature of 34 ± 0.5 °C. Systemic and pulmonary hemodynamics, and global, as well as regional myocardial blood flow, and metabolic variables were measured.
Results: The patients studied were about 56 years old, and the average period of aortic cross-clamp was 77.50 min. The adminstering of propofol caused a decrease in the coronary blood flow (-9%), great coronary vein flow (-23%), myocardial oxygen consumption (-14%), regional myocardial oxygen consumption (-11%), myocardial oxygen extraction (-6%), regional myocardial ooxygen extraction (-10%), while coronary vascular resistances and global coronary vascular resistances did not change. Oxygen saturation increased in the coronary sinus (+16%) as well as in the great cardiac vein (+32%). In no patient were significant changes suggestive of myocardial ischemia objectified. There was also found a decrease in systolic (-23%), diastolic (-20%) and mean (-25%) arterial pressure, systemic vascular resistance (-20%), and cardiac output (-8%).
Conclusions: In accordance with the clinical conditions of this study, the administering of propofol is not likely to cause changes in coronary autoregulation, oxygenation and myocardial metabolism.

EFFECTS OF ISOFLURANE ON CORONARY HEMODYNAMICA AND MYOCARDIAL METABOLISM IN THE POSTOPERATIVE PERIOD OF PATIENTS UNDERGOING CARDIAC SURGERY

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Objetive: Analyse the effects of 0.4% "end tidal" isoflurane (sedative dosage) on the metabolism and coronary hemodynamics during the postoperation period of patients undergoing cardiac surgery.
Patients and methods: 16 patients (12 women and 4 men) undergoing aortic and/or mitral valvular cardiac surgery, with an ejection fraction greater than 0.5 and normal coronary anatomy, were selected. After the surgical operation, 0.4 "end tidal" isoflurane was administered for postoperation sedation. The determination of variables to be studied was carried out before and 20 minutes after administering isoflurane, the patients being hemodynamically stable and a rectal temperature of 34 ± 0.5 °C. Systemic and pulmonary hemodynamics, and global, as well as regional myocardial blood flow, and metabolic variables were measured.
Results: The average age of the patients studied was 57 83 ± 8.87 years. During surgical operation the period of aortic cross-clamp was 78.56 ± 32.09 min. The administering of isoflurane was followed by a statistically significant drop in coronary perfusion pressure (-26%), coronary vascular resistance (-29%), regional coronary vascular resistance (-20 %), regional myocardial oxygen consumption (-7%), regional myocardial oxygen extraction (-6%) and accompanied by a significant rise in oxygen saturation in the coronary sinus (+16%) and in the great cardiac vein (+32%). Myocardial oxygen consumption, myocardial extraction of lactate and regional myocardial lactate extraction did not change. In no patient were enzyme or electrocardiograph changes objectified. Systolic (-23%), diastolic (-25%), mean (-25%) arterial pressure, and systemic vascular resistances (-28%) decreased, while cardiac output did not.
Discussion: The administering of 0.4% "end tidal" isoflurane, in the clinical conditions of this study, produced a decrease in systemic arterial pressure due to a reduction of systemic vascular resistance without deteriorate cardiac output. At coronary circulation level, has and effect on coronary autoregulation but had no effect on oxygenation and myocardial metabolism.

"Using of adrenergetic during TIVA."

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The idea of TIVA implies the realisation of major anesthesia components (los of consciousness, neurovegetative inhibition, analgesia, myorelaxation, providing the adequate gas-exchange) through i.v. introduction of drugs exclusively.

Aim: Providing for the main TIVA components with minimal side effects of the drugs used, taking into consideration the patients characteristics and the surgery specific character.

Methods: 78 anaesthesias have been conducted in patients aged 15–75 years (28 females, 50 males), undergoing planned and urgent operations with the pathology of lower, extremities, perinaeum, small pelvis, hypogastrium and with reserved spontaneus respiration against a background of 100 % O2 insufflation through mask. Operations lasted from 0.5–1.5 h. Anaesthesia adequacy was assested by constant monitoring: "CARDIOCAP" (NIBP, HR, RR, SaO2, T), through glykhaemia level and mimicry reactions. Standart premedication of M-cholinolytics (0.01 mg/kg) and H2-blockers (0.3 mg/kg) on the operational table was sumplemented by administration of 0.5–1.0 mg/kg of Lidocaine, 1.5–3.0 mkg/kg of Clonidine, 0.5–1.0 mg/kg of Pentamidine by the tachifilaxia method. The premedication adequacy was assessed through haemodynamics characteristics. Sedation: 0.05–0.1 mg/kg of Droperidol, 0.1–0.15 mg/kg of Diazepam and analgesia: 2–3 mkg/kg of Phentanyl, 1.0–1.5 mg/kg of Ketamine were introduced fractionally according to indications. Infusion rate of Ringer-Lactat solution was 5–15 ml/kg/h and depended on the intraoperational blood loss volume and on the patients preoperational condition. The duration of postoperative analgesia was registered.

Results: Clinical assessment of analgesia according to this techniques allowed to decrease the analgetics dosage to the subanaesthetic levels. Smooth stabilisation of haemodynamics (BP) at proper age norms in patients with the initial hypertension by the 30-th min. of anaesthesia as well as the absence of its increase in response to the additional introduction of anaesthetic have been achieved. (HR) had no abrupt changes and remained in the range of 70–80 per min. Adequate external breathing: decrease (RR) by 2–3 per min., with SaO2 increase from 94–96 % to 98–100 %. Hypoventilation was avoided by respirate ventilator. According to unauthentic data the glykhaemia level had been lowered by 10–15 % to the end of the operation with the initial moderate hyperglykhaemia of up to 10 mmol/l. The cutaneous covering grew warm and got pink colouring. No mimicry reactions. In the postoperative period patients were in the superficial sleep state (3–48) and analgesia lasted 6–8 h. There were no complications due to anaesthesia.

Conclusion: Combined using of BZ, opiates, neuroleptics potentiate the i.v. anaesthetics effects allowing lowering of each TIVA component dosage and, as a consequence avoiding their negative influence on respiratory and heart vascular systems. Complex application of adrenergetics (therapeutic doses of Clonidine and Pentamini with using of tachfilaxy effects) permitted to provide for analgetic and neurovegetative components of general anaesthesia under subanaesthetic doses of TIVA main components, and manifestation of hyperdynamic reactions of haemodynamics decreased while using of Lidocaine – the economical activity of heart – vascular system. Good level of muscle relaxation was achieved allowing for widening of surgical intervention extent without respirator ventilators and inhalation anaesthetics application. Anaesthesia is easily controlled due to fractional introduction of drugs with quick recovery of CNS functions after anaesthesia. Postanaesthetic analgesia is increased while concurrent opiates doses are decreased. Absence of marced haemodynamic, endocrine and metabolic reactions during the operation and after it resulted in shortening the period of patients staying in hospital.

HALOPERIDOL, TRAZODONE AND TORSADES DE POINTES

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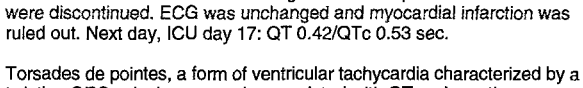
A 64 yo white man was admitted to hospital for dyspnea and a productive cough. He had CABG in past, but no recent cardiac ischemia. Physical exam: decreased breath sounds over right lung. Chest XRay: consolidation of right lung. Admission medications included diltiazem, furosemide (both were continued) and trazodone (which was discontinued). Admission ECG: sinus rhythm, QT 0.44/QTc 0.49 sec, with ST and T wave abnormalities similar to prior tracings. He required intubation and mechanical ventilation for progressive hypoventilation and hypoxemia. Between ICU days 8 and 16 he received haloperidol, 10–44 mg/d (cumulative dose 209 mg) for agitation and delirium. ICU day 11: QT 0.46/QTc 0.57 sec. ICU day 12: for better control of delirium, trazodone 50 mg q hs was added. ICU day 15: he developed frequent non-sustained ventricular ectopy . ICU day 16: QT 0.70/QTc 0.74 sec, pHa 7.48, $PaCO_2$ 50 mm Hg, PaO_2 72 mm Hg, K 4.9 mEq/L, Mg 2.0 mEq/L.



Later in ICU day 16 the patient had 3 brief episodes of torsades de pointes, each responding to precordial thump, and finally rhythm stabilized with i.v. lidocaine and magnesium. Haloperidol and trazodone were discontinued. ECG was unchanged and myocardial infarction was ruled out. Next day, ICU day 17: QT 0.42/QTc 0.53 sec.

Torsades de pointes, a form of ventricular tachycardia characterized by a twisting QRS axis, is commonly associated with QT prolongation. Haloperidol is used frequently in ICU for control of agitation and delirium, with reported doses up to 1000 mg/day. Over past decade, 9 cases of torsades de pointes with prolonged QT related to haloperidol have been reported. Trazodone may also prolong QT and cause ventricular arrhythmias, especially in patients with pre-existing cardiac disease. In this patient, trazodone likely exacerbated QT prolongation from haloperidol leading to torsades de pointes. Critical care physicians must be aware of this interaction. It is imperative to follow the QT interval for patients receiving haloperidol, especially when another drug also known to prolong QT is added. One must consider discontinuing the drug when QT/QTc becomes prolonged.

Propofol v. Midazolam in sedation of critically ill patients. The Multicenter Randomized Study.

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MATERIAL
62 patients 18 women, 44 men, average age 56 years, range 28-77, ASA I-III have been studied. The patients after elective surgical procedures were admitted to the ICU and mechanically ventilated due to: postoperative respiratory failure, hypovolemia or hypothermia. The patients with severe cardiac, respiratory, neurological and metabolic diseases have been excluded from the study.

METHODS
The study was run using GCP protocol and accepted by Ethical Committee.
After admission APACHE II Score was assessed. Patients were randomly allocated into 2 groups and 28 of them were sedated with midazolam and 34 with propofol. Both drugs were continuously infused. The level of sedation was evaluated every hour using Ramsey Sedation Scale. When sedation was stopped the patients recovery time was recorded.
During the study several parameters: blood pressure, central venous pressure, pulse rate, rectal temperature, oxygen saturation, respiratory rate, tidal volume, minute volume, blood gas analysis were measured.

RESULTS.
The study was completed in 60 patients. In every patient satisfactory level of sedation was observed, 3-5 points in Ramsay scale. Patients sedated with propofol needs deeper sedation level of 4-5 points. In midazolam group adequate sedation was achieved with 3-4 points in Ramsey Scale. Recovery time was significantly over 20 percent shorter in the propofol group than in midazolam group. Only in 1 patient from propofol group recovery time was significantly longer probably due to profound hypothermia and large dose of opioids given during operation.
In several patients of midazolam group, who received large dose of the drug, recovery time after extubation was prolonged up to 10 hours.

CONCLUSIONS
Both propofol and midazolam provide safe satisfactory sedation during mechanical ventilation.
Prolonged recovery time after sedation with midazolam produced longer stay of these patients in ICU.

INHIBITION OF LEUKOCYTE MIGRATION BY ANALGESICS AND ANESTHETICS IS MAINLY MEDIATED BY ENDOTHELIAL CELLS

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Department of Anesthesiology and General Intensive Care Medicine (B), University of Vienna, Austria

Objectives: Analgesics and intravenous anesthetic drugs are routinely used in critically ill patients, who often suffer from a secondary impairment of the immune system. Previous in vitro studies have demonstrated inhibitory effects of these drugs on polymorpho nuclear cells (PMN). The potentially important role of endothelial cells (EC), however, was not investigated, since suitable test systems were not available until recently. Therefore a physiologically more relevant in vitro migration assay through cultured human endothelial cell monolayers (ECM) we established. Using this assay system, the comparative effects of fentanyl, sufentanil, propofol and the known PMN inhibitor thiopental were tested.

Methods: Human umbilical vein endothelial cells (HUVEC) were isolated and cultured on microporous membranes (Cyclopore™) until an ECM was grown. PMN from male and female volunteers were separated by standard procedures. ECM and PMN were preincubated with clinically relevant concentrations of thiopental (10^{-5} M), propofol (4µg/ml), the solvent of propofol (intralipid), fentanyl (30ng/ml) and sufentanil (5ng/ml). After preincubation (ECM 30 minutes, PMN 15 minutes) with the respective drug, leukocyte migration towards the chemoattractant FMLP (10^{-7} M) was measured in a two chamber 24 well system for 3 hours. The migration rate of untreated (untr.) and treated (treat.) PMN through untreated and treated ECM were determined. As a control untreated PMN and untreated ECM were used. Results are given as means from 5 independent duplicate determinations and expressed as a percentage of control (Table). Statistical analysis was done with Student's *t*- test.

Results: Clinical concentrations of fentanyl, sufentanil and propofol showed similar inhibitory effects as the known PMN inhibitor thiopental (Table 1). Tab. 1:

	thiopental	propofol	intralipid	fentanyl	sufentanil
untr. PMN-treat. ECM	88%	94%	n.d.	89%	90%
treat. PMN-untr. ECM	80%	80%	n.d.	81%	85%
treat. PMN-treat. ECM	67%	73%	98%	74%	77%

Conclusions: For the first time we could show that analgesics and anesthetics exert their inhibitory effects not only on PMN, but mainly on the interaction of PMN with endothelial cells. Moreover, we could show a significant suppressive effect of the opioids fentanyl and sufentanil on both EC and PMN. The known inhibitory effect of thiopental obtained in EC- free test systems were also confirmed in our physiologically more relevant assay system.

SEDATION IN INTENSIVE CARE UNITS: RESULTS FROM GIVITI

Melotti R., Romano P, Michetti V., Albonico L., Leonetti C., Cattaneo A. and Apolone G. on behalf of GiViTI investigators.
GiViTI (Gruppo italiano per la Valutazione degli interventi in Terapia Intensiva).
Coordinating Center: Istituto "Mario Negri" - via Eritrea 62, 20157 Milano, Italy

Objectives: to investigate when and how sedation is used in a consecutive cohort of patients admitted in a large sample of Italian intensive care units (ICUs), gathered in a network named GiViTI, representative of the Italian ICUs system.
Methods: the study called for a recruitment period of one month, from January 10 to February 8, 1994. Data collection included age and other demographic variables, acute diagnostic broad profiles, severity of illness scores, treatments, lenght of stay and vital status at ICU discharge.
As concerned sedation, each patient was observed until discharge or for a maximum period of seven days. Information on all the drugs used for analgesia/sedation, the route and modalities of administration, the timing, dosages and purpose of the administration have been recorded.
Results: the study involved the cooperation of 138 ICUs, 128 of which enrolled at least one case. The total sample included 2932 patients. Overall, 60.7% of patients analyzed (1780/2932) received at least one prescription of sedative during their stay. Globally, at least one sedative drug was prescribed to these 1780 patients in 5014 days in ICU.
Although over 38 drugs were reported to be used, 10 pharmacological principles accounted alone for 89% of all prescriptions. Opioids were actually used in 33% of prescriptions; Propofol in 24% and Benzodiazepine in 18.3%. As regards the way of administration, intravenous administration was applied in 74% of cases and, followed by intramuscolar in 17.3%.
Moreover, non-steroidal anti-inflammatory drugs (NSAID) were used in 19% of patients and neuromuscular blockade agents (NMBA) in 23%.
Detailed analysis on certain subgroups (surgical, trauma, ventilated patients etc.) have been also carried out in order to describe the practice of sedation in these peculiar subgroups. Findings will be widely discussed during the presentation.
Conclusions: These results should be interpreted keeping in mind how peculiar is the intensive care setting compared to many other less complex settings of hospital care. In conclusion we thought it was important to present the data currently available in the most neutral form, to start moving in a direction which will enable us - by means of more specific and detailed studies, and with the cooperation and involvement of all those participating in the project - to shed light on one of the many aspects of medical practice in the field of intensive care which deserve closer attention.

"ANAESTHESIA WINDOW" EFFECT: PERMANENT ICU EXIT FOR THE AGED AFTER CARDIAC SURGERY

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Introduction: The aged run perilously high risks in cardiac surgery: among others, of haemodynamic fluctuations, respiratory depression and organ failure. Response to anaesthetics is a crucial determinant for post-operative complications, none the less being reintubation due to mechanical ventilation difficulties which increase morbidity, mortality and Intensive Care Unit (ICU) stay. **Objective**: We wanted to assess our *anaesthesia window* (selection, and a view of the induction - extubation period) for predicting safe and swift awaking, thus: ICU dismissal for the aged. **Methods**: In 1994, 162 selected patients (pts) (>70y, 62f) followed a regular elective cardiac surgery protocol (Propofol given at precisely designated time intervals). Upon ICU arrival, they were subjected to an admission protocol. Our predictive criteria for early extubation at 8h included: a) alertness and ready response to commands; b) adequate gag reflex and sufficient protection for respiratory tract; c) PaO_2 >75 mmHg with FiO_2 <0.4; d) stable pH>7.35 with spontaneous respiration; d) stable haemodynamics without dysrhythmias; e) adequate perfusion and diuresis (>1.0 mL/kg/h); f) mediastinal bleeding<100mL/h for at least 2h; g) normothermia (core temp>36°C and no shivering). Subsequent reintubation was for: 1) RR>35/min; 2) spontaneous ventilation for 30 min with $PaCO_2$>50 mmHg; 3) PaO_2<50 mmHg with FiO_2>0.4; 4) pH>7.45; 5) heart rate>120 bm; and/or 6) non mental alertness; and 7) other medical disorders, after which adequate weaning therapy was necessary. Then, successful weaning after 24h was considered: 1) spontaneous breathing without any form of mechanical assistance; 2) stability in haemodynamics; and 3) elimination of fever threat. **Results**: 122 pts (75%) were extubated at 8h without complication; 29 other pts (18%) at 8h but had to be reintubated because they were hypoxic and began weaning therapy; finally, they were all re-extubated by 48h. Only 11 pts (7%) proved problematic. **Conclusion**: *Anaesthesia window* options (selection, extubation, reintubation and weaning) predicted quick (times Propofol administration) and safe (rigid criteria) extubation (75%=8h and 18%=24h), exempting pts with developed post-operative complications (7%=extubation<72h) unrelated to *anaesthesia window* or ICU protocol. Dismissal and recovery then became an abbreviated question of time.

PAIN CONTROL:OUR EXPERIENCE WITH BUPRENORPHYNE IV AND ELECTRONIC SYSTEM FOR PCA

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OBJECTIVES:From august 1992 we have available the Electronic Infuser System for postoperative analgesia; crossing the first distrust in the surgical ward, we needed of a period of time to find the best way to use it. The choosen drug is Buprenorphyne Hydrocloride; now we make know our experience with this device.

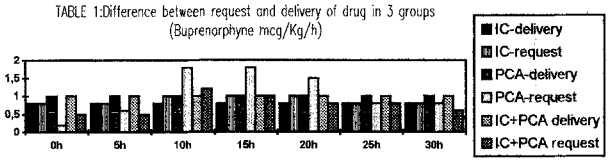
METHODS:We have selected three groups of patients, 35% females and 74% males, similar with respect to age, weight, ASA-class I-III,not-emergency hospital in-patients,informed and consenting, undergone to Abdominal Oncologic and Thoracic surgical operation with standardized general anaesthesia. The mean duration of surgical operation was 5 hours. The analgesia protocol foreseen preoperative bolus cv of Buprenorphyne (1,5 - 2 mcg/Kg) 15' minute before the induction of anaesthesia and the use of Electronic Infuser System (Abbott Life Care 4200 or Graseby 3300) in the ward with three different mode of drug administration: continous infusion (35 pts) [IC:0,8 mcg/kg/h], PCA (35 pts) [1 mcg/kg/h in 6 PCA bolus/h], IC [0.5 mcg/kg/h]+PCA [0,5 mcg/kg/h] (80 pts). The mean dosage of drug was 0.8 mcg/Kg/h (range:0.5-1 mcg/Kg/h depending on the ASA). The mean duration of postoperative traitment was 30hs (range:24-48).

The following antalgic traitment foreseen the administration of oppiate at demand of patients in the abdominal surgery and the cv infusion of Ketorolac Trometamine (3,7 mg/h) in the thoracic surgery.

RESULTS:The patient's evaluation judged analgesia mostly good to excellent: 66% of the patients were very satisfied; 20% referred the complete absence of pain (all pts IC+PCA). No patient complain of uncontrolled acute pain, nobody needed adgiunctive drug , nobody say to be unsatisfied with the method; VAS-values obtained were <2 at rest and during mouvement; no differences in the evaluation obtained from the nurses; no serious side-effects.

Medical evaluation of clinic data and the analysis of data recorded from Infuser System point out that we obtained the best likeness of drug's request and setting of device in the group with association of continous rate of half dose for 24h + PCA and just PCA in the second day (Table1) .

TABLE 1:Difference between request and delivery of drug in 3 groups (Buprenorphyne mcg/Kg/h)



CONCLUSIONS:Using Buprenorphine, a synthetic,long-acting, ago-antagonist opioid drug as analgesic, in the major Surgery we obtained the best clinic results with association of continous infusion of half dose drug with bolus of PCA in the first 15-20 hours and just PCA in the second day after surgery when the patient is less sleepy. In this way we dont have a great saving of suppled drug but the major well-being of patient without serious side-effects and quick mobilization; the dosage used don't compromise a good awake of patient: all patients are sleepy but ready for answer, no allucination, bradipnea but not less than 10 b/m without ipoxia. Also the patient preffered this kind of traitment than the traditional at demand. The ward staff feel it usefull and reliable. The negative feed-back technology of the Electronic Infuser System makes possible to use it safe in the ward with high drug's concentration too.

The infusion rate of low dose of drug assure a continuative analgesic covering in the first postoperative period; the PCA mode involves the patient him-self in the management of therapy and enables him to choose the best way to confront the difficulty of postoperative period without call medical staff. Using PCA-device we have had no problem, no accident.

ANALGESIA DURING EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY

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Objectives: Our task was to compare the analgetic effect of Norphin and Tramal.

Methods: Study was made of two groups of urolithic patients aged 23-61. Group A (23 patients) received buprenorphine hydrochloride (Norphin) at dosages of 4.52±0.25 mg/kg. Group B (30 patients) received tramadol hydrochloride (Tramal) at dosages of 1.50±0.38 mg/kg. Before the procedure diazepam was administrated i.v. (0.24±0.03 mg/kg). Blood saturation (SpO_2), hemodynamics incides (BP, HR,SV,CO,SAP,SVR) were examined and the patients' subjective assessments of anaesthesia quality were analyzed. The Hospital Ethics Committee approved the investigation.

Results: When using Norphin HR increased by 17.7% on the onset of the procedure while SAP and SV decreased by 8.4% and 9.6%, respectively ($p<0.05$). However, there were no reliable CO changes. SpO_2 reduced by 4.2% ($p<0.05$) and remained lower than the initial one after the procedure was over. When administrating Tramal 30 min. after starting the procedure SAP and SVR increased by 11.2% and 7.3% respectively. SV and CO decreased insignificantly. Nine patients in Group B suffering some discomfort needed additional Tramal injection. In the course of the whole procedure SpO_2 was constant and was higher than that in the case of Norphin ($p<0.05$).

Conclusion: Respiratory suppression by Norphin can limit its use in case of lithotripsy while the advantages of Tramal are: lack of dyspnoe and good contact with the patient.

EPIDURAL VERSUS INTRAMASCULAR ANALGESIA AFTER UPPER ABDOMINAL SURGERY IN PATIENTS WITH CHRONIC OBSTRACTIVE PULMONARY DISEASE. COMPARATIVE STUDY

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The aim of the present study was to evaluate the influence of Postoperative Analgesia (Post-O-A) on lung function in patients (pts) with Chronic Obstractive Pulmonary Disease (COPD), undergoing upper abdominal surgery. 28 pts, age 70.25±5.9 with COPD were divided in two groups of 14 pts each,according to the type of post-O-A. In group A, Epidural morphine in doses of 2-4 mg was given on demand. In group B, post-O-A was achieved with intramascular pethidine 1 mg/kg every 6h.In both groups FVC, FEV_1 and arterial blood gases were evaluated pre-O and the 2nd day post-O.Pre-O and post-O changes were analyzed by using the paired-t test while the comparison between groups was made with the student's t-test. Results (mean values of difference) were as follows:

	FVC	FEV_1	PO_2	PCO_2
A	24.60	17.82	14.07	-1.07
B	36.21	27.50	17.84	-0.96
p	p<0.03	p<0.03	p:N.S	p:N.S

(FVC and FEV_1 are expressed as % of the predicted values and PO_2, PCO_2 in mmHg). FVC,FEV_1 and PO_2 were significantly depressed in both groups post-O ($p<0.001$). In group A depression of FVC and FEC_1 were significantly lower than that in group B ($p<0.03$). There was no significant difference in PO_2 among groups of pts.

Conclusion: Epidural post-O-A, after upper abdominal surgery in pts with COPD affects more favorably lung function, compared with other types of post-O-A.

AN OPEN PHARMACOKINETIC STUDY OF PROPOFOL INFUSION IN THE SEDATION OF PATIENTS FOLLOWING ORTHOTOPIC LIVER TRANSPLANTATION (OLT).

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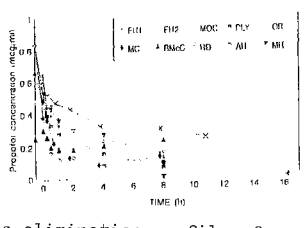
Objective: To evaluate the efficacy of propofol used to provide post-operative sedation in patients following OLT.

Type & No. of patients: 10 patients

Measurements: Mean infusion rate, Ramsey sedation score(RSS), serum propofol levels at intervals following termination of the infusion.

RESULTS: Mean infusion rate 1.57 mg/kg/hr (SD 0.6). Sedation scores were exactly as desired 68.2% (SD 27) of infusion time. RSS of 2-5 was achieved 97.35% (SD 3.93).

Figure 1



Discussion: The elimination profile of propofol in patients following OLT shows no difference from that seen in patients with normal liver function (ref 1). Normal elimination pharmacokinetics and high level of achievment of desired RSS confirms Propofol as a useful agent for sedation following OLT.

Ref; Crockshott ID et al. Eur J Anaesth 1990; 7: 265-275

THE ROLE OF SOMATOSTATIN (STILAMIN) IN THE TREATMENT OF UNTOLERABLE PAIN

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INTRODUCTION:

The role of uncommon agents of antinociception, placed epidurally, in the control of pain transmission in the spinal cord is well documented. Somatostatin as an inhibitory agent is found in the dorsal horn of the gray matter of spinal cord. The effects of somatostatin is similar to the opiates if injected into the epidural space (Ref. 1, 2, 3,4).

PATIENTS AND METHODS:

The aim of the present study is to present the clinical effect of above mentioned palliative therapy in the case of cancer and non cancer pain. Informed consent had been obtained from every patient before treatment was initiated under the legalisation of the local ethics committee. Using the permanent epidural catheter and continuous infusion pump, we administer somatostatin in the dose of 5 up to 20 microgram per hour for one up to three days. The patients pain feeling was evaluated using a VAS (visual analogue scale).

CONCLUSION:

We found that the opiate resistant pain level decreased by 50%. The rest pain could be controlled by peroral opiate analgetics or by combination of somatostatin and an opiate plus a local anaesthetic agent epidurally. Theoretically, it seems that epidural administration of somatostatin and local anaesthetic agent is useful in the control of acute pancreatic pain and systemic effect of somatostatin is beneficial in the treatment of acute pancreatitis.

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PHARMACOKINETICS OF I.V. INFUSION OF MIDAZOLAM IN CRITICALLY ILL PATIENTS: CLASSIFICATION ACCORDING TO HEPATIC METABOLIC FUNCTION

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Few studies have been performed in the critically ill (CI) and because of the complex pharmacodynamic and pharmacokinetic changes that occur, it is difficult to predict accurately drug responses and interactions in individual patients. Midazolam (M) is a water-soluble benzodiazepine with a rapid onset and short duration of action in normal individuals; however its metabolism is decreased in the CI. Critical care physicians every day experience suggest that among the CI there is a different pattern of response to M; here it is hypothized that such a response could be due to different metabolic behaviours of CI.

M (i.v.infusion rate 1-7 mg/h) and antipyrine (1000mg p.o.) were infused to CI with (10 patients - group 1) and without (10 patients - group 2) endotracheal intubation. Blood samples were collected at fixed times during and after M infusion. Total urine nitrogen and antipyrine elimination half-life demonstrated different metabolic characteristics in group 1 ("hypermetabolizer") as compared to group 2 ("hypometabolizer").

Results follow.

	Midazolam		Antipyrine
	dose normalized plasma concentration	elimination half-life	elimination half-life
Group 1	28 ng/ml	4.2 h	16.0 h
Group 2	57 ng/ml	7.1 h	22.4 h
Healthy volunteers	51 ng/ml	2.3 h	13.0 h

The results of our study are preliminary and more kinetic data in critically ill patients are needed to statistically confirm our approach of "hypometabolizer" and "hypermetabolizer".

Calcium chloride preserves myocardial contractility after induction of anesthesia with propofol

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Objectives: Some clinical and experimental studies suggest that propofol decreases myocardial contractility in coronary artery bypass grafting (CABG) patients.

The intrinsic negative inotropic action of the drug may be independent from changes of preload and afterload, whereas the myocardial depression induced by propofol may depend on changes in Ca^{++} ious availability. Aim of this study was to verify the hemodynamic effects of propofol in a group of CABG patients with uncompromised contractile function and to minimize myocardial depression, during induction of anesthesia, choosing to associate calcium chloride ($CaCl_2$) in an other group and to define its role in producing this effect.

Methods: Fourty patients, randomly divided in two groups (20 pts A and 20 pts B), undergone elective CABG, were enrolled in this study. Anesthesia was induced by senior anesthetist in both groups by means of fentanyl 7 $mg \times kg^{-1}$ in 60″, pancuronium 0.1 $mg \times kg^{-1}$ and propofol 2 $mg \times kg^{-1}$ in 60″. A blind investigator administered via another venous way at same speed (60″) saline in patients of group A and 10 $mg \times kg^{-1}$ $CaCl_2$ in patients of group B.

Hemodynamic data (heart rate HR, mean arterial pressure MAP, mean pulmonary artery pressure PAP, pulmonary capillary wedge pressure PCWP, central venous pressure CVP, cardiac index CI, stroke volume index SVI, systemic and pulmonary vascular resistances indexed SVRI and PVRI) were obtained at baseline (T0), 2′ after anesthesia induction (T1) and 2′ after tracheal intubation (T2).

Results: HR decreased moderately in both groups ($p = ns$). MAP decreased as well, more markeatly in group A at T1 and T2. This trend was statistical significant ($p < 0.05$) in both groups. PAP, PCWP and CVP unchanged following induction in any of two groups. CI decreased in group A ($p < 0.05$) dramatically dropping at T2, while in group B it showed a negligible decrease at T1 ($p = ns$) and value similar to baseline at T2. SVRI and PVRI did not exhibit statistically significant changes.

Conclusions: The use of propofol as a starter of anesthesia in CABG patients allows to reduce total dose of fentanyl, dramatically reducing post-operative intubation time. Propofol-fentanyl association prevented the hyperdynamic response to stress (i.e. laryngoscopy, intubation) but severely depressed CI and SVI. $CaCl_2$ simoultaneous administration effectively minimized the negative inotropic effect of propofol. Moreover no unwanted side-effects due to $CaCl_2$ were observed.

POST-OPERATIVE SEDATION IN THE PEDIATRIC ICU

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The term "sedation" is derived from the Latin word "sedatum" which means to make sleepy. In the ICU it has often come to mean the reduction of anxiety and even reduction of pain. Protocols are very important in the treatment of ICU patients: the sedation strategy should provide a basis for safe and effective patient management. The most useful method for assessment of sedation remains the objectivre scoring system. In our opinion, the best scoring system with regard to simplicity and reproducibility is the Cambridge Sedation Score. This Score gives important information about the patient by allocating a number from 1 to 7. We were studied the effect of midazolam on the post-operative sedation in the pediatric ICU. Forty children were participated in this study. The patients were 5 to 15 years of age, with a weight range 20 to 60kg. Patients were randomly assigned to one of two groups: continuous intra venous infusion midazolam, post one bolus doses, or midazolam bolus doses. The important principal in sedation is the combination of an anxiolytic agent and an analgesic agent (Fentanyl). For long-term treatment, the sedative used by both experts is midazolam. Continuous intravenous infusion should be used in the ac. phase followOed by a gradual switch to bolus techniques (or a combination of low-level infusions with boluses) as required. It is also important to start with low doses of sedative, particularly when used with an opioid analgesic, because synergy enhances the effects of both types of agents. Doses can then be titrated upwards to reach the desired effect.

EXPERIENCE OF B-ADRENOMIMETIC APPLICATION IN COMPLEX WITH MEDICATION SLEEP IN DISCOORDINATED LABOR ACTIVITY

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Discoordinated labor activity (DLA) is one of most serious in obstetric pathology.Medication sleep effect to a woman in birth is of limitation of pathologic impulsation from the central nervous system, but it does not influence processes resulting in and supporting DLA on the organ level. Constant discoordinated uterine contractions during medication sleep (MS) imcrease disturbances of uterine blood flow, organ hepoxemia connected with hyperergia of vascular wall and myometrium to catecholamines, that reduces efficiency of anesthesiologic protection.

We applied hexoprenalin in complex with MS to 20 primaparas. Efficiency control was being accomlished through hysterograms, grade scale of analgetic effect where hemodynamics reaction to pain, significance of emotional reactions and their vegetative manifestations before and during MS were registered, and also through hydrocortisone level in plasma before and during MS.

The examined women's average duration of MS was 2 hours more than in control and made 4 hours, though their average labor duration and in control was the same and made 12 hours. 98 % of the examined women experienced independant labor , as for the control group - only 68 %. Supplementary methods of anesthesia were required in 73 % in control,that increased medicamentous depression of the fetus, but for the examined group - only in 16 %. The examinees's newborns experienced favourable terminations, in control 3 newborns were in state of light rate asphixia. Analgetic effect was complete in control just in 15 %, and of examinees - in 82 %. On the women's hysterograms before MS discoordinated contractions were registered on the background of increased tonus. During MS in control similar uterine contractions were constantly registered, but for the examinees they were not marked at all or had the proper character. The examinees' hydrocortisone level was reduced for 42 % and in control only for 24 %.

The study has allowed to make a conclusion that hexoprenalin applications in complex with MS in case of DLA make anesthesiologic care safer and more effective, promote simultaneous removal of patholgic processes in the central nervous system and uterus, which lead to DLA development.

ANALGESIA IN UROLOGY

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Objectives:Short IV anaesthesia during period between 1984-1993.
Methods:3ooo urologycal operations were made in last ten years.We used following kinds of anaesthesia:
-general endotracheals anaesthesin in 1787 cases;
-infiltrative(local) an. in 600 cases;
- spinal,peridural, epidural anest. in 590 cases.
Results:Short IV anaesthesia has been done in many different combinations(ketamin, diasepam,etomidate,fentanyl) is a kind of anaesthesia which safe for many urological procedures.
Conclusions:Our experience shows that this is good type of anaesthesia because of its advantages in many urological procedures(urethra,bladder,prostata, testicles).

EVALUATION OF QUALITY OF POSTOPERATIVE ANESTHESIA FOR A PATIENTS IN UNCONSCIOUS STATES BY ELECTROENCEPHALOGRAPHIC (EEG) EXAMINATION

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Objectives: The aim of report is to present a clinical study results for the evaluation of anesthesia for a patients in unconscious states by EEG examination.

Methods: The study was conducted on 17 patients after a severe abdominal operations on stomach and intestine and on one patient after traumatical exarticulation of upper extremity. All patients have different unconscious state levels from somnolence to coma [I - Bozza Marrubini or 8 points Glasgo Coma Scale (GCS)]. Also thay have had respiratory insufficiency and control mandatory ventilation have been used. We were used intravenous injections of morphine hydrochloride from initial dose of 20 mg. Than we were increased the dose to 80 mg i.v. by drops with an accompanying EEG monitoring and Fourier spectral analysis. Initially all patients have had β-rhythm with slow θ- and Δ-activity. An α-activity index have been lower than 5%.

Results: After anesthesia the θ- and Δ-activity have disappeared. The α-activity index have increased to 35%. Also we have noted decreasing of the unconscious state levels to a possibility of a verbal contacts (13-14 points GCS).

Conclusion: The quality of anesthesia could be evaluated by EEG monitoring. A regaining consciousness after the injections of high doses of morphine, probably, may be a result of an opiate deficiency (full or partial).

REASONS AND IMPORTANCE OF HYPONATRIAEMIA IN SURGICAL INTENSIVE CARE PATIENTS

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Objectives: In literature the incidence of hyponatriaemia at ICU amounts to 30%, accompanied with a lethality rate over 40%. The study is analizing the reasons and quantity of clinical important hyponatriaemia by surgical patients on ICU.
Methods: During a period of 12 months all surgical patients (n=321) on ICU were registrated prospectvely. Per day more than 270 different characteristics were documented.
Results: The natriumlevel of 15 (4,7%) from n= 321 patients was below 125 mmol/l. The average time of hyponatriaemia was 1,2 days. The majority of the patients were female (73% vs 43%), patients with ascites (40% vs 4,5%) and alcoholics (27% vs 10%); they all had longer treatment times (hospitality stay and mechanical ventilation time). In almost all cases of hyponatriaemia we found hypovolaemia or reduction of the effective circulating volume (ascites and/ or edema). The related patients are treated with a higher dose of diuretics as patients with normal natrium- level. In one case we had to discuss a syndrome of inadequate ADH- secretion. There wasn't a specific symptomatic in any case.
Conclusion: In contrast to former statements hyponatriaemia is rare and from a trifling clinical importance.

INVOLVEMENT OF NITRIC OXIDE IN CLONIDINE SUPRASPINAL ANALGESIA

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Objectives: Nitric oxide (NO) is an endogenous gaseous transmitter which is involved in pain transmission. Our study focused on whether manipulation of NO biosynthesis affects clonidine supraspinal analgesia.
Methods: The study was approved by the Animal Use and Care Committee of the Faculty. ICR mice (22-25 g) were injected intracerebroventricularly under light halothane anesthesia with the following drugs: clonidine, L-arginine, L-N-arginine-methyl-ester (L-NAME), and their combinations. Tail-flick latency (TFL) was determined at time zero and 15 min after each treatment.
Results and Conclusions: Clonidine (1-4 μg/mouse) prolonged TFL in a dose-dependent manner. At a clonidine concentration of 4 μg/mouse, TFL increased 2.37-fold compared to time zero. L-Arginine increased TFL at a high concentration (100 μg/mouse). L-NAME suppressed TFL 1.2-fold compared to time zero at a concentration of 50 μg/mouse.
Conclusion: We have found that NO is involved in clonidine spinal analgesia. Studies are currently being undertaken to assess the effect of combination treatment of the above drugs on clonidine supraspinal analgesia.

EFFECT SUFENTANIL (SUFENTA) ON CIRCULATORY RESPOSES TO LARYNGOSCOPY AND TRACHEAL INTUBATION

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Objectives: Hemodynamic changes ussualy accompany laryngoscopy and tracheal intubation.The aim of this prospective study vas tu present the effectivness sufentanil in preventing feflex circulatory respone of laryngoscopy and tracheal intubation and provides stable hemodynamic condition for induction of balanced anaesthesia.
Methods: 30 adult ASA I-II patients sheduled for elective surgery.They were allocated randomly and divided into two groups:fifteen patients received single bolus of placebo prior to laryngoscopy and tracheal intubation. Anaesthesia induction was then performed with thiopental (5mg/kg) and atracurium (0,5 mg/kg), followed by neurolept anaesthesia. Mean arterial preassure (MAP) and heart rate (HR) were measured before, during and 5 min after intubation. Althought ECG was recorded at the same time intervals.
Results: The groups were compared with regard to the changes in arterial blood pressure,heart rate and electrocardiogram. Mean arterial preassure and heart rate were incresed significantly during and after laryngoscopy and tracheal intubation in control group but remained unchange the baselin values in the group who received sufentanil. Control group ECG suggested more changes than sufentanil group.
Conclusions: The results indicated that 1,2 mg/kg sufentanil for anaesthesia induction reducing the pressor response to laryngoscopy and tracheal intubation.

EXPERIMENTAL MORPHOLOGICAL STUDY OF THE INFLUENCE OF ANESTHESIA ON THE LIVER AND ON ISOLATED HEPATOCYTES. PRELIMINARY RESULTS

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Objective: The aim of this experimental study was to evaluate morphologically the influence of anesthesia in liver as well as in isolated hepatocytes (Hc).
Methods: A total of 16 female swine (20-22 Kg) were used as liver donors and were randomly assigned to one of two groups regarding anesthesia protocol: Group A (n=8): induction with intravenous sodium thiopental in a dose of 5 mg/Kg, Group B (n=8): propophol in a dose of 2 mg/Kg for induction and 10 mg/Kg/h for maintainance of general anesthesia. Both groups were under the same preanesthetic regimen (diazepam, ketalar and atropin) and received standarised doses of fentanyl and pancuronium during anesthesia. In both groups total hepatectomy was performed and the liver was perfused with 4-5 lt of cold (4°C) University of Wisconsin solution for a period of 5 hours before hepatocyte isolation. Liver tissue samples were fixed in formalin for the morphological study and stained with hematoxylin-eosin and PAS. For Hc isolation collagenase solution (Type V, Sigma, C-9263, 1.3mg/ml) was infused via portal vein and the liver was incubated at 37°C for 45 min. Cells were filtered and then washed in cold Hanks' solution. Isolated Hc were fixed and prepared for staining or simply cryopreserved (-20°C).
Results: Histology was completed in 8/16 experiments (4 in group A and 4 in group B). Mononuclear infiltration (halothane type injury) was found in all specimens (8/8). Focal zonal necrosis and acidophilic bodies were found in specimens from group A (2/4 and 1/4 respectively) while portal inflammation with piece meal necrosis was found in one specimen from group B (1/4). Smears of hepatocytes -both formalin fixed and cryopreserved at -20°C- were stained with hematoxylin-eosin and showed morphologically intact hepatocytes.
Conclusion: Preliminary study of our material reveals more frequent liver injury in the thiopental group, but this finding has yet to be established by increasing the number of observations.

The importance of sedation of the patients with severe head injuries

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Objectives: In this paper we present our experience and point out the importance of sedation of those patients who suffered severe head injuries/contusio cerebri with signs of decelebration/ and who were put on ventilatory machine to obtain better mechanical ventilation in neurosurgical intensive care unit of Emergency center in Belgrade.

Methods: 256 patients were treated from Jan. 1994 till Dec. 1994./ Midazolam, Fentanyl, Propofol, Thiopenton/.

Results: In 157 patients we successed to reduce agitation and decelebration.

Conclusions: The major demand of sedation in neurosurgical patients are that the patient should be calm, comfortable and painless.

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THREE KINDS OF EARLY POSTOPERATIVE ANALGESIA IN ORTHOPEDIC OPERATIONS ON LOWER EXTREMITIES

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We compared three analogous groups of 20 patients in each, with orthopedic operations on lower extremities. In each group we applied different kind of analgesia: first group received local anesthetic (4 ml 0.5% Bupivacaine) when analgesia was first demanded; second group received 2 ml Fentanyl via peridural catheter when analgesia was first demanded, and third group received 2 ml Fentanyl intravenously on demand for analgesia.
We used Visual Analog Scale (VAS) for estimation of pain intensity and success of applied therapy. Statistical data analysis was performed using Student's t-test.
The best VAS had group in which local anesthetic was applied periduraly. Second was the group with periduraly applied Fentanyl, and third was the group with intravenously applied Fentanyl. The longest duration of the effect of analgesia was in the second group. There were no adverse effects and complications, apart from mild sedation in the third group.
For orthopedic operations on lower extremities, application of peridural catheter for anesthesia and successful postoperative analgesia with local anesthetic, or opioid analgesics is acceptable.

13. Nursing & Physiotherapy

COMPARISON OF TYMPANIC MEMBRANE, RECTAL AND PULMONARY ARTERY TEMPERATURE MEASUREMENT IN THE ADULT INTENSIVE CARE SETTING.

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Background and Objective : Tympanic temperature measurement (TTM) is a relatively new procedure which provides accurate estimates of core temperature in stable postoperative patients and in patients admitted to the emergency ward. However, experience with this technique in hemodynamically unstable adult ICU patients is limited.
Design : Prospective study with patients serving as their own control.
Setting : Adult medico-surgical ICU in a tertiary care hospital.
Patients : 51 consecutively enrolled patients with thermodilution catheters in place and without contraindication for rectal temperature measurement and without hypothermia (core temperature <35°C).
Interventions : Tympanic temperature, measured by a commercialized tympanic thermometer (Genius 3000 A First Temp) was compared with pulmonary artery (PAT) and rectal temperature (RT). Within 10 minutes, core temperature was assessed in each patient by the same trained individual using the three techniques in random order.
Measurements and Main Results : Mean bias (Δ°C) and its variability (SD_Δ) of method comparison pairs were calculated using the methods comparison analysis as described by Bland and Altman (Lancet, 1986 ; i : 307-310). Three pairs (PAT vs. RT ; TTM vs. RT ; TTM vs. PAT) were yielded. Statistical difference for measurements within one comparison pair was evaluated by paired t-test.

Method comparison pair	Δ°C	SD_Δ	95% confidence interval
PAT vs. RT	-0.00	0.29	+.57 to -.57
RT vs. TTM	-0.26*	0.35	+.42 to -.95
PAT vs. TTM	-0.26*	0.37	+.46 to -.99

*p < 0.001

Conclusion : TTM is an easily performed and non-invasive method for measuring core temperature in critically ill adult ICU patients. As compared with PAT and RT, TTM overestimated core temperature by approximately 0.25°C. This difference has only minor clinical importance and can be minimalized by adjusting calibration. TTM values have to deviate at least 1.5°C from PAT measurements before becoming clinically relevant.

THE EFFECT ON PRESSURE SORE SEVERITY WHEN USING A PRESSURE SORE RISK CALCULATOR ON THE INTENSIVE CARE UNIT.

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Objective: To measure the prevalence of pressure sores on the intensive care unit and the effect of risk calculation on pressure score prevalence and pressure score severity.
Method:In 1993 during a period of 5 months a series of prevalence studies was carried out on the SICU to investigate how many patient days with pressure sores were taken care for by the ICU nursing staff, what kind of preventive interventions were done and what the patient risk was on developing a pressure score.
Results: On average there was a prevalence of pressure sores on the buttocks of 18.5% on the short stay unit and 42.8% on the long stay unit; preventive interventions increased when the pressure score was visible for the nurse and the majority of patients had a high risk or extra high risk for developing pressure sores according the pressure score risk calculator. As a result of these findings the nursing management decided in 1994 that nurses had to complete daily on every patient the pressure score risk assessment in order to be able to take adequate preventive interventions. When the results of the two studies were compared, the most important results were that: 1) there is no indication of a reduction in patient days with pressure sores (short stay unit: 14%, long stay unit: 55%); 2) there is a reduction in severity of pressure sores (grade IV decreased from 2.4 % to 0.7 %) because adequate preventive measurements are initiated by ICU nurses in an earlier stage.
Possible explanations for the increase of patient days with pressure sores on the long stay unit are that the average pressure score risk score was increased from 17.8 to 19.8 and the mean frequency of nursing patients on alternate sides decreased from 1.4 to 0.6 times each day.
Conclusion: Daily assessment of the individual patient risk on developing pressure sores does not decrease development but reduces the severity of the developed pressure sores.

Woundmanagement of patients with an open abdomen

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Objective: Introduction and evaluation of a new woundcare method of patients with an open abdomen.
Method: The conventional woundcare method of patients with an open abdomen is to change frequently the saline soaked ribbon gauze pads (4-6 times each day). This method is labour intensive for the ITU nursing staff and rather uncomfortable for the patient. Problems that often occur are: insufficient hygiene, frequent nursing interventions, a progressive risk for deterioration of the skin and underlying tissues, difficult to measure abdominal output and in case of bowel fistulas enteral feeding is hardly possible.
In using the new method, stomahesive is applied on the skin surrounding the wound. A large size of surgical film dressing, Opsite®, is applied over the abdomen. Two or more Foley® catheters Ch 22 are inserted through an opening in the surgical filmdressing. The application of several lateral openings in the catheters is advised. The drains are held firmly in place between two layers of sterile Opsite® "Flexigrid®" 6x7 with the so called bookend method and are connected to a low vacuum suction system (1-2 kph)
Results: We studied the frequency of dressings changes on 12 patients in the ITU. In total they had 363 days with an open abdomen. During this period there were 63 dressing changes. This means one dressing change every 6 days. Further advantages of the new method are; more hygiene in patient care, no maceration and irritation of the skin, nursing on alternate sides is possible, output can be measured, in case of bowl fistula, enteral feeding is possible and an abdominal lavage is possible on the SICU by opening the Opsite®
Conclusion: This new method of woundcare management is more patient friendly, prevents several nursing complications and decreases the work load for the nursing staff.

THE CLOSED SUCTION SYSTEM:
A WOLF IN SHEEP CLOTHES?

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Objective: To investigate the interaction between the ventilator and the closed suction system related to possible induced negative pressure by this sytem.
Method: We studied in a testlung model what the effect was of the different ventilators (Evita: Dräger; Servo 900 C: Siemens), ventilation modes (IPPV, SIMV) and ventilator settings (TV, Trigger level, frequency, PEEP level) on the induced negative pressure by the closed suction system during suctioning.
Results: When using the Evita the magnitude of the negative pressure increased when the ventilation frequency and TV decreased. The largest negative pressure (-76 cm H_2O) was produced with a TV of 600 ml and a frequency of 6 /min in the IPPV mode with trigger level on -3 cm H_2O and a PEEP level of +10 cm H_2O.
The Servo 900 C showed a complete different pattern. The largest negative pressures were measured when no trigger level was set (27 cm H_2O), the induced negative pressure was not depended on the TV or ventilation frequency but more depending on the ventilator mode. The SIMV mode produced the smallest negative pressures (1- 4 cm H_2O) and the IPPV mode the largest (16-27 cm H_2O).
Conclusion: The effectiveness of the closed suction system is very much depending on the kind of ventilator, ventilator mode and ventilator setting that is used. If the interaction with the used ventilator is not known by the ICU nurse this piece of equipment can cause damage to the patient by inducing large negative pressure in the comprimised lung and there fore creating the possibility of alveolar collaps and atelectasis or oedema.

THE ROLE OF THE ALTERNATIVE THERAPY IN THE PREVENTION AND CURE OF DECUBITUS

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Objectives: The decubitus is considered to be a nosocomial injury because in its development, the ignorance of the causing factors, the insufficient prevention and the incorrect nursing care have signifi cant roles. Due to the character of the diseases and the patients condition the prevention has a particular importance in the neurological intensive care units. The author introduces the alternative (natural cure) therapy of the developed decubitus.

Methods: Between 1991 Feb. and 1995 March 28 patients (12 male, 16 female) were cured with these two natural substances in the following diseases: 4 tetraplegia (1 brain stem tumour, 3 cervical intramédullar tumours), 3 paraplegia (traumatic spinal transsection), 21 hemiplegia (11 brain trauma and postoperative complication of 4 supratentorial tumours and 6 subarachnoid haemorrhage cases). The average age was 48. The therapy of choice depends on the stadium of the decubitus. In our institute in the last four years we used ointment of pot marigold (Unguent Calendulae officials) in the I. and II. stadium of the decubitus and Swedish drop in the III. stadium.

Result: The duration of the healing of the decubitus in the I. and II. stadium was 5 days, in the III. stadium 12 days. Allergic sign, toxic effect were not observed.

Conclusion: According to our experiences these traditional, natural drugs with curative effects, however they are not official medicines, significantly shortened the recovery time of the decubitus, so they have place in decubitus therapy.

ETHICAL MANAGEMENT IN AN INTENSIVE CARE UNIT

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Introduction : Ethical problems are daily and disturbing preoccupations for the ICU staff.
Objectives : improving ethical management in ICU by creation of an interprofessional group of ethical reflexion (IGER).
Methods : Existing was evaluated by a preliminary formulated series of questions sended to the whole staff (Q1, n = 43, 13 items). After two training sessions (laws, deontology, professional values, culture, norms of quality) followed by 38 persons (88 %) and directed by an external chairman, satisfaction and needs of the staff were evaluated by a second series of questions (Q 2, n = 38, 12 items). At the issue, IGER was created.
Results : Q1 : 30 responders (70%). Law's misinformation : 33 to 70 %, disagreement for limitation of intensive cares : 40 %, hope to improve collective decisions and creation of IGER : 88% . Q 2 : 29 responders (76%) : satisfied by the training sessions : 65%, non satisfied : 31 %, want to continue the project : 68 %, refuse : 10 %. IGER was constitute by physicians, nurses, secretary, dietetic (n = 15). The first working theme was « therapeutic's withholding and withdrawing decisions in ICU ». Four subgroups of IGER's members (having access to an ethical library) worked independantly and submitted their reflexions in a trimestrial plenary session of IGER in the presence of an external chairman, allowing a synthesis. At the issue a report was writted to be used as a reference for bedside and individual decisions.
Conclusions : Constitution of IGER seems to improve ethical management in ICU. The first result of IGER is that it is now possible to began collectively a reflexion concerning therapeutic's withholding and withdrawing in ICU. The work is going on and further subjects will be studied.

THE IMPORTANCE OF CEREBRAL PERFUSION PRESSURE MONITORING IN NURSING

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Objectives: In the neurointensive practice besides the routinely observed parameters like EKG, non invasive blood pressure, arterial oxygen saturation, respiration rate, temperature, in certain cases it is reasonable to measure, and record other parameters continuously by invasive method e.g. systemic arterial pressure (SAP), intracranial pressure (ICP) and derived values like mean arterial pressure (MAP) and cerebral perfusion pressure (CPP).

Methods: We use Marquette monitoring system, the SAP is meas ured by PVB pressure measuring stamp, and ICP is recorded by Spiegelberger epidural measuring set. The system is suitable for automatic alarming, calculating MAP, CPP and other derived values, storing the dates for 24 hours, plotting trends etc. In the last year we used this method in 84 subarachnoid haemorrhage and 34 severe cerebral traumatic cases.

Results: With some cases we demonstrate the effects of different nursing activities on ICP, CPP, the reliability of the method, the different technical faults and the problems of control.

Conclusion: Despite the fact that the invasive monitoring system makes the nursing care more difficult by connecting 15 or sometimes more wires and tubes to the patient, it gives the benefit by receiving the possibility of the patient's closer observation, the necessary immediate intervention, the optimal care and also the better nursing and the control of all of these thing.

OXYGEN CONSUMPTION CAN INCREASE DURING PASSIVE LEG MOBILIZATION

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Objectives: to define the cardiovascular response to physical therapy in critically ill patients and to relate this response to the cardiac status of these patients.
Methods: we studied changes in oxygen consumption (VO2) during passive leg mobilization (PLM) in 23 mechanically ventilated ICU patients (63 ± 12 years), in stable hemodynamic status (no change in treatment for at least 2 hours) and sedated with midazolam and morphine. Complete hemodynamic data, arterial and mixed venous blood gases, respiratory gas analysis (Metabolic Cart CCM, Medgraphics) were obtained at baseline (2x), twice (q.10min) during PLM (complete, all articulations, all amplitudes) and 20 min after the end of PLM. Data were analysed by ANOVA.
Results: although entirely passive, PLM resulted in a 16% increase in VO2 (from 161 ± 32 to 182 ± 40 ml/min.m2, $p<0.01$). Mean arterial pressure (MAP) also increased, from 79.1 ± 15.1 to 85.1 ± 16.6 mmHg, $p<0.01$. The increase in VO2 was associated with a slight but significant increase in blood lactate levels (1.36 ± 0.36 vs 1.46 ± 0.41 mEq/L, $p<0.05$). The relative contributions of cardiac index (CI) and O2 extraction (O2ER) were studied separately in the 10 patients with altered cardiac function (history of cardiomyopathy, LVEF<45% or treatment with dobutamine) (group 1), and the 13 others (11 sepsis, 2 neurosurgery) (group 2). In group 2, the increase in VO2 was met by an increase in CI (from 3.91 ± 1.54 to 4.21 ± 1.50 L/min.m2, $p<0.01$) and by increases in both CI (from 2.91 ± 0.72 to 3.11 ± 0.86 L/min.m2, $p<0.01$) and O2ER (from 32.8 ± 8.8 to 34.9 ± 8.1% $p<0.01$) in group 1.
Conclusions: PLM can be associated with a significant increase in VO2 which is primarily met by an increase in CI in patients with unaltered cardiac function and by combined increases in CI and O2ER in patients with altered cardiac function. Monitoring of O2ER (or simply SvO2) can be useful to assess the cardiovascular response to physical therapy in ICU patients with compromised cardiac function.

HEAT-MOISTURE EXCHANGERS WITH OR WITHOUT BACTERIAL FILTERS IN THE PREVENTION OF VENTILATOR ASSOCIATED RESPIRATORY INFECTIONS

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Objectives: 1) To compare the value of heat-moisture exchangers with bacterial filters (HMEF) and without bacterial filters (HME) in the prevention of colonization of ventilator tubing and ventilator-associated respiratory infections. 2) To asses the temperature and relative humidity of inspired air using both types of heat-moisture exchangers. **Methods:** 48 mechanically ventilated patients were randomized, to either HMEF or HME. Endotracheal aspirates, pharyngeal swabs and samples from tubing were collected for bacterial cultures on the 1st, 2nd day mechanically ventilation and weekly thereafter. Temperature and relative humidity were measured in 23 patients (13 HMEF and 10 HME) 3 h and 24 h after placing the HME or the HMEF. **Results:** Both groups were comparable as regards age, mechanical ventilation period, severity score (SAPS II), leukocyte count, and number of patients with prior antibiotic treatment. From the HMEF group, 10 (42%) ventilator tubing yielded microorganisms in, at least, one sample as compared to 7 (29%) of the HME group; p=NS. The incidence of respiratory infection was similar in both groups (25% *vs* 17%, p:NS, for HMEF and HME respectively). Among the 16 bacterial species isolated from ventilator tubing in the HMEF group, 7 (44%) were not isolated from pharyngeal swabs. A similar ratio was shown in the HME group (6/15, 40%). Both heat-moisture exchangers were efficacious in keeping a good relative humidity of inspired air (97% ±2% *vs* 96% ± 3.%; p=NS, for HMEF and HME respectively). Relative humidity was significantly higher after 3h of mechanical ventilation in the HME group as compared to HME group (28.5% ±2% *vs* 26.5% ± 2%; p=0.03). **Conclusions:** Both types of heat-moisture exchangers have the same effect on the prevention of colonization of ventilator tubing. Similar relative humidities are achieved when using either type of heat-moisture exchanger.

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THE ROLE OF NURSE IN FOLLOWUP OF OPERATED PATIENTS WITH ENDOCRINE DISORDERS VIA NONINVASIVE MONITORING

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Methodes: At the Center of Endocrine Surgery, Belgrade, within the period 1990-1994, there were 3.200 pts. operated due to various endocrine organ diseases.

Results: Tumor and nontumor enlargements of the thyroidea were present in 85% of the operated, surgical adrenal disease in 10!, hyperplasia or parathyroid gland tumor in 2% and endocrine pancreatic tumors in 3%. In the Intensive Care Unit, these patients were screened by noninvasive monitoring in 85% of cases, and invasive monitoring was applied in 15% of cases. The basic noninvasive methods included: Electrocardiogram with standard and precordial leads, percutaneous automatic measurement of systolic, diastolic and mean arterial pressure, measurement of hourly diuresis and body temperature, frequency, hearing capacity and rhythm of one s own breathing as well as pulse oxymetry. A special place in monitoring and control of vital parameters in postoperative period belonged to the nurse, thoroughly trained for analysis and interpretation of the observed parameters which would be discussed in the paper.

Conclusion: A highly trained expert team composed of nursing technicians and doctor specialists with modern technological equipment in the ICU contributed to the fact that there was not a single case of fatal outcome registered in patients screened by noninvasive monitoring, though highly severe endocrine diseases were in question often enough.

LEADERSHIP AT THE CROSSROADS: THE SUCCESS OF EMPOWERMENT

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It has been believed that the leader sits at the pinnacle of power. Over the years, this has proven to produce frustruation and anguish instead of the expected results. Leaders have not been able to produce the changes they know are essential to their organization's survival with this command-and-control paradigm.

Through literature reviews and evaluating leadership styles, one can clearly see the most effective form is that of empowering people to a new level of performance - not ordering it. Changing the leadership paradigm to a manner/style that has been shown to be effective and one of people empowerment shifts the focus to personal responsibility for performance. Removing obstacles, stimulating self-directed actions, and determining focus and direction are just a few elements used to create the successful environment of empowerment.

With increasing pressure in the health care arena, it becomes critical that a leader's job is to get the people to be responsible for their own performance. Developing ownership, creating an environment where people want to be responsible, being a mentor or coach, and learning faster while encouraging others to do so demonstrates the commitment to effective leadership.

This presentation will illustrate the critical components that are achieved when every person in the institution is empowered to perform at a level that is directed toward positive, effective results.

CAN PROGRAMMED WASHES OF THE FILTERS IN CONTINUOUS VENO-VENOUS HAEMOFILTRATION IMPROVE EFFECTIVE LIFE SPAN?.

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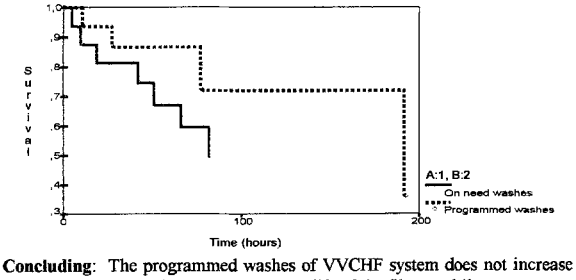
Objective: The systems of veno-venous continuous haemofiltration (VVCHF) have a high cost and a limited life span. In an attempt of lengthening their mean life, it has been proposed to accomplish programmed washes of the systems. This practice supposes an increase in nursing workload. In order to evaluate the real efficiency of this practice we have accomplished this study.

Material: Prospective randomized study of all the filters of VVCHF used during the last year in our ICU. We have determined two groups of filters, in the first (group A) we accomplished washed in a programmed way, and in the other (group B) only when the alarms of the system suggested a clotting of the filter. For the statistical analysis we used the Kaplan-Meier test for survival analysis.

Results: We have studied a total of 24 patient submitted to VVCHF during the last year. We used a total of 32 filters with this results. Group A: 16 filters with a mean life of 168 hours (117-219hours). Group B: 16 filters with a mean life of 105 hours (71-139 hours). The Log Rank test did not show meaningful differences among this groups. (p=0,2332)

Analisis of survival.



Concluding: The programmed washes of VVCHF system does not increase in a statistically significant way the mean life of the filters, while supposes an increase in nursing workload and raises the cost of the technique.

FAMILIES' INFORMATION CONCERNING PATIENTS TREATED IN INTENSIVE CARE UNIT

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Sasso Corbaro Clinical Research Institute, Bellinzona, CH
* Critical Care Unit, Regional Hospital, Bellinzona, CH

For years we have been putting a lot of effort into offering information support to the families of patients who are admitted into our department. A survey has been conducted to verify whether or not these efforts have met the needs of the families concerned: questionnaires were distributed to the families of patients just prior to their transfer to other departments of the hospital. This sample was composed of 176 families. The questions were divided into 4 main categories: the significance of the term "intensive care", the first day in intensive care, memories connected to time spent in the intensive care unit, suggestions to improve the service.
For 46 % of the people interviewed, the term "intensive care" had positive connotations (safety and/or hope), however, the type of answer depends on previous hospital experience and on the nature of the illness. For 73 % of the interviewees, the waiting time before entering the ward was very brief, although their predominant feeling could be described as "extremely anxious".
For 92 % the information given was clear and adequate, but 21 % described their initial reaction in terms such as anxiety, fear, sadness, distress.
25 % would have welcomed more detailed explanation and in particular some practical advice as to whether and in what way they could actively participate in the care of the patient.
Particular attention should be paid to how information is given: a sympathetic relationship between family and medical staff can be a meaningful aid in sustaining such difficult periods.

DEVELOPMENT AND VALIDATION OF CRITSCORE

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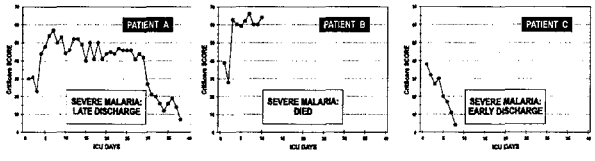
INTRODUCTION: A patient classification system in critical care units is of the utmost importance for scientific, objective determination of nursing workload. The time is past when nursing managers can manage by virtue of experience or intuition alone. What is required is a multi-dimensional patient classification system with an empirical basis and proven reliability that can expediently measure patient needs, quantitatively as well as qualitatively. Although our patient classification will be for use in the South African context, the development and validation model for adapting TISS could be used anywhere to develop similar systems for local use.
AIM: To develop and validate a scientific patient classification system for critical care patients in different critical care and high care units in South Africa according to which workload and nursing requirements can be ascertained.
METHOD: An exploratory, descriptive instrumental design was used. A literature review of patient classification systems, TISS and the ethical professional responsibilities of the South African critical care nurse was done. Based on the above and practical experience a concept critical care patient classification instrument was designed. The instrument, termed CRITSCORE, was based largely on the TISS instrument significantly tailored to encompass the ethical and professional responsibilities of the South African critical care nurse. Content validity index in the development and quantifying phase was determined according to Lynn's model (1986). A guideline was written for the instrument following which each item was debated by a group of six domain experts until consensus was reached on each item. The instrument was subsequently mailed to 25 domain experts that had to validate each item according to a four point rating scale. The instrument was finally tested in different public and private sector critical care and high care units.
RESULTS: Content validity index was confirmed in both the development and quantification phases. It was found that CRITSCORE could discriminate between the acuity levels of different critical care and high care populations and similarly also between patients with the same diagnosis, for example severe malaria.



CONCLUSIONS: It was determined that CRITSCORE could successfully measure patient acuity level and therefore categorise patients in order to predict nursing workload. The authors of CRITSCORE are of the opinion that it is not always cost effective to reinvent the wheel. Already developed patient classification systems can be successfully modified, adapted and validated for local use.
REFERENCE: Lynn, M.R. 1986: Determination and quantification of content validity. Nursing Research: Volume 35(6) p382-385.

NURSES' ROLE ON THE INFORMATION TO PATIENTS RELATIVES OF AN INTENSIVE CARE UNIT. AN OPINION STUDY BY QUESTIONARY.

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Objectives: Sounding out the nurses about the need to inform patients' relatives and the rigth kind of such information, like a preliminary approach to an information cuality assessment.
Methods: We inquired all the nurses of the Intensive Care Unit of an Regional Hospital by an semiestructurated questionary which included personal data: age, sex, contractual relation, professional experience... and opinion data: do you think to inform relatives is a nurse task?. Which of the next informations do you think is more important?. Please, write others topics about information you think are relevant. We process the data on Epi-Info estatistical program and use X^2 test to compare the results.
Results: From 80 nurses of staff 5 refused to fill the quetionary, and 8 were not available. Of the 67 remaining, 71% were women and 29% men. the mean age were 31. 51% had an stable contract and 49% eventual. the mean professional experience were of 10 years and 44% worked in the Unit since more than 6 years.

The 88% answered that offer information to relatives is part of the nurse activities. We did not find differences with nurses who answered negatively comparing by sex, age, contractual relation or proffesional experience. The three information topics found out like more important were: 1) to inform about patient mood. 2) To inform about happenings from the last visit. 3) To inform about dressing instrument required by the patient.

Nurses who answered negatively think that to inform is a Doctors task or that nurses are not competent.
Conclusions: Intensive care unit teams (Nurses, Doctors and auxiliar personnel) should get accord on who and how to inform relatives. We consider the nurses' role on information as unquestionable.

RESPIRATORY AND CARDIOVASCULAR COMPLICATIONS OF INTRAHOSPITAL TRANSPORT IN PATIENTS UNDERGOING OXYGEN THERAPY

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Objective: Investigate the respiratory and cardiovascular response after discontinuing oxygen therapy during intrahospital transport.
Design: Fifty-one patients (29 male and 22 female, aged 69±2,5 and 73,9±2,4 years respectively, $\bar{x}$+SEM) being on O2 therapy were studied prospectively in two consecutive intrahospital transports. Oxygen therapy was continued in the first transport while the second one was performed as usually, i,e, without O2. During transport each patient was monitored by pulse oxymeter and Holter whereas arterial blood gases were tested just before and after transportation.
Results: Compared to baseline, PaO2 and SaO2 were significanthy decreased in the case of oxygen discontinuation ($p<0,001$). PaCO2 was significantly increased only in the subgroup of patients with obstructive lung disease ($p<0,01$).
Heart rate increased in all phases of the transport when O2 administration was discontinued. Blood pressure remained stable in either case. The percentage of supraventricular extrasystoles, ectopic venticular contractions and ST-segment depression was progressively increasing and became very high at the end of transport in the case of O2 therapy discontinuation. Other arrhythmias did not change significantly.
Conclusion: Discontinuation of oxygen therapy during intrahospital transport causes severe drop of PaO2 and SaO2, increases the heart rate and contributes to the appearance of arrhythmias which were not present before.

14. Neurology/Neurosurgery

Role of clonidine in the treatment of major withdrawal syndromes

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PRINCIPLES OF DIAGNOSTIC AND TREATMENT OF ENCEPHALOPATHIES RESULTING FROM ASYSTOLIA

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Objectives: Elaboration of principles and methods of diagnostic and therapy of postasystolic syndrome.

Methods: For evaluation of the functional state of brain the complex of methods was used, which included electro encephalography (brain mapping), rheoencephalography, tetrapolar transtorax rheography. For the estimation of humoral status the level of histamine and serotonine, products of free-radical oxidation, enzimatic markers of ishemic damage of brain and of endogenous intoxication was investigated.

Results: 92 patients with encephalopathies after resuscitation were observed. Asystolia was as a result of: shock, trauma, asphyxia, poisonings, application of drugs, eclamp sia, injury of the heart, diseases of the cardiac vessels. All patients with postasystolic syndrome entranced in comatose condition. In the 1 group (reconvalescents) the depth of coma by Glasgo-Pittsburg"s scale was 23,3+-1,78. The duration of coma was from 30 min. to 48 hour, average 11,9+-4,6h. In the 2 group (the deads) the depth of come was 13,8+-0,86. The artificial lung ventilation was used in all patients: in the 1 group 2,64+-0,92 days, in the 2-6,1+-1,1 days. Apallish syndrome developed in 5 cases, in 5 patients diagnozed «brain death».

The 4th degree encephalopathy (coma) was found to be associated with disorganized EEG-pattern with predomi nant alpha- (1 group) and slow (2 group) activity. The relative power of delta- and theta-ranges was about 77-87 per cent. The patients with apallich syndrome demonstrated greatly elevated theta-range power, that of beta -range was essentially decreased.

The degree of disturbances of circulation in the both groups was different. Cardiac index (CI) and stroke index (SI) in the 1 group decreased on 19,5% and 44,3%, in the 2 - on 45,9% and 63,3%. General peripheral resistance (GPR) increased in the 1 group on 40,5%, in the 2 -on 69,4%. In the 1 group brain blood flow was increased, in the 2 - decreased on 37,6%. In the 1 group there was the normotonic type of REG-curve, in the 2 - atonic or hypotonic type (without reaction on pharmacologic influ ence). Disturbances of permeability of cellular membranes (enhanced free-radical oxidation with an increase in di enic conjugates on 107 and 121%) and vascular ones (an increase of serotonin concentration on 90 and 110%, hi stamine content on 116 and 180%) resulted in hyperfermentia (an increase of concentration of creatine phosphoki nase in the 1 group on 59%, in the 2 - 69%. The level of middle molecules (MM) increased in the 1 group on 79,2%, in the 2 - on 120,8%, of polyamines (P) (spermidin, spermin, putrescin). Coefficient of correlation between MM and P was 0,891.

Immediate correction of neurocyte metabolism is impossible due to marked brain oedema-swelling, severe dis ordes of cerebral circulation, disturbances of membrane permeability. Thus, the following treatment algorythm might be advisable:

1. Protective inhibition of brain and reduction of its energy requirements. 2. Recovery of cell and vascular membrane functions. 3. Recovery of blood circulation. 4. Oxygenation of nervous tissue and drainage of brain disintegration products. In 22 patientsHBO carried out. 5. Active methods of detoxication (hemo- and enterosorption). 6. Correction of cerebral metabolism. 7. Dehydrative therapy must be very cautious.

Conclusion: the activation of energetic metabolism in neurocytes must be carred out only under neurophysiological control and after definite preparation.

THE FUNCTIONAL STATE OF BRAIN IN CRITICALLY ILL PATIENTS

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Objectives: There were investigated the degree of acute cerebral insufficiency (ACI) in critically ill patients (67). The clinical estimation of acute cerebral failure carried out by Glasgo-Pittsburg"s classification of coma. We studied such groups of patients: poisoning CO (36), asystolia (8), eclampsia (5), acute renal failure (5), control group (13).

Methods: electroencephalography (brain mapping) was fulfilled by means of encephalograph «Medicor» in 8 monopolar channels. The estimation of EEG patterns by Zhirmunskaya method (1984) was carried out. There were analyzed and changes of EEGb by results of rapid transformation Furie after rhythmical photostimulation(PhTS) 2,6,10,20 Hz. We studied also the figures of absolute and relative power in such diapason : delta (1-4 Hz), theta (5-7 Hz), alpha (8-12 Hz), beta1(13-25Hz), beta2(25 Hz and more).

Results: All EEG changes were divided into following types: I -organized (3,4 groups); III - asynchronic (8 group); IV - disorganized with prevalence of alpha-waves (12,13,14 groups); V - disorganized with prevalence of delta- and theta activity (16,17,18;19,20 groups) by Zhirmunskaya classification. The figures of absolute (AP [mkv/SQRT(Hz)]) and relative power (RP [%]) of frequency diapason EEG are presented in table:

Typ group	n		Delta	Teta	Alpha	Beta1	Beta2	D+T+b1	A+b2
I	13 AP	M	0.8	0.9	1.8	0.51	0.287	2.18	2.07
		m	0.1	0.3	0.1	0.01	0.01	0.12	0.09
3,4	RP%	M	18	22	42	12	7	51	49
		m	1	1	0.3	1	0.4	0.2	0.3
III	12 AP	M	0.73	0.82	0.53	0.4	0.25	1.95	0.78
8		m	0.02	0.02	0.006	0.003	0.003	0.39	0.09
	RP%	M	27	30	19	15	9	71	29
		m	0.1	0.2	0.2	0.1	0.1	0.3	0.2
IV	32 AP	M	1.02	1.01	1.62	0.57	0.42	2.61	2.03
12,13,		m	0.03	0.05	0.23	0.023	0.01	0.08	0.22
14	RP%	M	22	22	34	12	9	56	44
		m	1	1	3	0.3	1	2	2
V	10 AP	M	2.67	2.79	1.35	0.74	0.46	6.21	1.8
16,17,		m	0.25	0.41	0.15	0.07	0.64	0.64	0.74
18,19,	RP%	M	34	34	17	10	6	77	23
20		m	2	2	1	1	0.3	1	1

After using of rhytmical PhTS pathognomonic changes were observed. IV type was characterized by following changes: after PhTS 2 Hz - increasing of delta-range, on 5%, decreasing beta2 - on 3%; increasing of D+T+b1 on 5%, decreasing alpha+beta2 on 5%; after PhTS 9 Hz -increasing of RP in alpha - range on 3%, decreasing b2 on 4%.

Conclusions : Method of "brain mapping" allows quntity assesment of ACI level. Coefficient [D+T+b1/A+b2] reflects type, group EEG, its disorganization rate.

NEUROLOGICAL MANIFESTATION OF ADVANCED GESTOSIS AND NEW POSSIBILITIES IN THEIR CORRECTION

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Akkording to our model of hormonal-metabolic disbalance in pregnancy , one of the main reason of destosis is hypoergos , reesults in endotoxemia and neuro-endokrine disregulation . So , stady of central nervous system function give us the information about adaptation processes .

The aim of our work is to study the degree of neurologikal deficit in destosis when olifen and lipin were used .

There were studied 20 pregnants with different severe forms of gestosis . The degree of neurologikal deficit was valued by datas of neurologikal status . EEG with «brain mappinng» , electrikal resistance of the skin .

The komplex inteensive therapy with applikation of olifen and lipin allowed to improve the patient,s condition , decrease the degree of neurolodikal deficit and mortality .

OPPORTUNITIES OF PLASMAPHERESIS IN PREGNANTS WITH ACCOMPANYING OBSTETRICAL AND EXTRAGENITAL PATHOLOGY

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Plasmapheresis (PPH),as other extracorporal methods of detoxicatin,has a great importance in contemporary medicine.The role of PPH is special,because of its simplicity, effectiveness, atraumatic.We incalcated PPH in obstetrical clinic. There are rough changes in agregate condition of blood in more of pregnants.These changes lead to disturbances of central,organ and peripheral hemodynamic.The therapeutic effect of PPH is due to influence on agregate condition of blood.

We considered that application of PPH is very effective in pregnants with:bronchial asthma,severe forms of diabet, psorias, gestosis, allergic diseases.

We used the membrane PPH in pregnants:apparatus-»Hemos-PF», plasmofilter PMF-800,with effective area-800 cm,the volume of extracorporal contour-60 ml.Such PPH has no the « agressive effect» , as in cases of application another extracorporal methods. This method was incalcated in our practice recently,so results will be reported in further publications.

INTRACRANIAL PRESSURE DURING CIAGLIA PERCUTANEOUS TRACHEOSTOMY IN NEUROSURGICAL INTENSIVE CARE UNIT

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Objectives : To evaluate the impact of Ciaglia percutaneous tracheostomy on intracranial pressure (ICP) in patients with risk of intracranial hypertension.
Methods: From September 1994 to March 1995 Ciaglia percutaneous tracheostomies were performed in our Neurosurgical Intensive Care Unit (NICU) on 9 patients with continuous ICP monitoring (4 males; age 16-78 ys; Glasgow Coma Score 5-10). Tracheostomy was indicated on clinical grounds. ICP monitoring was indicated for high risk of intracranial hypertension because of head trauma (5 patients), subarachnoid hemorrhage (2), post-operative cerebral neoplasm (1), post-operative subdural hematoma (1). ICP was monitored via a catheter inserted in the lateral ventricle and values were continuously digitally recorded by means of a bedside computer data acquisition system (MacLab). The fiberoptic tracheobroncoscope, which guided the procedure, was passed between the nasotracheal tube and the trachea in order to avoid hypoventilation. The patients had stable baseline hemodynamics. Propofol infusion and fentanyl boli were administered to mantain stable mean arterial pressure values. Peak (mean(SD)) ICP during the 30 minutes pre-Ciaglia procedure (baseline values) were compared with values during Ciaglia procedure, and the 30 minutes post-Ciaglia procedure. Data were compared with repeated measures ANOVA.
Results: Ciaglia procedure duration was (mean(SD)) 30(14) minutes. Baseline peak ICP was 29.7(9.4) mmHg, Ciaglia peak ICP was 32.1(8.2) mmHg, post-Ciaglia peak ICP was 30.3(12) mmHg. Differences were not statistically significant.
Conclusions: These preliminary data suggest that Ciaglia percutaneous tracheostomy may be considered a safe procedure in intensive care patients who are at risk of intracranial hypertension.

Transient global amnesia (TGA): a study of 25 cases

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Objectives: Transient global amnesia (TGA) is a syndrome caracterized by impairment of short-term memory, inability to form new memories, retrograde amnesia and repetitive queries, without other neurological signs and symptoms. The pathophysiology of TGA is unknown; thromboembolic, epileptic, migrainous and metabolic mechanisms have been suggested. To address some of these issues, we undertook a study of 25 cases of TGA in whom we examined clinical, laboratory data, electroencephalogram, CT of the head, ultrasonography ecodoppler.

Methods: 25 patients were included in this study: 9 men and 16 women. The mean age was 64 years. All cases underwent a standard clinical examination, electrocardiogram, routinary humoral tests and x-ray, electroencephalogram (EEG), CT scan of the head, ultrasonography ecodoppler.

Results: The mean duration of amnesia was 5 h. 32 m. +/– 7 h. 10 m. Hypertension was found in 19 patients (76 %), ischemic heart disease in 4 patients (16 %), hypercholesterolemia in 10 patients (40 %), hypertrigliceridemia in 3 patients (12 %), smoking in 2 patients (8 %), atrial fibrillation in 1 patient (4 %), history of epilepsy in 1 patient (4 %), migraine history was not recorded. CT scans of the head showed multiple small deep infarcts in 4 patients (16 %), a single hypodense lesion in 4 patients (16 %). In 11 patients electroencephalogram was normal (44 %), in 8 patients there were widespread nonspecific electrical changes (32 %), in 6 patients there were focal nonspecific EEG abnormalities (24 %).

Conclusion: In our study TGA was more common in women (64 %). We showed a prevalence of hypertension, hypercholesterolemia and cerebral infarcts compared to normal controls. We have demonstrated a higher incidence of nonspecific electrical changes in TGA of lower length, while ischemic lesions in CT of the head were more frequent in TGA of greater length. These data seem to be in agreement with the hypothesis that TGA is a heterogeneous clinical syndrome, consisting of pure, epileptic, and ischemic types. However we did not find any correlation useful in discriminating pure from associated TGA forms. From our study it is tempting to speculate that pure TGA is a rare event, underlying still unknown mechanisms wich differ from ischemic, epileptic, migraineous causes.

Modification of triple H therapy due to intracranial pressure measurement in patients with subarachnoid haemorrhage

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Objectives: Aneurysmal subarachnoid haemorrhage (SAH) is special condition increasing intracranial pressure (ICP) in various ways. At the other hand cerebral vasospasm and related delayed ischaemic deficit (DID) could answer for the poor outcome. Triple H therapy seems today a basic option to prevent DID, but it may increase the ICP worsening the altered intracranial pressure condition and thereby the cerebral perfusion pressure (CPP). Is there any way to individualise the triple H therapy when it is necessary?

Methods: Between Sept. 94–March 95 thirty-seven patients with intracranial aneurysms were operated on within 48 hours following SAH. Five patients were in Hunt-Hess IV at admission. All patients received triple H therapy in a preventive fashion following surgery and were monitored by daily transcranial Doppler ultrasonography (TCD). ICP and CPP was measured in twenty-four cases. Twenty-two of them received lumbar liquor drainage (LLD) and nineteen were administered induced hypertension. The other group was treated by basic triple H therapy.

Results: In group with monitored ICP the outcome was twenty-one excellent, one poor, two died (one of them died from extracranial decease). In the other group four had excellent, six moderate, two poor outcome, and one died.

Conclusion: According to our recent observation the patients can be divided into two groups of therapy. In group I, the patients with elevated TCD values and either low or high ICP reacted to LLD. We are concerned that haemodilution and slight hypervolaemia should dominate in the triple H therapy. In group II patients having high ICP with TCD and/or symptomatic vasospasm should be managed by the induced hypertension-hypervolaemia dominated therapy focusing on CPP (ICP) and focal neurological signs.

AIR EMBOLISM AS THE CAUSE OF CENTRAL NERVOUS SYSTEM DYSFUNCTION

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Air emboli were detected in 10% (n=12) of patients undergoing coronary artery bypass grafting (CABG). Central nervous system dysfunction occured in 23% of the patients with air emboli and in none of those withhout air emboli.

Hypothermia is the classic form of protection used during cardiopulmonaly bypass. The surgeon showed thoroughly evacuate air from the heart, but the anesthesiologist can significantly influence the outcome by employing methods to detect and treat air emboli.

TIME-DOMAIN MEASUREMENTS OF HEART RATE VARIABILITY AS A PROGNOSTIC INDEX IN BRAIN DAMAGE

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The changes in heart rate are primarily due to alterations of autonomic tone. The heart rate variability (HRV), that express the degree of heart rate fluctuation around the mean heart rate, reflects somehow the condition of central nervous system. HRV may be measured by a number of techniques. Short-term time-domain variables of HRV are reflect generally the vagal activity. In this study the changes in HRV variables of patients with brain damage, and in addition the changes in HRV measurements in comparison with the clinical evolution were evaluated. Eight patient with brain damage and six normal individuals as control group were studied. A elecrocardiographer with availability of computation the sequence of beat-to-beat intervals for one minute was used. The following variables of HRV were measured: 1) standard deviation (SD) of beat to beat R-R interval differences that reflects the respiratory control, 2)the maximum/minimum (max/min) interval that reflect variability related to baroreflex and thermoregulation and 3) the coefficient of variation (CV). The results are shown in the table.

	SD	max/min	CV
Brain death (4)	0.002-0.004	1.01-1.02	0.26-0.33
Vegetate (1)	0.005	1.02	0.40
a)GCS 3-7 (3)	0.005-0.020	1.03-1.13	0.64-2.93
b)GCS 8-10	0.027-0.32	1.14-1.24	3.37-3.94
c)GCS 11-15	0.030-0.32	1.24-1.24	3.94-4.4
Control (6)	0.020-0.069	1.13-1.39	2.51-7.73

In the patients with brain death and in vegetate state there were virtually no HRV. Increased HRV pattern was found with clinical improvement, the changes of HRV precede of the changes of GCS.
We conclude that time-domain HRV could reflects the degree of brain damage, it is good prognostic index of the brain damage and may change earlier than the GCS.

TREATMENT OF GUILLAIN-BARRÉ SYNDROME AND CHRONIC INFLAMMATORY DEMYELINATING POLYNEUROPATHY BY CEREBROSPINAL FLUID- FILTRATION

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Objectives: Only 50% of patients suffering from acute Guillain-Barré syndrome (GBS) respond promptly to established therapies like plasma exchange or intravenous immunoglobulines. In contrast to serum, cerebrospinal fluid (CSF) of GBS and CIDP patients contains enriched portions of antiexcitatory factors(1) and cytokines (2) able to induce pronounced conduction block (3). To reduce or remove such pathologic factors we introduced a technique with direct access to the subarachnoid space.
Methods: With informed consent we lumbally inserted 18 G catheters in 24 GBS- and 22 CIDP -patients under sterile conditions. Some of them had not responded very well to established therapies. 30-40 ml of CSF were withdrawn and retransfused by a bidirectional pump (Flofors) after passing newly developed filters (Pall). Daily filtrations with several cycles were performed (200 -300 ml) over one week.
Results: The 24 GBS patients improved after 19 days (median) for one grade (according to the GBS-Scale from the GBS Study Group). The ventilator dependent patients were weaned after 16 days (median). Patients not at all treated before (16/24) responded better than patients that had been pretreated (8/24) with plasmaexchange or intravenous immunoglobulines. 18/22 CIDP patients drew benefit from treatment, 10 stabilized longterm.
Conclusions: CSF- Filtration is a relatively save and well tolerated additional procedure. The costs are considerably lower (1/3) than those for plasmaexchange or intravenous immunoglobulines.
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Efficacy of laser therapy in alcohol coma

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Clinical observations were made in 24 patients admitted to the clinic. They were in coma associated with acute alcohol intoxication.

Standard evaluations (ECG-monitoring, electrocardiography, neuromonitoring, studies of acid-alkali condition, biochemical and toxicologic investigation of blood and urine) prior to and following the treatment conducted were undertaken in all the patients.

To correct irreversible impairement of functions twofold laser blood irradiation by means of ALOK-01 apparatus, the exposure within 20 minutes, was carried out.

The data obtained confirm more rapid coma withdrawal of the patients, reconstruction of the heart and central nervous system electrophysiologic indeces, reliable reduction in complications compared with the control group.

THE INCIDENCE OF THE CRITICAL ILLNESS POLYNEUROPATHY IN AN INTENSIVE CARE UNIT. A preliminary study.

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OBJECTIVE: To know the actual incidence of the Critical Illness Polyneuropathy(CIP).
SETTING: Fourteen intensive/critical care unit beds, in 550 bed University Hospital, covering 345.000 inhabitants (majority rural area). The ICU patients are medical, surgical and coronary, excluded the neurotrauma and neurosurgical.
DESIGN: A consecutive and prospective study. All the patients admitted during three months, from January 1th to March 31th 1993, were eligible (patients with admittance diagnosis of polyneuropathy were excluded).
METHODS: Patients with APACHE II score >10, at the admission and six days after admissions were included into the study protocol.
Diagnosis of sepsis, MOF, and all the drugs administered days before were recorded. A complete neurological exam, by a neurologist, in absence of sedatives and muscles relaxant (7th, 25th and 60th days after ICU admittance) was made. We evaluated the nerve and muscles function with and electromyography study in all patients, at same days. In some patients with CIP we performed a nerve biopsy.
RESULTS: From 285 patients (APACHE II score: 12.82) admitted in the ICU, 16 (5.6%) enter the study protocol. Seven (2,45%) had an axonal polyneuropathy(CIP), three very severe. Only four of the patients with CIP had pathologic clinical exam. APACHE II score: CIP vs non-CIP was 22.6 vs 16.6. The incidence of CIP by diagnosis (CIP/ diagnosis) was: Sepsis, 5/9 and MOF, 6/11.
CONCLUSIONS:
1. -We think that it is necessary to define the "critically ill" for some score, before designing a study to know the incidence of this syndrome.
2. - We think that the incidence of the CIP is lower that the latest papers say.
3. - The severity and the duration of the disease, is a determinant of the development of CIP. Sepsis and MOF are important, but not unique etiology.
4. -Possibly in critically ill patient, the CIP it is not the only cause of weakness. Probably some patients have a muscle weakness not identified yet.
5. -The clinical exam it is not a good parameter to confirm the presence of CIP.

THERE IS NO RELATIONSHIP BETWEEN NEUROMUSCULAR ABNORMALITIES, SEPSIS, ORGAN FAILURE, STEROIDS OR NEUROMUSCULAR BLOCKING AGENTS (NMBAs) IN THE ICU

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Objective: To study the relationship between the varieties of acquired neuromuscular abnormalities associated with critical illness, the presence or absence of sepsis and organ failures, and the use of steroids or NMBAs. We have previously divided the neurophysiological study (NPS) features into 5 groups: Group I (normal), group II (sensory), group III (motor), group IV (motor & sensory) and group V (miscellaneous).
Methods: We performed NPS on 44 patients who had been on the ICU for 7 days or more. We documented preceding sepsis, development of organ failure and steroid and NMBA use. In addition age and APACHE II scores were recorded.
Results:
Data are presented as median (range) except where indicated.

Group	No	Age	APACHE	Organ Failure
1	5	54(27-70)	27(24-23)	3(1-6)
2	5	63(29-72)	14(12-24)	2(1-6)
3	16	59(33-84)	19(10-32	2(1-4)
4	11	61(31-76)	14(18-29)	2(1-6)
5	7	57(41-70)	19(9-29)	3(1-5)

Group	NMBA (%)	Steroids (%)	Sepsis (%)	Mortality (%)
1	80	20	80	0
2	60	20	40	20
3	69	31	81	38
4	81	36	64	27
5	100	14	43	0

Conclusion: Abnormalities of neurophysiological function may occur in the presence of single or multiple organ failure, presence or absence of sepsis, and are not caused by steroids or NMBAs.

BILATERAL CEREBRAL CO_2 VASOREACTIVITY IN COMATOSE PATIENTS.

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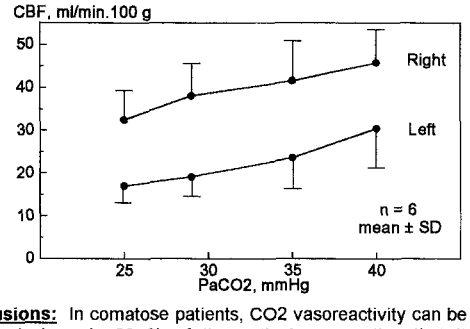
Objectives: Cerebral CO_2 vasoreactivity is an important determinant of cerebral blood flow (CBF) and has been shown to be of prognostic value in head trauma (Acta Anaesthesiol. Scand. 1991;35:113-122). We wondered whether CO_2 vasoreactivity could be selectively altered in one hemisphere in comatose patients. **Methods:** 6 patients (5M/1F, age 32-65yrs, Glasgow 4-8) in coma due an acute brain lesion (trauma, hemorrhage, or infection) were studied. CBF was measured bilaterally using jugular thermodilution at $PaCO_2$ 25, 30, 35, and 40 mmHg by increasing $PICO_2$ with mechanical ventilation kept constant. Normal CO_2 vasoreactivity was defined as an increase in CBF of at least 1 ml/min.100 g per mmHg $PaCO_2$.
Results: 2 patients had normal CO_2 vasoreactivity bilaterally, 2 patients had altered CO_2 vasoreactivity at both sides, and 2 patients had a normal response at one side (left or right) with an altered response on the other side (right or left). For the 6 patients left CBF was in mean 17 ml/min.100g lower than right CBF (figure).



Conclusions: In comatose patients, CO2 vasoreactivity can be altered in one hemisphere in 33 % of the patients suggesting that it must be evaluated at both sides. Difference in CBF between the left and right hemispheres could be due to anatomical difference in size between left and right jugular veins.

BRAIN OXIDATIVE STRESS IN NORMOXEMIC VS HYPOXEMIC HYPOPERFUSION: PRELIMINARY EXPERIMENTAL STUDY

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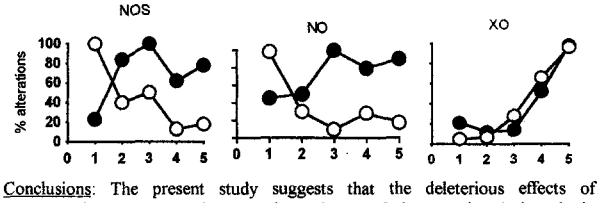
Objectives: To investigate if hypoxemic hypoperfusion (shock without mechanical ventilation) induces different level of brain injury compared to hyperoxemic hypoperfusion (shock during mechanical ventilation).
Methods: Following institutional approval 4 piglets (body weight 25±1.5) were anaesthetized by 2% fluothane. A catheter was placed in the right femoral artery for blood pressure monitoring and a fiberoptic catheter (oxymetrics-3 Abbott) was advanced via the right internal jugular vein to the jugular bulb for SjO_2 determinations. Another catheter with a balloon on the tip was advanced in the right atrium via the right femoral vein. A mean arterial pressure (BP) at 25 mmHg was achieved by appropriate balloon inflation for 10 min and two groups were created: i) the hypoxemic group by respirator disconnection (•) and ii) the hyperoxemic group by FiO_2=1 on respirator (o). Samples were obtained at 0 time (1), 10' min at hypoperfusion (2) and at reperfusion at 1' (3), 3' (4) and 10' (5). PaO_2, PjO_2 and oxidative brain stress evaluation was performed from jugular bulb blood. The latter included: i) NO synthase (NOS) and xanthine oxidase (XO) activities by a method based on the oxidation of scopoletin detected fluorometrically. ii) NO levels estimated as $ONOO^-$ by luminol enhanced chemiluminescence in the presence of 500μM hydrogen peroxide (H_2O_2).
Results: The mean PaO_2 was 34 mmHg for Group I and 160 for Group II during hypoperfusion and 180 and 300 during reperfusion respectively. The respective values for PjO_2 were 30, 40, 60 and 85 mmHg. The redox enzymes activities and NO, expressed as persentage alterations are presented in the following figures.



Conclusions: The present study suggests that the deleterious effects of hyperoxemia are more intense than those of hypoxemia during brain hypoperfusion. This is supported by the decrease of both; NO synthase activity and NO levels observed in animals subjected to hyperoxemia.

Others

PLASMA EXCHANGE AS A CAUSAL TREATMENT IN HYPERLIPIDEMIA-ASSOCIATED PANCREATITIS

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Introduction: The hyperlipidemia-associated pancreatitis is a rare type of pancreatitis, mostly induced by alcohol abuse with consecutive excessive levels of cholesterol and triglycerides. The rationale for plasma exchange (PE) in hyperlipidemia-associated pancreatitis is to improve the blood flow of the pancreas by reducing the hyperlipidemia-induced hyperviscosity.
Methods: Beside the usual intensive care therapies (fasting, substitution of volume and electrolytes, analgetics) plasma exchange was performed as a membrane plasmaseparation. Three litres of plasma were exchanged, the substitution solution was human albumin solution. No complication of the PE was seen.
Results: From 1986 to 1994 five patients (average age 48,2 years) with hyperlipidemia-associated pancreatitis were treated with PE in our medical ICU. The diagnosis was confirmed by elevated enzymes (mean values: amylase 1363 U/l, lipase 1590 U/l) and computed tomographic diagnosis. In all patients, the hyperlipidemia was triggered by alcohol abuse, no patient had gallstones. The average level of cholesterol was 2454 mg/dl, the level of triglycerides 2311 mg/dl before PE. After PE, we saw a cholesterol reduction of 89,8 % (mean value 251 mg/dl) and a triglyceride reduction of 69,8 % (mean value 697 mg/dl). No more analgetics were needed after PE and the clinical course improved rapidly.
Conclusion: The early performed PE in patients with hyperlipidemia-associated pancreatitis seems to be a causal therapy, because the rapid fall of elevated cholesterol and triglyceride levels can stop the damage of the pancreas and perhaps prevent necrotising pancreatitis.

BLOOD LACTATE LEVELS AFTER MAJOR SURGERY - PROGNOSTIC VALUE ?

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Introduction: Blood lactate levels are a useful indicator of tissue hypoxia. Many studies have shown that blood lactate levels in survivors and nonsurvivors of traumatic and septic shock are significantly different. The degree of multiple organ failure is related to the duration of lactic acidosis (1). The aim of this study was to evaluate blood lactate level as a prognostic marker of high risk postoperative patients who may benefit from invasive hemodynamic monitoring and aggressive fluids administration and early inotropic support based on oxygen transport parameters.
Methods: 32 patients undergoing elective long term vascular and abdominal surgery (ASA I-III) were studied. Blood lactate levels were measured after ICU admission. In the case of blood lactate level above 2 mmol/l, measurement was repeated every 4 hours for 12 hours or until normalisation (blood lactate level less than 2 mmol/l). Type of surgery, length of surgery, amount of fluids delivered intraoperatively and postoperatively, hemoglobin levels, hemodynamic variables, diuresis, postoperative complications, length of ICU stay and clinical outcome were recorded. Because no attempts were made to randomise therapy or change our standard therapy protocol institutional approval was not required.
Results: The frequency of postoperative complications was 12,5 % and mortality was 5,5 % in a group of patients with blood lactate level less than 2,5 mmol/l (n = 18). Frequency of complications (62,5 %) was significantly increased in a group of patients with blood lactate levels 2,5-4 mmol/l (n = 8), mortality was 12,5 %. Mortality (60 %) and frequency of complications (80 %) were significantly increased in a group of patients with blood lactate levels above 4 mmol/l (n = 5).
Conclusion: Blood lactate levels can serve as early marker of high risk postoperative patients and may predict increased risk of postoperative complications and postoperative death.

1. Crit Care Med 1994;22:633-639

DO THE RESULTS OF UPPER GI-ENDOSCOPY SUGGEST THAT PROPHYLAXIS FOR GASTRIC ACID AND/OR BILE IS NECESSARY AT THE INTENSIVE CARE?

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Objectives: Reviewing indications and results of upper GI endoscopy at the Intensive Care Unit [ICU].
Methods: We retrospectively reviewed all 411 upper GI-endoscopies, performed in the period January 1992-July 1994 in 301 patients (199 men and 102 women) admitted at the 4 ICU's of our hospital.
Results: It concerned 129 surgical, 103 medical, 50 cardiological and 19 neurological patients with a mean age of 57.9 yrs (range: 14-91). In 86%, the endoscopy was performed at the ICU and in 14% at the endoscopy department. In 56% of the cases, the endoscopy was primarily diagnostic, of which 70% was performed for localization of upper GI blood loss. In 44% the endoscopy was primarily therapeutic, of which 89% was performed for placement of a duodenal feeding canula. Location of the upper GI bleeding was: varices (31%), duodenal ulcer (20%), oesophagitis (13%), gastric ulcer (11%), others (13%) and none (10%). As coincidental findings were noted: oesophagitis (37%), gastritis (16%), gastric ulcer (14%), duodenal ulcer (9%), duodenitis (8%), oesophageal ulcer (7%) and others (8%).
Conclusions: There were marked differences in indications and findings of endoscopy at the different ICU's. These differences reflect an admission bias and differences in populations and treatment preferences. Compared with cardiological and neurological ICU's, substantially more endoscopies were performed at surgical and medical ICU's. In a considerable number of cases, no source of upper GI blood loss could be found endoscopically. When upper GI blood loss was the ICU admission diagnosis, the main cause was bleeding varices, which could be controlled endoscopically in the vast majority of cases. When upper GI blood loss was nót the ICU admission diagnosis, peptic ulcer and oesophagitis were the main causes of bleeding. Because of the considerable number of coincidental abnormalities found at endoscopy, there is still room for debate whether antacid medication and/or motility stimulating agents should be given prophylactically at ICU's.

MONITORING OF HEPATIC VENOUS OXYGEN SATURATION AFTER LIVER RESECTION: CLINICAL PRACTICABILITY AND CLINICAL VALUE

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Objectives: Investigated practicability and clinical value of the routine measurement of hepatic venous oxygen saturation ($S_{hv}O_2$) after major liver surgery, as $S_{hv}O_2$ is considered an indirect parameter for splanchnic and hepatic blood flow.
Methods: 30 consecutive patients were included in this study after liver resections for primary or secondary liver tumors. 5 patients suffered from liver cirrhosis (Childs A). Immediately after post-operative admission on the ICU a PA-catheter was inserted under fluoroscopy via the right jugular internal vein into the hepatic vein contralateral to the resection area. Hepatic venous and arterial blood samples were drawn every two hours. $S_{hv}O_2$ was correlated to the clinical course, macro hemodynamics, ABGs and other established lab parameters.
Results: In 26 out of 30 attempts the catheter could be placed correctly. In four cases after right hemihepatectomy the left hepatic vein could not be intubated due to a dorso-lateral tilting of the left liver. This is also reflected in a significantly longer time of fluoroscopy for catheterization of the left hepatic vein (12.9 ± 7.5 min vs. 3.7 ± 2.5 min; $p < 0.001$). The procedure requires a total of between 45 and 75 minutes. Relevant clinical complications were not observed except for short term supraventricular arrhythmias during passage of the catheter through the right atrium. Hemodynamics and pulmonary function could be considered normal in all individuals at time of measurement. $S_{hv}O_2$ showed a span from 27.4% to 90.0% with a mean of 67.0% ± 10.8%. The following statistically significant findings could be obtained: (a) Patients with liver cirrhosis showed a significantly lower $S_{hv}O_2$ than patients without (53.4% ± 5.3% vs. 68.7% ± 10.1%; $p < 0.001$). (b) A negative correlation between $S_{hv}O_2$ immediately after operation and the duration of intraoperative hepatic vascular occlusion could be observed ($r = -0.58$; $p < 0.05$). This correlation could also be seen for the first 12 post-operative hours ($r = -0.42$; $p < 0.01$). (c) A negative correlation between $S_{hv}O_2$ and the difference between arterial and hepatic venous lactate levels was found ($r = -0.39$; $p < 0.02$).
Conclusions: The routine measurement of $S_{hv}O_2$ appears to be a promising extension of post-operative monitoring after major liver surgery. It is a safe method easily feasible on any major surgical ICU though relatively time consuming. A further validation of this method is necessary in larger studies. Therapeutic recommendations on the basis of $S_{hv}O_2$ findings cannot be given yet.

EFFECT OF PROSTACYCLIN ON HEPATIC VENOUS OXYGEN SATURATION AFTER LIVER RESECTION

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Objectives: Evaluate the effect of systemic application of Prostacyclin (PGI_2, Flolan, Wellcome) on hepatic venous oxygen saturation ($S_{hv}O_2$) after liver resection.

Methods: In 5 cases after major liver resection, in which abnormally low readings of $S_{hv}O_2$ suggested an impaired hepatic blood flow, PGI_2 was applied at a dose rate of 5 ng/kg/min. As $S_{hv}O_2$ can be considered an indirect parameter for hepatic blood flow, the effect of PGI_2 infusion on $S_{hv}O_2$ was measured. Moreover, the changes of macro hemodynamics and pulmonary function were monitored.

Results: Before the application of PGI_2 mean $S_{hv}O_2$ for all 5 patients was 54.1% (47-9 - 47-3). In three cases without major structural alteration of the remaining liver tissue the continuous intravenous administration of PGI_2 lead to a sustained increase of $S_{hv}O_2$ to an average of 67.1% (65.6 - 69.1). The postoperative course in these three cases was uneventful. In two cases with compensated liver cirrhosis after hepatitis C no change in $S_{hv}O_2$ under PGI_2 infusion could be observed. Both patients died 32 and 45 days respectively after operation in protracted liver failure. Side effects of PGI_2 included a slight decrease of systemic and pulmonary vascular resistances. Consequently MAP decreased by up to 10% as did intrapulmonary right-left shunt increase. In none of the observed patients did these side effects posed a limitation of continuous application of PGI_2.

Conclusions: In patients without structural alteration of the liver the systemic application of prostacyclin at a dose rate of 5 ng/kg/min could significantly increase an abnormally low hepatic venous oxygen saturation after major liver resections. In two cases of severe liver cirrhosis a similar increase could not be observed. After first clinical investigations and with the results of recent studies in animal further controlled clinical studies of prostacyclin in the postoperative management after liver surgery appear justified.

CONTROLLED CLINICAL TRIAL OF SELECTIVE DECONTAMINATION FOR THE TREATMENT OF SEVERE ACUTE PANCREATITIS

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Methods:
Between April 22, 1990 and April 19, 1993, 102 patients with severe acute pancreatitis were admitted to 16 participating hospitals. Patients were entered into the study if severe acute pancreatitis was indicated, on admission, by multiple laboratory criteria (Imrie score ≥ 3) and/or computed tomography criteria (Balthazar grade D or E). Patients were randomly assigned to receive standard treatment (control group) or standard treatment plus selective decontamination (norfloxacin, colistin, amphotericin; selective decontamination group). All patients received full supportive treatment, and surveillance cultures were taken in both groups.

Results:
Fifty patients were assigned to the selective decontamination group and 52 were assigned to the control group. There were 18 deaths in the control group (35%), compared with 11 deaths (22%) in the selective decontamination group. (Adjusted for Imrie score and Balthazar grade: $p = 0.048$). This difference was mainly caused by a reduction of late mortality (> 2 weeks) due to significant reduction of gram-negative panreatic infection ($p = 0.003$). The average number of laparotomies per patient was reduced in patients treated with selective decontamination ($p < 0.05$). Failure of selective decontamination to prevent secondary gram-negative pancreatic infection with subsequent death was seen in only three patients (6%) and transient gram-negative pancreatic infection was seen in one (2%). In both groups of patients, all gram-negative aerobic pancreatic infection was preceded by colonization of the digestive tract by the same bacteria.

Conclusion:
Reduction of gram-negative colonization of the digestive tract, preventing subsequent pancreatic infection by means of selective decontamination, significantly reduces morbidity and mortality in patients with severe acute necrotizing pancreatitis.

THE EFFECT OF CIMETIDINE VERSUS RANITIDINE ON THE GASTRIC EMPTYING RATE IN INTENSIVE CARE UNIT PATIENTS

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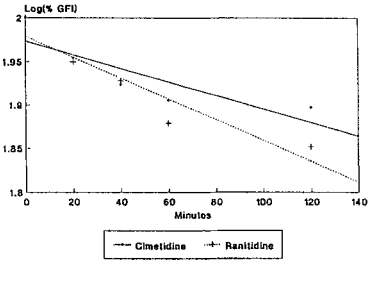
Any delay in gastric emptying can promote micro-aspiration and give rise to ventilator associated nosocomial pneumonia. H2-receptor antagonists have been suspected of promoting pneumonia by changing the gastric pH. In a few trials on humans ranitidine was noted to delay gastric emptying. The aim of this prospective, randomised, blinded study was to evaluate in a ventilated ICU population if there was a difference between cimetidine (C) and ranitidine (R) on the gastric filling index (GFI).
24 patients could be enrolled, 22 were evaluable. A standard protocol with fentanyl/pancuronium was used. Bowel sounds had to be present.
In twenty-two ventilated patients GFI was compared after 500 ml Nutrison®.

	C	R
n	10	12
Age (yr)	50	77*
Weight (kg)	69	72
Height (m)	1.71	1.70
Creat. (mg/dl)	0.6	0.8**

* p<0.01
** p< 0.05



Conclusion: in this population there was no difference in GFI between C and R; however the age and creatinine were significantly different and could have favoured the C group. Also the very long t/2 could have hidden smaller differences between C and R as has been described in volunteers.

Indirect electrochemical blood and exfused plasma oxidation (IECO) in the treatment of surgical patients with endotoxicosis.

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Introduction: IECO by sodium hypochlorite (NaClO) infusion is considered to be a model of microsomal oxidation in liver on cytochrome P-450. Active ClO provides oxidation of toxic metabolic products in the blood and exfused during plasmapheresis plasma, and also hydrophobic to hydrofilic transformation of substanses. Sterile NaClO in necessery concentrations was obtained by electrolysis of saline (0,85-0,9% NaCl solution) in electrochemical set ЕДО-4 (Russia,Moscow).

Methods: 1. The NaClO in concentration 600 mg/l (400-800 ml/24h) was administred into central veins in patients with extensive peritonitis and endotoxicosis 2-3/t. Erytrocytes resistance to NaClO, circulating blood volume glycemia and hemostasis were initially estimated.
2. After plasmapheresis exfused toxic plasma was mixed with NaClO conccentration of 1000 mg/l in 10:1 ratio in sterile "hemacons".The effectiveness of plasma detoxication and possibility of its reinfusion were evaluated by determination of albumin effective concentration (ECA 35 g/l), the concentration of medium molecular oligopeptides (MM 0,2) and other biochemical tests (bilirubin, creatinine, carbomide and so on).

Results: 1. The intravenous administration of NaClO excels detoxicative effect of hemosortion by 17-20% provides efficive presentation of protein components and blood cells and improves the transport function of albumin by 37%.
2. The return of exfused plasma after its purification IECO was 70-80%. Only the remaning 20-30% of deficient plasma were compensated by fresh cryoplasma and albumin solutions.

ACUTE PANCREATITIS OF UNKNOWN ETIOLOGY IN THE ELDERLY .
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Objectives:Acute pancreatitis(AP)is becoming a more important problem among the elderly as the population ages. The increasing presence of gallstone disease,as well as the use of certain drugs,may also contribute to the occurrence of pancreatitis.
Methods:All patients(>60 years)admitted to our medical department over an eight year period were included.Pancreatitis was confirmed by biochemical tests and imaging techniques.Scores were developed using Ranson's criteria and a Multiple Organ System Failure(MOSF)index . Overall, 103 patients were evaluated; 21(23%)had pancreatitis of unknown etiology .
Results:(1)Patients with pancreatitis of unknown etiology were sicker and had greater morbidity(48% vs 22%),mortality(24% vs 8%),and longer hospital stays than patients with pancreatitis of known cause.(2)The best predictor of severity and outcome was the MOSF index and not Ranson's criteria;the higher the score,the greater the associated disease,the worse the outcome.(3)Curiously,no difference existed in associated medical conditions between patients with known and unknown causes of pancreatitis.
Conclusions:Greater organ dysfunction exists in patients with pancreatitis of unknown etiology, even though age and associated medical conditions do not differ .

The enteral nutritional support of the burns disease

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The application of the total enteral nutrition in the burns disease has minimized the complication rate and consequently increased the survival rate of children and adults. Time of initiation, composition, duration and way of administration are very important in obtaining the optimum beneficial effect from the treatment and diminishing the complication rate and side effects. The above features will be discussed in view of our experience in 240 cases.

EVALUATION OF THE ACCURACY OF GASTRIC TONOMETERS

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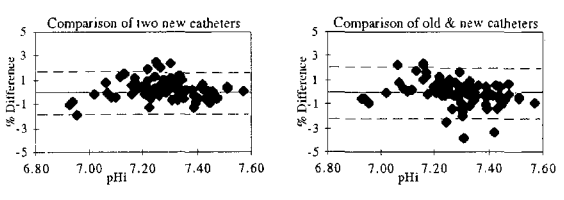
INTRODUCTION: Gastric mucosal pH (pHi) monitoring has been proposed as a relatively noninvasive index of the adequacy of aerobic metabolism in the gut.

OBJECTIVE: To examine the accuracy of gastric intramucosal pH measurements as a function of time and as a function of the catheter itself to determine whether the measurement error between catheters is clinically acceptable.

METHODS: Patients with a gastric tonometer (TRIP^{TM}, Tonometrics, Worcester, MA) insitu for >3 days were studied. Following informed consent two new tonometers were inserted equidistantly & correct position was confirmed radiographically. Measurements of intramucosal gastric pH were then performed over a 36 hr period.

RESULTS: Eight - ten measurements were made in each of ten critically ill patients. Percent differences between the two new catheters were 1.6% ie at pH 7.3 ±0.12 (95% limits) and between old & new catheters were 2.2%, ie pH 7.3 ±0.16 (95% limits).

CONCLUSIONS: The results suggest that the function of the tonometer deteriorates over time and that the absolute values of pHi are not sufficiently accurate. However as a trend monitor pHi may be useful in the clinical setting.



GASTRO-INTESTINAL STRESS-BLEEDING PROPHYLAXIS IN PATIENTS WITH CEREBRAL LESION: NO SPECIFIC PROPHYLAXIS, MONOTHERAPY OR COMBINATION OF TWO SPECIFIC DRUG?

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Despite a continuous decline both in frequency and severity of gastro-intestinal stress-lesion/-bleeding (GISB) due to both improvement in preclinical support and in intensive care medicine, patients with cerebral lesion are still considered at high risk for developing GISB. Therefore the question arises, whether no specific GISB-prophylaxis besides general and neurological intensive care, specific pharmacotherapy or even the combination of two specific drugs reveals any protective effect on frequency and severity of GISB.

This prospective randomized study has been performed in 173 patients suffering from head-injury/cerebral lesion and with a Glasgow-Coma-Scale on admission (GCS_a)of ≤9. According to randomization the patients have been grouped as follows: **I:** analgesia/sedation (n=37); **II:** analgesia/sedation plus pirenzepine 60 mg/day (n=54); **III:** analgesia/sedation plus sucralfate 6 x 1 g/day (n=47); **IV:** analgesia/sedation plus pirenzepine 60 mg/day plus sucralfate 6 x 1 g/day (n=35). Statistical analysis has been performed by CHI^2-test, rank correlation and unpaired t-test; statistical significance has been set with $p < 0.05$.

28/173 patients (16.2 %) developed GISB. Although the mean GCS_a-value (x ± SD) did not reach significance between patients with and without GISB (5.61 ± 1.65 vs 6.12 ± 1.65), a significant inverse correlation between GCS_a and the incidence of GISB (R_{sp} = 0.89) has been shown. The frequency of GISB among the groups is as follows: **I:** 18.9 %; **II:** 18.5 %; **III:** 17.0 %; **IV:** 8.6 % (CHI^2 =1.94; not significant). No GISB-induced blood transfusion or mortality, respectively, could be demonstrated. Survival rate between the groups did not differ significantly (Chi^2 =5.86; P=0.1186) and reached an overall-value of 75.1 %.

Drug-specific GISB-prophylaxis - administered either as monotherapy (pirenzepine, sucralfate) or in combination of these two specific-drugs - reveals no additional significant influence on the incidence of GISB in patients with cerebral lesion compared to no specific prophylaxis besides the general trauma-/disease-specific intensive care measures.

GASTRO-ESOPHAGEAL REFLUX AND NASOGASTRIC TUBE FEEDING: PREVENTION BY ENDOSCOPIC GASTROSTOMY (PEG)

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Objectives: The correlation of longterm presence of nasogastric tube (NGT) to gastroesophageal reflux (GER) is still in question. In case of positive correlation, PEG should represent an alternative to tube feeding in patients unable to be fed orally. Therefore, we investigated: i) the correlation between NG and GER and ii) the effect of PEG on GER.

Methods: A 24-h esophageal pH-metry was performed in 40 patients in recumbent position at 30° who had a NGT for more than 10 days and were on sucralfate for gastric mucosal protection. The tip of the pH-probe was lied 5 cm over the esophagogastric junction, confirmed by x-rays. Patients who presented a percentage of GER-total (i.e. with a pH less or more than 4) (GER-T) more than 3%, underwent a PEG. The presence of a crescent-notch on the esophagogastric junction persisting on inspiration and the grade of endoscopic and histologic esophagitis (scale=0-3) was noted. Two pH-metries repeated on 48 h and on 7 days post-PEG were compared to the pre-PEG one, with the following parameters taken in consideration: i) % GER-T, ii) number of GER-total per hour (No/h GER-T) and iii) the duration that pH was less than 4 (TpH<4). In case of GER persistence at the pH-metry on 7th day post-PEG (Group II) another endoscopy was performed, while patients with reduced GER (Group I) were considered as esophagitis-free.

Results: 23 out of 40 patients presented a GER-T>3%. Eleven out of 23 patients underwent-PEG. The mean (± SD) score of endoscopic esophagitis in Group I vs Group II was 1.5±0.5 vs 2.6 ±0.3 ($p<0.05$), and the histologic one 0.4±0.1 vs 1.4±0.3 ($p<0.05$). The crescent-notch was observed in 1 and 5 patients respectively. Group I patients presented decrease of GER on 7th day compared to pre-PEG pH-metry ($p<0.05$ table) while those of Group II did not. On the second endoscopy the persistence of esophagitis and crescent-notch was observed in Group II patients.

	Group I (n=6)	Group II (n=5)
age	51±23	47±17
NG days	35±11	29±11
I. GER-T	7.6±2.5	8.3±4
No/h GER-T	1.9±3	2.7±0.8
TpH<4	108±35	120±61
II. GER-T	8.6±3.2	5.6±1.7
No/h GER-T	2.1±0.7	1.9±0.5
TpH<4	118±48	80±24
III. GER-T	3.1±1.5	8±1.4
No/h GER-T	1±0.4	2.8±0.5
TpH<4	41±19	116±20

Conclusions: i) longterm presence of NGT is associated with increased GER. ii) PEG decreases GER when esophagitis or crescent-notch regress.

ISCHEMIC HEPATITIS IN THE ICU

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Ischemic hepatitis (IH) is a severe complication in critically ill patients. Acute circulatory failure of multiple etiology can lead to splachnic hypoperfusion and cause acute and reversible anoxic damage. Over a period of 26 mos 12 pts, 8 M and 4 F, mean age 64±6.6 yrs developed liver disease compatible with IH. Eight pts had a documented hypotensive episode (six pts with septic shock and two hypovolemic shock), while cardiogenic pulmonary edema in the absence of hypotension was responsible for IH in the remaining four pts. All the pts had a rapid striking elevation of AST, ALT and LDH with equally rapid resolution of these parameters to near normal witnin 9 days (mean 6.25). The mean peak level of AST, ALT and LDH was 4340 IU/L (range 2105 to 7500), 3453 IU/L (range 1685 to 5150) and 2868 IU/L (range 1440 to 6960) respectively. Serum total bilirubin levels rose transiently with a mean peak level of 1.95 mg/dL (range 1.1 to 2.7), while altered coagulation parameters (PT > 1.5 times normal) was observed in four pts and clinically significant coagulopathy with fibrin degradation products occurred in one pt (8.3%). Renal impairment (Cr>2.0 mg/dl) was manifest in all pts; six pts developed non-oliguric renal failure (50%) while two pts required hemodialysis. Ten pts required vasoconstrictor inotropes [dobutamine (range 3-10μg/kg/min) and dopamine (range 7-25 μg/kg/min), while replacement of circulatory blood volume was performed in two pts with hypovolemic shock. Eight pts expired (66.6%), but none died as a direct result of hepatic damage. The mortality rate was higher among pts with concurrent renal failure (75%). It is concluded that: 1) IH is not uncommon complication in the ICU with the prognosis depending on the underlying disease. 2) Clinically significant coagulopathy is uncommon complication of IH. 3) Titration of inotropes is required to obtain optimal cardiac output support and subsequently liver blood flow.

GRAFT TONOMETRY AS AN INDEX OF JEJUNAL FREE FLAP ISCHAEMIA IN RECONSTRUCTIVE SURGERY

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It is difficult to ascertain the perfusion of free flaps such as jejunal loops after surgery.

Objectives: To assess ischaemia as evidenced by intramural pH of jejunal free flaps used for reconstructive surgery following total pharyngo-laryngectomy.

Methods: The sigmoid pH tonometer (Tonometrics Inc.,USA) was used to monitor intramural pH of the jejunal free microvascular flaps (pHig) in 15 patients who underwent total pharyngo-laryngectomy. A standard general anaesthetic was given and all patients were admitted to the ICU for controlled ventilation and monitoring. All had similar postoperative care. PHig was measured pre, post-revascularization of the flap and on ICU admission, 4, 12 and 24 hours post-revascularization.

Results: PHig was low prior to revascularization (<7.20). Successful flaps showed consistent and sustained increase in pHig values (>7.32). Despite small initial improvement, pHig of all failed flaps (3 cases) remained low (<7.20).

Conclusion: It is possible to monitor perfusion of jejunal free flaps by a sigmoid pH tonometer. Phig values may reflect graft ischaemia when it is low (<7.32) post-revascularization. Failure of pHig value to recover may necessitate early intervention to save the graft.

INTRATHORACIC COMPLICATIONS (ITC) OF ACUTE NECROTIZING PANCREATITIS (ANP) - THEIR ROLE TO FINAL PROGNOSIS.

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Objectives: To classificate the wide spectrum of ITC of ANP into distinct pathophysiological patterns according to presentation and course.
Patients (pts) and methods: 52 pts, 34 ♂ (65,4%), 18 ♀ (34,6%) were admitted in the ICU because of ANP and acute respiratory failure(ARF). Mean age:54,3±10,3 years. Mean stay in ICU:29,2±9,4 days. 38 pts were operated, 15 of them twice. Mean value of Ranson's scale:4,4±0,6 (2-7). We analyzed hemodynamic measurements,arterial blood gases(ABG), X-ray findings(XRF), CT-scans and operative records.
Results: 5 patterns of pleuropulmonary complications were identified: a)Early hypoxia without XRF - 33 pts. b)Early ARDS with typical XRF - 5 pts(1 died). c)Early ARF with XRF(atelectasis,infiltrates) - 15 pts(9 died). d)Late ARDS with typical XRF-32 pts(31 died). e)Pleural effusions in various combinations with the above patterns - 38 pts. Overall mortality rate: 41/52 = 78,8%.
Conclusions: 1)Frequent X-rays and ABG are important for the classification of ITC of ANP. 2)Even though patterns of classification in ANP are not clearly distinguishable,they facilitate an anticipatory management. 3)Deterioration of ABG and XRF indicates that preventive measures for ARF must be intensified and agressive surgical therapy is required. 4)Delay of surgical therapy is related to worse prognosis($p<0,05$) and prolonged hospitalisation time($p<0,01$). In the contrary, the early timing of the operation before infection and extrapancreatic necrosis is essential for a better prognosis ($p<0,05$).

PROGNOSTIC RELEVANCE OF CHOLESTASIS ON ICU

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Objectives: The development of cholestasis during intensive care treatment is allied with an inferior prognosis. This study investigates the sensivity, specification and also the positive and negative forecast of patients survival - exemplary for bilirubine.
Methods: During a period of 12 months all surgical patients on ICU were registrated prospectively (n= 1572). For documentation of disease development a standard folderform based on a computer- data- system was used. The results of this kind of documentation showed aapprox. 5,2 mill. of single patient informations.
Results: 1300 of 1572 patients didn't suffer from liver disease or have any operation on liver or bile tract. 1201 of them have had a normal scale of bilirubine in the postoperative period, a higher scale of bilirubine was registrated by 99 patients. At a „cut- off" of 4mg% (total- bilirubine) the sensitivity was 0,7, specivity 0,6, positive predicive level 0,8, negative predictive level 0,5 for survival criteria of a patient. The max. reached level of bilirubine, also the daily increase turned out almost the same results as they were found for other parameters of cholestasis like AP or Gamma-GT.
Conclusions: Cholestasis of surgical patients on ICU isn't important for the clinical survival of the patient.

MORPHOLOGY AND FUNCTION OF AN ISOLATED LIVER GRAFT IN AN EXTRACORPOREAL LIVER SUPPORT CIRCUIT

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Objective: The aim of this experimental protocol was to evaluate the morphological and functional parameters of isolated pig liver grafts, perfused in an extracorporeal liver support system.
Methods: The system consists of the graft liver, a membrane oxygenator (oxygenation surface 1.2 cm^2, O_2 flow=3 lt/min), a heater, a centrifuge pump and a fluid reservoir. Twenty pig livers, mean weight 790 gr (min 610, max 870 gr) were obtained and after a mean cold ischemia time of 35 min were perfused for a mean of 7.5 h (min 4.5, max 9 h). Perfusion solution consisted of R/L and Hemacell. Inflow to the graft liver was performed through the portal vein at a mean pressure of 16 (12-25) mmHg at 38^oC while outflow was secured through the suprahepatic inferior vena cava. During perfusion the following parameters were evaluated through pre- and posthepatic hourly (T_0-T_8) sampling: pO_2, pCO_2, pH, HCO_3^-, Na^+, K^+, Ca^{++}, osmolality, glucose, lactate, AST, ALT, ALP, γ-GT, bilirubin and coagulation factors I, V and VIII. Biopsies were obtained periodicallty.
Results: Results were as follows: mean pH fell from 7.45 at T_0 to 7.168 at T_8 while mean output pO_2 fell from 527 at T_0 to 10 at T_8. Mean output AST values increased from 361 at T_0 to >2500 at T_8 while mean output ALP values increased from 3.66 at T_0 to 197 at T_8. Mean output K^+ values increased from 3.93 at T_0 to >8 at T_8. Histology revealed lesions of ischemic necrosis, more prominent after T_6.
Conclusion: Results show that the isolated liver graft presents satisfactory function and morphology at least for a five hour perfusion period in the described extracorporeal circuit. Correction of pH contributed to an increase in bile flow.

EXTENDED CRITERIA FOR CARDIAC ALLOGRAFT DONORS

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To expand the current criteria for potential cardiac allograft donors, a questionnaire was sent to all cardiac transplant surgeons in the UK. Replies representing the opinion of 88% of surgeons were analysed. Eighty per cent of respondents believe that donor age could be extended to 55 years even in the absence of on-table coronary angiogram, pharmacological stress test ECG, or Echocardiography. Family history of ischemic heart disease, and brain death due to paracetamol or barbiturate overdose were not considered prohibitive to cardiac allograft donation. Similarly prolonged mechanical ventilation, pre-referral cardiac arrest or hypotension for any length of time, and ST-segment elevation were not considered to be a contraindication. In contrast, significant Q wave, the presence of hepatitis C antibodies, pulmonary capillary wedge pressure more than 21 mmHg, and dependency on multiple inotropic support were considered definite exclusion criteria. Donor hormonal resuscitation (T3 Cocktail), and direct measurement of intra-cavitary pressure at the time of retrieval were considered unnecessary. There was no consensus of opinion regarding the use of donors with systemic infections, brain death due to carbon monoxide poisoning, or death due to alcohol and drug abuse. In conclusion, there is a scope of expanding the cardiac allograft donor pool by increasing the upper limit of donor age, and by considering victims of brain death due to Paracetamol, and Barbiturate overdose as potential donors.

INFLUENCE OF TRANSPLANTATION ON ORGAN DONATION

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Between 1982 and 1993 the practice of transplantation has changed drastically in Switzerland - besides Kidneys also hearts, heart and lung, lung, liver and pancreas transplantation has started in several centers. Major information efforts have been made, organ exchange rules were set up and a national coordination center was initiated. The aim of this retrospective single center study was to assess the influence of transplantation on organ donation. In the past eleven years 205 organs were donated from 458 potential donors (139 single, 66 multi organ donations) analysis of refusal was evaluated categorized into medical and/or familiar reasons. The number of potential donors increased from 28 (1982), to 61 (1992) with a concomitant drastic reduction of donations from 64% in 1982 to 26% in 1992; amounting to a net unchanged number of donations over the last 10 years (1982 = 18; 1992 = 17). The import and export of donor organs was balanced since the introduction of the national coordination center. In contrast multi organ donation increased from 0% in 1986 to 90% in 1993 despite of the more stringeant selection criteria. In conclusion the introduction of a full range of transplantation procedures at several new university programs and the increase of multi organ donation has not had the forecasted impact on organ donation despite a sustained informative and promotional campaign.

VASODILATORS IN PATIENTS RECEIVING LIVER GRAFTING

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Objective: Monitoring hepatic venous oxygen saturation ($SvhO_2$) provides on-line information about hepatic-splanchnic oxygen supply-demand ratio [1]. Previously, we reported hepatic venous catheterization in patients undergoing orthotopic liver transplantation (OLT) [2]. In the present study, we assessed the effects of nitroglycerin (NG), a vasodilator that affects the venous capacitance vessels more than arterial vessels and prostacyclin (PGI_2, *Flolan™*, Wellcome, UK), an arterial and splanchnic vasodilator on hemodynamics and hepatic venous oxygen saturation ($SvhO_2$) in human liver transplantation.

Methods: With institutional approval and informed consent, 14 consecutive patients, mean age 50±10 years, were studied following OLT. Postoperatively, fiberoptic pulmonary artery catheter was inserted into the right hepatic vein. Timed infusions of NG at a rate of 0.1 µg/kg/min and PGI_2 at 5 ng/kg/min were initiated for a 45 min period. Each sequence was followed by baseline therapy for 45 min. Results are expressed as mean±SD. Statistical analysis was performed using Friedman's-two-way-ANOVA-test, significance was accepted at $p<0.05$.

Results: NG at 0.1 µg/kg/min induced a decrease of mean arterial pressure (MAP) (*84±9 [baseline]* vs. 75±9 mmHg) and pulmonary artery wedge pressure (PCWP) (*8±2 [baseline]* vs. 6±1 mmHg). Cardiac index (CI) (*5±1* vs. 4±1 l/min/m^2), oxygen delivery index (DO_2I) (*655±108* vs. 618±123 ml/min) and $SvhO_2$ (*74±12* vs. 69±19%) were decreased ($p<0.05$).

PGI_2 at 5 ng/kg/min induced a reduction in MAP (73±8 mmHg) and PCWP (6±1 mmHg). CI (6±1 l/min/m^2), DO_2I (755±135 ml/min) and $SvhO_2$ (81±6%) were increased ($p<0.05$).

Conclusions:

- Vasodilatation induced by NG decreased systemic oxygen supply and impaired splanchnic oxygenation.
- PGI_2 increased systemic oxygen delivery in parallel with $SvhO_2$, suggesting a corresponding improvement of hepatic-splanchnic oxygenation.
- Thus, if vasodilator therapy is indicated in the patient receiving liver grafting, PGI_2 appears to be advantageous. However, due to its platelet aggregation inhibiting properties, the usefulness and safety of PGI_2 in OLT patients has still to be determined.

References: [1] Anesthesiology 1991:74:49.
[2] Transpl Proc 1994:26:3608.

EFFECT OF STEROID GIVEN TO DONOR ON THE EARLY FUNCTION OF TRANSPLANTED KIDNEY

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Objectives: To analyze the effect of steroid treatment given to donor on the early function of transplanted kidney.

Methods: From January, 1994 until now 56 donors were involved into this prospective study. Every other donor was treated with 30 mg/kg Solu-Medrol one hour before organ retrieval. According to the steroid treatment of the donor the recipients were divided into two groups: Group 1 - steroid pretreatment group (n=35), and Group 2 - control group (n=37). The donors and the recipients were treated using the same kidney transplantation protocol. Only the adults, and the first cadaver kidney transplanted patients were involved into the study. The daily routine parameters were analyzed pre- and intraoperative, and on the 0-5th, 14th and 30th postoperative days.

Results: We could not show any clinically important differences between the two groups in respect of donor parameters. Preoperative, the patients in Group 2 had slightly lower creatinin level (819 ± 244 µmol/l vs.923 ± 254µmol/l) which persisted into the early postoperative phase. The values of the other examined pre- and intraoperative parameters were almost the same. During the first 5 postoperative days the patients in Group I needed less diuretics (furosemide and renal dose of dopamine) and their sodium excretion was closer to the physiological range than in Group 2. The other parameters did not differ significantly. The less furosemide need in Group 1 persisted to the end of the first month.

Conclusions: According to our data the steroid treatment of the donors improves the early function of the transplanted kidney in some respects. To prove the real benefit of the donor steroid treatment needs more data and further analysis.

INFLAMMATORY MEDIATORS AND HEMODYNAMIC CHANGES DURING ORTHOTOPIC LIVER TRASPLANTATION (OLT).

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INTRODUCTION. Patients undergoing OLT present a transient hyperdynamic status similar to that observed in septic patients. Nitric oxide (NO) released by several cells when stimulated by endotoxin and/or other inflammatory mediators, has been related to hemodynamic impairment in sepsis.
PURPOSES 1. To analyse plasma concentrations of endotoxin, TNF-α (Tumor Necrosis Factor), and (NO_2^-/NO_3^-) during and after OLT in relation to changes in hemodynamic indexes. 2. To investigate whether plasma inflammatory mediators may be involved in the pathogenesis of ischemic graft injury after OLT.
PATIENTS AND METHODS. A total of 41 OLT were performed in 40 patients. Ischemic time median (range) was 11 hours (6-20). Thirteen patients (31%) showed hepatic ischemic injury (HII) (group 1) defined as a level of ALT > 1000 U/L, TP ≤ 40% histological criteria in the 48 hours after OLT. Plasma TNF-α, endotoxin, NO_2^-/NO_3^- and cardiac index (CI) were measured at: predisection (stage I), anhepatic phase (stage II), 15 minutes (stage III), 60 minutes (stage IV), 180 minutes (stage V) after reperfusion , and 4 days after ICU admission (stage VI). All results are expressed as median and range.
RESULTS. Increases of CI and NO_2^-/NO_3^- were observed during OLT reaching maximum values at stages III [5.8 (5.0-7.1) L/min/m^2] and IV [42 (26-67) nmol/L] respectively, and decreasing to baseline levels at stage VI. NO_2^-/NO_3^- at stage IV were significantly higher ($P<0.001$) in group 1 [76 (50-85) nmol/L] than in patients without HII, group 2 [35 (23-49) nmol/L]. TNF-α increased in both groups up to maximum levels at stage IV [36 (27-48)pg/mL]. No significant differences in peak levels were observed between the group 1 [46 (35-48) pg/mL] and 2 [32 (21-50) pg/mL], however in group 1 TNF-α levelled down more slowly than in group 2. No significant changes in plasma endotoxin levels were observed in any group.
CONCLUSIONS. Endotoxin don't initiate the proinflammatory response observed. The relationship found between CI and NO_2^-/NO_3^- suggest than NO is involved in the development of OLT-related hyperdynamic

CYTOKINES AND EXTRACELLULAR MATRIX PARAMETERS AS INDICATORS OF SEVERITY OF REJECTION AFTER LIVER TRANSPLANTATION

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Objectives: Evaluation of the cytokine network after liver transplantation may give some insight in pathophysiologic mechanisms of rejection and may lead to detection of patients at high risk.
Methods: 81 patients with 85 transplants were monitored for various cytokines on a daily basis between August 1993 and September 1994. Rejection was assessed by histology in combination with clinical signs of rejection and laboratory investigations.
Results: During the first postoperative month, 28 patients (34.6%) developed rejection; 14 patients were successfully treated with methyl-prednisolone (steroid-sensible rejection), while further 14 patients required additional treatment with FK506 or OKT3 (steroid-resistant rejection). 4 patients subsequently developed chronic rejection. Mean levels of various cytokines and extracellular matrix parameters including TNF-RII, IFN-γ, IL-1ß, IL-2R, IL-4, IL-6, IL-8, hyaluronic acid and neopterin were significantly higher in patients with steroid-resistant than in patients with steroid-sensible rejection. A further increase of some parameters was observed in patients who subsequently developed chronic rejection; bilirubin: 18.2±4.1 mg/dl vs 11.2±1.7 mg/dl; TNF-RII: 23374±798 pg/ml vs 18246±679 pg/ml; IL-8: 1024±192 pg/ml vs 275±67 pg/ml; neopterin 148±37 nmol/l vs 49±21 nmol/l; hyaluronic acid: 290±63 µg/l vs 223±28 µg/l for patients with chronic versus patients with acute steroid-resistant rejection. Sialic acid levels decreased in patients with acute steroid-resistant rejection; and a further decrease was observed in patients who developed chronic rejection: 437±34 mg/l vs 671±55 mg/l.
Conclusions: Various cytokines and extracellular matrix parameters were indicative of severity of rejction. The extensive increase of bilirubin, TNF-RII, IL-8, hyaluronic acid and neopterin may indicate subsequent chronic rejection. Monitoring of these parameters may, therefore, lead to changes in immunologic management after liver transplantation.

CYTOKINES AND EXTRACELLULAR MATRIX PARAMETERS - INDICATORS FOR SEVERITY OF INFECTION AFTER LIVER TRANSPLANTATION

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Objectives: Severe infections may compromize the outcome of liver transplantation. Determination of new parameters may increase the knowledge of pathophysiologic mechanisms and may lead to changes in postoperative therapeutic management of patients at risk.
Methods: Between August 1993 and September 1994, 81 patients with 85 transplants were monitored for cytokines and extracellular matrix parameters on a daily basis. Serious infections (n=10) included microbiologic evidence and more than 2 secondary organ failures. Patients with cholangitis (n=11) or uneventful postoperative course (n=37) referred as control groups.
Results: 1-year patient survival was 88.9% (72/81): 5 patients died due to serious infections, while 4 died for other reasons. Mean bilirubin, sTNF-RII-, IFN-γ-, IL-4-, IL-8-, IL-10-, laminin- and neopterin levels were significantly elevated in patients with serious infections compared with patients experiencing mild cholangitis or with an uneventful postoperative course. A further increase of all parameters was observed in patients who subsequently died; TNF-RII: 28310±788 pg/ml vs 20452±355 pg/ml; IFN-γ: 466±57 pg/ml vs 4.4±1.8 pg/ml; IL-4: 214±35 pg/ml vs 148±29 pg/ml; IL-8: 667±48 pg/ml vs 251±26 pg/ml; IL-10: 149±52 pg/ml vs 52±11 pg/ml; laminin: 3010±312 ng/ml vs 1263± 117 ng/ml; neopterin: 247±37 nmol/l vs 96±19 nmol/l for non surviving vs surviving patients. A significant decrease of sialic acid was observed in patients with serious infections; and a further decrease occurred in patients who subsequently died: 455±31 mg/l vs 685±52 mg/l.
Conclusions: The increase or decrease of various cytokines and extracellular matrix parameters may be indicative for severity of infection. Routine monitoring of these parameters may improve current diagnostic tools and possibly lead to changes in therapeutic management of patients at risk.

ARTERIAL MYCOTIC ANEURYSM : A LIFETHREATENING COMPLICATION OF WHOLE KIDNEY-PANCREATIC TRANSPLANTATION.

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Background : Combined kidney and pancreatic transplantation is being performed with increasing frequency in patients with diabetes mellitus and renal failure, as it offers more chances of success and better results than kidney transplantation alone. Mycotic arterial aneurysm constitutes a devastating complication following pancreatic transplantation. All cases of mycotic arterial aneurysms have been however reported with exocrine pancreatic drainage into the gastrointestinal tract.
Intervention : We describe a series of 8 consecutive whole kidney-pancreas transplantation performed at the University of Geneva Hospitals (1500 beds) between December 1992 and May 1994. Exocrine pancreatic drainage into the bladder (EPDB) was performed to improve early detection of rejection episodes. EPDB was hypothesized to reduce the risk of contamination from the gastrointestinal tract and the subsequent possible occurrence of potentially fatal infectious complication. In all patients the dual transplantation was performed through a median incision according to the procedure described by Nghiem.
Results : Two out of the 8 patients who received kidney-pancreatic transplant developed arterial mycotic aneurysms 15 and 35 days following surgery. Aneurysms developed at the site of the arterial anastomosis used to rearterialize the homograft. Both patients had peritonitis caused by *Candida albicans* requiring surgical drainage and intravenous antifungal therapy. Rupture with hemorragic shock occured in both patients leading to graft removal in one patient, and three episodes of lifetreatening hemorragic shock followed by graft failure and removal 32 days after transplantation in the other.
Conclusion : Arterial mycotic aneurysm constitutes an early, lifetreatening complication of kidney-pancreatic transplantation; it mandates graft removal. Although exocrine pancreatic drainage into the bladder consitutes a definitive advantage for ealier diagnosis of graft rejection, it does not eliminate the risk for retrograde colonization and subsequent severe infection in our experience.

Correction of hemorragy in hepato-pancreato-duodenal surgery

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Acute profound loss of blood can result from the very different injuries and hepato-pancreato-duodenal operations enter such a rank.

Ill-timed and inadeguate correction of operation hemorrage is one of the reasons for postoperation complications, including polyorganic insufficiency.

The pathogenesis seems to be very complex. In early stages of bleeding the liquid enters the vessel bed, followed by hypoproteinosis and hematocrit fall. However, as decompensation develops, the fluid leaves the vessel system in the result of increasing postcapillary resistance and lowering colloidnooncotic blood pressure (COP). The resulting hypovolemia causes primarily acute disturbance of central hemodynamics and then of microcirculations and transcapillary exchange. Central hemodynamic failure after acute loss of blood manifests itself through cardiac output lowering and capillary blood flow deceleration.

Taking into consideration, that 35 % is critical value for CPV loss and for CEV it is 65 %, we consider arising the level of COP to the immediate task. COP raising allows to normalize transcapillary exchange, which we assess through COP and MCP (mean capilary pressure) gradient. The next task is to make up for globular volume till homeostasis providing level. Considerable attention is given to catabolism inhibition and maximum possible enegry provision. Control over high proteolitic activity of blood and callicreinkinin system activity implies direct proteases inhibitors.

Reologic, membrane stabilizing, antihypoxanthine and anticoagulant therapies are obligatory.

TREATMENT OF ACUTE LIVER FAILURE - A NARROW MARGIN BETWEEN MEDICAL SUPPORTIVE CARE AND LIVER TRANSPLANTATION

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Regarding a high mortality up to 85 % of fulminant hepatic failure orthotopic liver transplantation seems to be the only promising therapeutic approach in many cases. This study shows experiences from a transplantation center.

Between June 1991 and April 1995 39 patients suffering fulminant hepatic failure were admitted to our surgical intensive care unit All patients showed severe liver dysfunction with grade II to IV encephalopathy.

After a period of diagnostics and conservative treatment ranging from few hours to 10 days (mean 2.4 days) we reported 22 of these patients as possible organ recipients to Eurotransplant. All of these 22 patients were transplanted within 48 hours, 16 (73 %) of them even within 24 hours. The principal aetiologies were hepatitis B (7), hepatitis C (1), NANB hepatitis (5), mushroom poisoning (amanita phalloides 1). After transplantation 2 patients suffered from initial-non-function and underwent re-transplantation. The one-year-survival rate was 82 %. 5 patients died within 3 months after transplantation due to various reasons.

17 patients were not referred for liver transplantation. 10 of them never met transplantation criteria, improved by conventional therapy and could finally be discharged from hospital. The known reasons for liver failure in this group were mushroom poisoning (4), paracetamol intoxication (4) and fulminant hepatitis A (1). 7 patients suffering from fulminant hepatitis (6) or intoxication (1) were excluded from emergency liver transplantation for various contraindications. 6 of these 7 patients (86 %) died despite conventional intensive care.

We don't know if some of the patients in the transplantation group would have survived without transplantation, because whenever we decided on transplantation we could perform the operation within 48 hours.

But
- the good survival rate in the transplantation group (82 %)
- the 100 % recovery rate in the group, where there was no transplant-indication in our opinion
- and the fatal outcome (86 % mortality) in patients with contraindications

are an encouraging proof of a successful therapeutic strategy in acute liver failure. These results are based on a close cooperation between experienced transplant surgeons, hepatologists and intensive care doctors, using sophisticated laboratory and imaging techniques in a specialized center.

Title: Hemodynamic and hormonal changes after the administration of triiodothyronine in brain death patients potential organ donors.

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Introduction: During brain death patients suffer from multiple endocrinologic disturbances. One of the most important are those related with thyroidal axis. It is well described the Euthyroid Sick Syndrome whose more frequent pattern consist of decreased triiodothyronine (T3), increased reverse T3 (rT3) with normal levels of tetraiodothyronine (T4) and TSH. This lacking in T3 levels lead to a change from aerobic to anaerobic metabolism which results in tissular damage.

Objective: 1.To study thyroidal pattern in brain death patients potential organ donors. **2.**To avoid organ impairment by administration of T3. **3.**To study the hemodynamic and hormonal changes after the administration of T3 in these patients.

Material and Methods: Population: 22 brain death patients of any etiology potential organ donors admitted to the Intensive Care Unit.

Patients were classified in hemodynamically stable (group 1) and unstable (group 2). Group 2 received a bolus of 0.25µgr/Kg. and a perfusion at a dose of 2-3,5 µgr/h of T3.

Hormonal assays: Total T3 (TT3), Total T4 (TT4), TSH, free T3 (FT3), free T4 (FT4) and rT3 were determine at the moment of clinical brain death (0 hrs) and in group two these assays were repeted at hours 4, 8 and 12.

Results: 22 patients (17 male) with a mean age of 33 years (range 17 to 71yrs.) were studied. The clinical brain death was confirm later with other explorations (EEG, doppler). There were 15 patients in group 1 (68,1%) and 7 patients in group 2 (31,8%). Hormonal pattern: At the moment of brain death TT3 was normal in 21 cases (95,4%) and decreased in 1 (4,6%); TT4 was normal in 9 patients (40,9%) and decreased in 13 (59,1%); FT3 was normal in 3 cases (13,6%), decreased in 19 (86,4%); FT4 was normal in 19 patients (86,4%) , decreased in 3 (13,6%) .rT3 was normal in 17 cases (77,2%) and increased in 5 cases (22,8%). There were no statistically significant differences in hormonal pattern between the two groups. Only T3 levels at hours 0, 4 and 8 were significant in group 2. In the 19 cases with FT3 decreased, the TT3 was normal in 18 (84%) and decreased in 1 (16%), TT4 was decreased in 11 (57,8%) and normal in 8 (42,1%), TSH was decreased in 11 (57,8%), normal in 7 (36,8%) and increased in 1(5,2%) and FT4 decreased in 3 (15,7%) and normal in 16 (84,2%) and rT3 was normal in 14 (73,68%) and increased in 5 (26,3%). There were no statistically significant differences in cardiac index, vascular resistances and pulmonary shunt before and after the administration of T3.

Conclusions: 1. The hormonal pattern most often find in brain death patients was: normal TT3, decreased TT4, normal TSH, decreased FT3, normal FT4 and normal rT3. **2 .** There were discrepancies in the values of FT3 and TT3 **3.** There were no statistically significant differences in hemodynamic and pulmonary parameters.

CARBON DIOXIDE DEPENDENT CHANGES OF CEREBRAL HEMODYNAMIC DEMONSTRATED BY MAGNETIC RESONANCE ANGIOGRAPHY

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Objectives: Magnetic Resonance Angiographie (MRA), a non-invasive procedure, provides flow-related information additionly to the anatomy of the vascular system. Measurement of signal intensity and edge detection of vessel structures permits to calculate blood flow velocity and vascular diameters. We examined whether cerebral hemodynamic changes by altering the arterial pressure of carbon dioxid (Pa_{CO2}) could be detected by MRA.

Methods: Following institutional approval and informed consent, 10 mechanically ventilated patients without elevated intracranial pressure underwent MRA with defined periods of hyper-, hypo- and normoventilation (Pa_{CO2}: 30, 50, 40 mmHg; arterial blood gas probes; AVL). MRA was performed with a 1.5 Tesla Magnetom (Vision, Siemens). Two different MRA techniques were used: a conventional Time-of-Flight-3D-Angiography (TR: 39 ms; TE: 7 ms; FL: 20 deg; Slab: 56 mm) for vessel diameter detection and a Flash-2D-Gradient-Echo-Sequence (TR: 28 ms; TE: 5 ms; FL: 30 deg) for measurements of blood flow velocity. An axial view parallel to the AC-PC-line (anterior-posterior-commissur-line) was used for repeated imaging of identical regions of interest (ROI) of the proximal part of the internal carotid (ICA) and middle cerebral artery (MCA) as well as of peripheral branches of the MCA and the posterior cerebral artery (PCA).

Results: Changes of Pa_{CO2} correlated with changing signal intensities, whereby under hyperventilation a decrease of 23.7% (P 0.01) and under hypoventilation an increase of 28.4% (P 0.01) was observed compared with normoventilation. Blood pressures were stable throughout the whole study period. Pa_{CO2} dependent changes in vessel diameters were more pronounced in peripheral branches of MCA and PCA. A change from normo- to hyperventilation produced a decrease in proximal vessel diameter of -3.5% ($P \leq 0.01$) and in peripheral diameter of -22.2% ($P \leq 0.001$). A change from normo- to hypoventilation produced an increase in proximal diameter of +6.1% ($P \leq 0.05$) and of +21.3% ($P \leq 0.001$) in peripheral diameter.

Conclusions: Pa_{CO2} related changes of cerebral vessel diameter can be easily detected by MRA without injecting a contrast agent. The results confirm that CO_2-reactivity is more pronounced in peripheral cerebral vessels, which are subjected to greater changes in diameter than major basal arteries. Hyperventilation leads to a decrease and hypoventilation to an increase in signal intensity thus reflecting the corresponding changes in blood flow velocity.

AIR BRONCHOGRAM SIGN AS A NEGATIVE CRITERION FOR BRONCHOSCOPY IN ATELECTASIS IN ICU PATIENTS

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Objectives: The value of bronchoscopy in pulmonary atelectasis of ICU patients is under question. The presence of an air bronchogram sign in x-rays, which is considered as evidence of central bronchus patency, is referred in several studies as a negative criterion for bronchoscopy, whereas its absence as a positive one. It is also referred that air bronchogram sign correlates with delayed resolution of atelectasis, probably because of obstruction of many periferal airways (not central). The purpose of this prospective study was the evaluation of the air bronchogram sign on frontal chest film as a negative criterion for bronchoscopy and as criterion of delayed resolution of atelectasis.

Methods: ICU patients with atelectasis were studied prospectively. They underwent bronchoscopy. Bronchoscopic findings, presense of air bronchogram sign, and outcome of atelectasis were recorded. Correlations were made, between: 1) Bronchoscopic patency of airways and air bronchogram sign 2) Resolution time of atelectasis and broncoscopic patency of airways. 3) Resolution time of atelectasis and air bronchogram sign. Methods of statistical analysis were the T-student test and the Chi square test.

Results: The patients were 23, men 19 women 4. Seventeen patients had atelectasis of whole lung, 3 of upper lobe, and 3 of lower lobe. Ten patients had atelectasis in right and 13 in left lung. Eight from 23 patients had air bronchogram sign in x-ray. There was no statistical correlation between air bronchogram sign and bronchoscopic patency of airways [6 from 8 patients with air bronchogram sign (75%) and 11 from 15 without air bronchogram sign (73%), had bronchoscopic patency of airways, p>0,1]. Resolution time of atelectasis didn't correlate statistically with bronchoscopic patency of airways (mean resolution time in patients with bronchoscopic patency 2,29 days and in bronchoscopically closed bronchi 2,33 days, p>0,1). There was also not a statistical correlation between resolution time of atelectasis and air bronchogram sign (mean resolution time in patients with air bronchogram sign 2,25 days, and without air bronchogram sign 2,33 days, p>0).

Conclusions: The presense of an air bronchogram sign in x-ray of ICU patients with atelectasis, does not coexist obligatorily with bronchoscopic patency of airways and cannot be used as a negative criterion for bronchoscopy, neither as a criterion of delayed resolution of atelectasis.

Diagnostic Use of Chest Sonography in ICU Patients

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Chest sonography (CS) is routinely used in our department to examine ICU patients with clinical symptoms of pulmonary embolism, pneumonia, pleural effusion or unclear chest pain. We perform CS with a sector transducer (4.0 MHZ) and a linear transducer (7.0 MHZ) using ACUSON 128XP/10 c.

The sonographic signs of pulmonary embolism and infarction are most well demarcated, mainly wedge shaped and triangular pleural based lesions, more roughly structured, observed with a hyperechoic reflex in the center corresponding to the bronchiole (Fig. 1). Pneumonia is characterized by homogenously hypoechoic, wedge shaped parenchymal lesions, containing air or fluid bronchograms; they move with respiration (Fig. 2). Pleural effusions are spaces of various echogenicities, from anechoic to homogeneously echogenic, which may contain floating strands or complex septa, located between visceral and parietal pleuras (Fig. 3).

From march 1994 to april 1995 we did 55 examinations by CS in 34 ICU patients (20 male, 14 female; age from 29–87).

Diagnosis	Patients	Examinations
Pulmonary embolism	10	16
Pneumonia	7	16
Pleural effusion	13	19

US-guided thoracic punctions were performed in 7 patients.
In two patients we found pneumonia or pleural effusion caused by a lung carcinoma. Another two patients showed a normal CS (diagnosis: inflammation of the gall bladder, inflammation of the myocardium).

Conclusion: CS is a very useful method for ICU patients with chest diseases. It takes less time and is less expensive than CT and sometimes of a higher diagnostic value than X-ray. Last but not least CS is invaluable for the ICU patient, because the examination is done save and quickly at bed side and the results of CS are very helpful in diagnoses and treatment.

Detection of Pericardial Effusion in Patients With Human Imunodeficiency Virus Infection. Clinical/Echocardiographic Analysis and Therapeutic Implication of a Prospective Study

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Patients (pts) with the Human Imunodeficiency Virus (HIV) infection have frequently pericardial effusion (PE). The aim of our study was to analyze the prevalence of hemodynamically significant PE, its clinical and therapeutic implications. We prospectively studied 245 pts, 33% with PE during the clinical course. We analyzed the following parameters: age, gender, race, type of HIV, CDC classification, number of T4 and T8 type cell population and its ratio, therapeutic with AZT, type and number of opportunist infections (INF, Mycobacteriosis (MB), Neoplasm's (NEO). The echocardiographic parameters were LV internal diastolic and systolic diameters, LV percentage of fractional shortening, interventricular and posterior wall thickness, degree of PE. We found moderate to large PE in 19 pts (23%-Group 2) and a small PE in 63 pts (77%-Group 1). These two groups differed significantly in the following parameters:

	HIV	IVDA	T4	NEO	MB	AZT
Group 1	1.7±2.5	.4±.5	152±210	.5±1	19%	.7±.6
Group 2	1.0±.2	.7±.4	262±243	.2±.6	52%	.2±.4
p Val	.03	.001	.002	.04	.001	.0001

Conclusion: Large pericardial effusion can occur in early stages of HIV disease. In these cases, the clinical evolution of the HIV cardiomyopathy is more favorable when compared with patients with small pericardial effusion. The presence of hemodynamically significant pericardial effusion is not related with the number of opportunist infections, but is strongly related with the type of infection.

DIAGNOSTIC AND THERAPEUTIC IMPLICATIONS OF TRANSESOPHAGEAL ECHOCARDIOGRAPHY IN PATIENTS ADMITTED TO A MEDICAL I.C.U.

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Objectives : The aim of this prospective study was to evaluate the diagnostic and therapeutic implications of transesophageal (TEE) echocardiography in intensive care patients.
Methods : Between January 1, 1992 and May 31, 1993, 61 patients (mean age : 63 ± 15, Apache II score : 19.5 ± 9, mechanical ventilation : 66 %) with shock (n = 14), severe and unexplained hypoxemia (n = 31) or suspected endocarditis (n = 16) underwent a TEE examination to supplement transthoracic echocardiography (TTE). The results of each TEE examination were compared with the clinical and TTE data. The following classification was used : class 00 = the TEE results refuted the TTE diagnosis ; class 0 = the TEE results were similar to TTE results ; class 1 = the TEE results revealed a new but minor finding ; class 2 = the TEE results revealed a new and major finding without therapeutic consequences ; class 3 = TEE led to an immediate change of treatment. All TEE data were reviewed by 2 different intensive care staff members. In case of disagreement the results were discussed until a consensus was reached.
Results : Inter-observer reliability was evaluated as an 83 % concordance. Results of the TEE classification were : class 0 : n = 21 (34 %) ; class 00 : n = 13 (21 %) ; class 1 : n = 7 (12 %) ; class 2 : n = 8 (13 %) class 3 : n = 12 (20 %). Therapeutic implications of TEE in class 3 patients were : cardiac surgery in 5 patients (two cases of acute mitral regurgitation, two valvular abscesses and one hematoma compressing the left atrium), discontinuation of PEEP in one ventilated patient with an atrial septal defect, weaning of mechanical ventilation in one patient with an atrial septal defect, prescription of antimicrobial therapy in 3 patients with endocarditis and prescription of anticoagulant therapy in 2 patients with left atrial thrombus. The only noteworthy complication was a case of spontaneously resolving supraventricular tachycardia.
Conclusion : TEE is safe and well tolerated, and is useful in the management of ICU patients with shock, unexplained and severe hypoxemia or suspected endocarditis.

TRANSESOPHAGEAL ECHOCARDIOGRAPHY FOR ASSESSMENT OF MOBILE RIGHT HEART AND PULMONARY ARTERY THROMBI UNDER THROMBOLYSIS WITH RT-PA

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In the majority of cases right atrial or ventricular thrombi represent pulmonary emboli in transit. These may be fatal in patients (pts) treated conservatively with anticoagulation only. In literature the incidence of right heart thrombi in pts with proven pulmonary embolism (PE) is said to be in the range of 3-4%. Extremely mobile, long, worm-shaped masses in the right heart cavities carry an especially high early thrombus-related mortality rate which ranges from 40-50%. Current therapeutic strategies favour fibrinolytic therapy with consecutive anticoagulation. We report five cases (4 male, 1 female, 55-74 years) of right heart and pulmonary thromboembolism. In these pts diagnosis and regression of thromboemboli following systemic intravenous lysis therapy with recombinant tissue-type plasminogen activator (rt-PA) was documented by transesophageal echocardiography (TEE). A submassive PE occured in 3 pts, a massive PE in 2 pts. One patient (pt) had a cardiac arrest. In all 5 cases TEE clearly identified the extensive thrombus formation in the right-sided cavities of the heart and in the central pulmonary artery in 2 cases. All pts were treated with 100 mg rt-PA, 3 pts in a front-loaded regimen over 90 minutes, 1 pt over 120 minutes, and, due to the life threatening situation, in one case a bolus injection as ultima ratio was performed with no intracerebral bleeding complication. Regression of thromboembolic masses after fibrinolytic therapy was demonstrated by transthoracic and transesophageal echocardiography after 1 to 15 hours. All pts survived and were put on coumadine, 1 pt developed an intracerebral bleeding with persistent hemiplegia.
Conclusions: The use of thrombolytic therapy is highly efficacious for the therapy of pts with PE and concomitant right or ventricular thrombus formation. Transthoracic and especially transesophageal echocardiography are powerful bed-side diagnostic tools for the immediate diagnosis and follow-up of successful treatment in this life-threatening condition.

IMPROVEMENT OF ULTRASOUND-ASSISTED CANNULATION OF THE INTERNAL JUGULAR VEIN : A PROSPECTIVE AND RANDOMIZED I.C.U. STUDY

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The aim of this study was to determine whether ultrasound guidance can help interns to improve the results of jugular vein access in ICU.
Methods : In a prospective and randomized study, we compared, in 79 patients admitted to the ICU, an ultrasound-guided method (ultrasound group : 37 patients) with an external landmark guided technique (control group : 42 patients). All jugular vein accesses were performed by young interns with an experience of < 5 procedures.
Results : Internal jugular cannulation vein was achieved in all patients in the ultrasound group and in 10 patients (24 p.cent) in the control group ($p < 0.01$). Average access time was longer in the control group (235 ± 408 sec. vs 95 ± 174 sec. ; $p = 0.06$) and puncture of the carotid artery occurred in 5 patients in each group ($p = 0.83$). 32 patients (86 p.cent) in the ultrasound group and 23 patients (55 p.cent) in the control group ($p < 0.05$) were cannulated in 3 min. or less. The cannula was therefore unable to be inserted within 3 minutes in 19 patients in the control group, with failure of cannulation in 10 of these patients (53 p.cent). Failure was due to thrombosis (n = 1), small calibre of the internal jugular vein (< 4 mm) (n = 5), abnormal vascular relations (n = 3) or cervical irridation (n = 1). Among the 10 primary failures of cannulation, an internal jugular vein catheter was able to be inserted in 4 cases by an experienced physician on the side initially selected and with ultrasound guidance in 2 cases. The catheter was inserted into the contralateral internal jugular vein under ultrasound guidance in the remaining 4 cases. Jugular cannulation was obtained at the first attempt in 26 p.cent in the control group and 43 p.cent in the ultrasound group.
Conclusion : Ultrasound guidance improved the success rate of jugular vein cannulation by inexperienced operators in ICU patients. When the internal jugular vein has not been successfully cannulated within 3 minutes by the external landmark guided technique, the authors recommend the use of the ultrasound guidance.

THE LUNG LYMPHATICS IN HYPEROXIC LUNG INJURY. A NEW SCANNING ELECTRON MICROSCOPIC TECHNIQUE FOR STUDY OF LUNG LYMPHATICS IN THREE-DIMENSIONS

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Hyperoxia induces severe lung edema. Pulmonary lymphatics are important in lung edema clearance but which lymphatics drain alveolar fluid and how they change during lung injury and edema is uncertain.
Methods: To study this question we cast the lungs of 16 rats exposed to 85% O_2 for 7 days. At 0, 3, 7, and 14 days after removal from hyperoxia 10 ml methylmethacrylate were instilled into the trachea at 25 cm H_2O pressure. The lungs of 4 similar room-air breathing rats served as controls. Tissue was taken for light microscopy and wet-to-dry ratio (W/D) determination. The casts were examined for lymphatic filling with a scanning electron microscope.
Results: Rats exposed to hyperoxia had diffuse damage and extensive edema. On removal from hyperoxia (day 0), 35% of the rat bronchioles had saccular lymphatic casts around them, 25% had conduit lymphatic casts, and 18.5 % had saccular lymphatics surrounding the wall of digested arteries. Lymphatics were also present on the pleural surface, near alveoli and alveolar ducts, and around digested veins. All were different from the rats kept in room air ($P<0.0001$) and returned to control level by the 14th day. The peribronchial and periarterial saccular lymphatics formed separate groups with communicating conduit lymphatics. The perivenous lymphatics had their own separate conduit lymphatics.
Conclusions: In this model, airway casting allows three dimensional analysis of the lung lymphatics. It shows that during hyperoxic lung injury and edema the lung lymphatics expand and return to normal with the resolution of the edema, and that peribronchial and perivascular saccular lymphatics connect to conduit lymphatics of the peribronchovascular bundle perhaps comprising complementary lymphatic compartments .

APPLICABILITY OF A MODIFIED PHOTO- AND MAGNETOACOUSTIC MULTIGAS ANALYZER FOR ESTIMATION OF CARDIAC OUTPUT BY THE RETBREATHING METHOD

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Objectives: The aim of the present study was to compare the performance of a specially modified version of a photo- and magnetoacoustic (PA/MA) gas analyzer (Brüel & Kjær, Denmark) with a conventional quadrupole mass spectrometer (MS) (Innovision, Denmark) in inert gas rebreathing (RB) tests such as determination of functional residual capacity (FRC), pulmonary capillary blood flow (PCBF) and lung tissue volume (Vtc).
Methods : From simultaneous readings of inert gas concentrations with the MS and the PA/MA analyzer during RB experiments a comparison was made of the PCBF, Vtc and FRC values. The RB tests were performed during rest and exercise (0,50 and 100 W) in ten healthy subjects.
Results: The differences (mean +/- SD) between simultaneous estimates of rebreathing parameters were the following (PA/MA - MS) for pooled data, PCBF: 0.18 +/- 0.38 l/min, Vtc: -33 +/- 108 ml and FRC: 0.028 +/- 0.048 liters.
Conclusions: Small but significant differences were found between the estimates of PCBF, Vtc and FRC using the MS and PA/MA, respectively.
Reference: P. Clemensen, P. Christensen, P. Norsk, and J. Grønlund.
A modified photo- and magnetoacoustic multigas analyzer aplied in gas exchange measurements. J Appl Physiol 1994; 76: 2832-2839.

ULTRASOUND GUIDED FEMORAL VEIN CATHETERISATION

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Objective: To evaluate the efficacy of a portable ultrasound device (Site Rite,Dymax Corp.) in cannulating the femoral vein 10-20 cm distal from the inguinal ligament.
Although widely used, catheterisation of the femoral vein in the groin using "landmark" technique is frequently complicated by accidental arterial puncture. Suboptimal hygiene and patient discomfort are also associated with this technique. With regard to these last two factors cannulation of the femoral vein 10-20 cm below the inguinal ligament would seem an attractive alternative. As "landmark" technique is not possible for the cannulation of the femoral vein in this part of the thigh, ultrasound was used to locate the vessel and the results of this technique were evaluated.
Methods: A portable compact ultrasound device (Site Rite,Dymax Corp.) featuring a 7.5 MHz transducer (ultrasound depth 4-5 cm) fitted with a needle guide and a 6 cm screen was used by residents with no previous experience in ultrasound guided cannulation.
Patients consisted of a surgical ICU population.
Results: In 46 patients 55 catheters were introduced.In 6 cases more than one (2-4) attempt was made and in 3 patients the procedure was unsuccesfull due to the fact that the vessel was situated out of reach of the ultrasound (vessel depth > 4-5 cm), during the 55 procedures one accidental arterial punction was registered. The catheters remained in situ for a mean of 9 days (range 1-22) and were used for volume suppletion, medication, parenteral nutrition and haemodialysis.Colonisation rates compared to those of subclavian catheters in our ICU.
In the first 20 patients 3 cases of asymptomatic thrombosis of the femoral vein were seen on CT-scans performed for other indications, in the following 26 patients duplex scanning performed after removal of the catheter yielded another 3 cases of asymptomatic femoral vein thrombosis.
Conclusions: Ultrasound guided femoral vein catheterisation 10-20 cm below the inguinal ligament is a safe and simple technique that can easily be performed by residents without prior experience. The incidence and impact of thrombo-embolic complications associated with this technique are still subject to further investigation.

COMPARISON BETWEEN TRANSCRANIAL DOPPLER AND KETY-SCHMIDT METHOD TO ASSESS CEREBRAL VASOREACTIVITY IN BRAIN INJURED PATIENTS.

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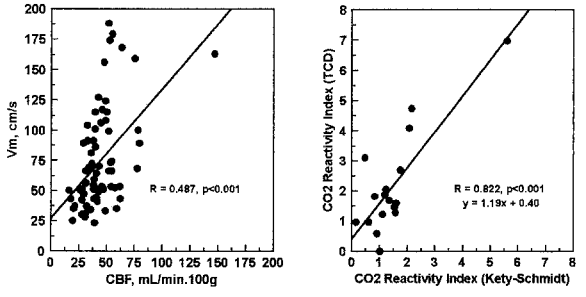
Objectives: Because transcranial Doppler (TCD) has been proposed to explore cerebral CO_2 vasoreactivity in brain injury (Stroke 1992;23:962-6), we compared this technique with the Kety-Schmidt reference method to assess cerebral vasoreactivity in comatose patients.
Methods: 17 mechanically ventilated patients (age 30-81 yrs, Glasgow 3-10) in coma due to acute brain injury were investigated during stepwise changes in $PaCO_2$ (25, 30, 35, and 40 mmHg) by increasing inspired PCO_2. Middle cerebral artery velocity (Vm) was measured by TCD. After insertion of a catheter in the ipsilateral jugular bulb, cerebral blood flow (CBF) was determined by the Kety-Schmidt method, using the inhalation of 10% N_2O through the inspiratory line of the ventilator. For each patient a cerebral CO_2 vasoreactivity index was calculated as the slope of linear relationship between Vm or CBF and $PaCO_2$.
Results: Absolute values of Vm and CBF were poorly correlated (R=0.487, p<0.001) (figure, left panel), but the cerebral CO_2 vasoreactivity as calculated using TCD and Kety-Schmidt method showed a stronger correlation (R=0.822, p<0.001) (figure, right panel).



Conclusions: Although absolute velocity cannot be used as an indicator of CBF, TCD is a valid technique to estimate cerebral CO_2 vasoreactivity in comatose patients.

COST OF DRUGS AND CONSUMABLES IN A GREEK ICU: CORRELATION WITH OUTCOME, ILLNESS SEVERITY AND TYPE OF ADMISSION.

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The intensive care unit (ICU) is the second, after the operating room, most important consumer of resources in the hospital. The cost of an ICU includes a fixed cost calculated for a 12 month period (FC) and a variable per patient cost (VC).

Objectives: a) to estimate the total and per day VC related to treatment and consumables used in a multidisciplinary 8-bed ICU in Athens-Greece and b) to correlate this VC with patient's outcome, severity of illness and type of admission.

Methods: Prospective data from 137 consecutive patients admitted to the ICU from 1/10/1994 to 30/3/1995 were studied. A tick chart was designed to record drugs, materials and consumables regularly used for ICU patients. This chart did not include low price drugs and consumables provided from the hospital's pharmacy as stock, since they were included in the fixed cost. The chart also contained demographic details and data necessary for calculation of several Illness Severity Scoring Systems (ISSS). All data were stored in a computer using special software for VC computation.

Results: Total VC was significantly higher in non survivors (non-S) than in survivors (S), but this was due to the difference in time spent in the ICU (12 vs 6.6 days). Mean per day VC did not differ significantly neither between S and non-S, nor between patients with different types of admission. There was no correlation of VC neither with SAPS, SAPS-II and APACHE-II, nor with the risk of death predicted by SAPS II, MPM0, MPM24 and ODIN.

COST[#]\pts	all	non-S	S	MED*	SS*	Un-SS*
total	780	1244	575	731	695	866
/24hrs 111	110	114	109	110	70	124

in thousand drachmas =4 US$, *Type of admission: MED = medical, SS and UnSS= scheduled and unscheduled surgical.

Conclusions: Mean VC per patient and per day was estimated approximatly 110.000 drachmas (450 US$). The fact that this VC was not related to patient outcome, severity of illness and type of admission simplifies cost estimation in our ICU.

COST OF ANTIBIOTHERAPY IN A GREEK ICU: RELATION WITH TOTAL AND PER DAY COST OF DRUGS AND CONSUMABLES, OUTCOME AND ILLNESS SEVERITY.

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Objectives: To estimate the cost of antibiotherapy (AB-cost) in a multidisciplinary 8-bed greek ICU and to correlate AB-cost with total cost of drugs and consumables and with patient's outcome, severity of illness and type of admission.

Methods: Prospective data from 137 consecutive patients admitted to the ICU from 1/10/1994 to 30/3/1995 were studied. A tick chart was designed to record all drugs, materials and consumables regularly used for ICU patients, but did not include low price drugs and consumables, which are provided from hospital's pharmacy as stock and were included in a fixed ICU cost calculated for a 12 month period. The chart also contained demographic details and data necessary for the calculation of several Illness Severity Scoring Systems.

Results: Our patients received up to 17 antibiotics (AB) during their hospitalisation (mean number of AB/patient =4). There was no correlation of AB-cost with outcome, SAPS, SAPS II and APACHE II, nor with mortality predicted by SAPS II, MPM0, MPM24 and ODIN.

COST[#]\Pts	all	dead	survivors	MED*	SS*	Un-SS*
total	780	1244	575	731	695	866
drugs	467	728	350	465	427	479
AB-cost	255	335	165	222	222	210
total/24h	111	114	109	110	70	124
drugs/24h	61	58	62	65	29	65
AB-cost/24h	24	23	24	26	11	26
AB/total	33%	27%	29%	30%	32%	24%
AB/drugs	55%	46%	47%	48%	52%	44%

in thousand drachmas =4 US$, *Type of admission: MED= medical, SS and UnSS= scheduled and unscheduled surgical

Conclusions: AB-cost in our ICU represents 50% of the total cost of drugs (or 30% of drugs and consumables). AB-cost was not related to patient outcome, severity of illness and type of admission. Rational use of AB seems essential for cost limitation and efficient management of resources in the ICU.

A CLINICAL INFORMATION SYSTEM (CIS) IN INTENSIVE CARE: HOW TO MAKE IT WORK?

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Objectives: Over 3 years evaluate the necessary efforts and expenses to implement a CIS in the routine of a 16-bed SICU.

Methods: In June 1992 a commercially available, unix-based CIS was installed on a 16-bed surgical ICU. The goal was a paperless documentation at the bedside. After more than 2 years clinical experience two aspects were investigated: What effort is necessary to install and support a CIS, and what is the benefit for patients and personnel on the ICU?

Results: The installation and support of a full-fledged CIS requires a considerable effort: (a) The conceptual framework for the CIS has to be defined. This includes the definition of documentation standards, as well as nursing and therapeutic standards, which is the essential basis for the configuration of any CIS. (b) Configuring a CIS, i.e. "fine-tuning" it to the user's specific needs, is always a laborious task. Moreover, constant maintenance is necessary. These tasks require the following personnel: Experienced health care professionals for defining the conceptual framework, 1-3 trained health care professionals for configuration, 1 system administrator. On a single ICU (12-20 beds) these are not considered full-time jobs. (c) Training is best done employing the "train-the-trainers" approach. (d) Beside the necessary amount of man power and money to install and purchase a CIS, administrative and MIS support is needed, especially when interfaces to the hospital and laboratory information systems have to be set up. In general, a CIS needs the commitment of all people involved. Without a really professional approach with a long-term goal any major CIS can turn into an unnecessary but inevitable night mare. After 3 years clinical use and a thorough implementation of a CIS on a major SICU it can be said that full-fledged CIS offers an opportunity to dramatically improve the working environment on an ICU. Moreover, it adds to patient safety, quality of care and cost efficiency in one of the most advanced and expensive areas of medicine.

Conclusion: A major investment in man power and money is necessary to install and maintain a full-fledged CIS. A sincere professional commitment to the goals of a CIS is necessary. In exchange, a well configured and well maintained CIS dramatically improves the quality of therapy and care on the ICU. Even return of investment and financial profitability of a CIS seem feasible today. From the clinical perspective it appears that the users themselves are the central determinant whether a CIS makes a dream come true or turns into a night mare.

Auditory alarms and monitoring in the intensive care unit (I.C.U.)

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Objectives: To establish a relationship between the activities of the staff and the occurrence of auditory alarms on the I.C.U. ard to evaluate confusion between auditory alarms.

Methods: Laboratory based studies which investigated aspects of confusion between alarms in current use on the I.C.U.

The observational studies were conducted over an 18 month period and examined the frequency and duration of alarms together with the concurrent activites being undertaken by staff on the unit.

Results: The laboratory based studies showed that there were enduring confusions between the alarms on various items of medical equipment, for example a ventilator alarm and an E.C.G. monitor alarm.

The results of the observation studies demonstrated that alarms are activated when specific activities are being undertaken by staff.

Discussion: Aspects of acoustic features involved in confusions between sounds could be used in future recommendations for alarms on medical equipment. Suggestions are also discussed for improving and rationalising auditory warnings in the I.C.U.

INFERIOR PETROSAL SINUS BLOOD: A POSSIBLE SOURCE OF CONTAMINATION OF SAMPLING FROM A CATHETER IN JUGULAR BULB

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Objectives: We investigated inferior petrosal sinus (IPS), the lowest affluent to jugular bulb (JB), as a possible source of contamination of samples in JB for monitoring oxyhemoglobin saturation ($SjbO_2$). Pulling back the catheter the oxyhemoglobin saturation usually rises indicating extracerebral contamination (Jakobsen M et al: J Cereb Blood Flow Metab 1989;9:717).
Methods: The study was carried out on patients undergoing IPS sampling to differentiate Cushing disease from ectopic ACTH syndrome and to lateralize any resulting pituitary lesion. We studied the value of oxyhemoglobin saturation high in JB ($SjbO_2$), at IPS ($SipsO_2$) and at mid jugular vein (5th cervical vertebra) ($SmjO_2$) bilaterally.
Results: We found significant differences between right $SjbO_2$ and both right $SipsO_2$ (p= 0.007) and right $SmjO_2$ (p= 0.017) and between left $SjbO_2$ and both left $SipsO_2$ (p= 0.01) and left $SmjO_2$ (p= 0.017) We did not find any difference bilaterally.

right $SjbO_2$ %	left $SjbO_2$ %	right $SipsO_2$ %	left $SipsO_2$ %	right $SmjO_2$ %	left $SmjO_2$ %
n = 8	n = 6	n = 9	n = 9	n = 10	n = 10
x ± sd	x ± sd	x ± sd	x ± sd	x ± sd	x ± sd
58.3 ± 6.7	57.4 ± 7.1	67.7 ± 4.8	71.1 ± 8.5	70.1 ± 10.2	69 ± 8.1

Conclusions: We confirmed that $SjbO_2$ is bilaterally equal in subjects with normal intracranial dynamics (Gibbs EL et al: Am J Psychiat 1945;102:184). The IPS has a different oxyhemoglobin saturation than JB. This is well explained by the physiological heterogenicity of regional oxyhemoglobin saturation in the brain (cerebral regional contamination)(Chi OZ et al: Anesth Analg 1994;79:860). Furthermore IPS drains cavernous sinus which drains ophtalmic vein (extracranial contamination). We perceive that if the tip of the catheter is low in the JB, it could draw blood from IPS before its complete mixing in JB, so we suggest to place the tip of the catheter in the superior JB.

PREDICTIVE VALUE OF MONITORING ALARMS IN ICU.

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Sophisticated monitoring systems are extensively used in ICUs. They are provided with audible and visible alarms. The predictive value of monitoring alarms activation has never been evaluated. In this study we examined the predictive value of alarm activation available in ICU.
Method. Over a six days period, all the alarm systems available in our ICU were kept activated. Nurses staff, preset the limits as usual The set-up of the alarm limits was not influenced by this study. Data collected concerned ECG, systemic and central venous pressure, SaO2, EtCO2, airway pressure, minute ventilatory volume, airway humidifier, infusion pumps, body temperature and respiratory rate. Nurses noted all the sounding alarms on a specific recording form and it was specified if any sort of intervention was required or not. When preset limits were exceeded, alarms were divided in two groups, one due to clinical reasons (hypertension, etc.) and the second due to artifacts induced either by patients, nurses or instruments. The alarms that were manually silenced by nursing staff, were considered significant, while those automatically reset were neglected. Among the former group, we related the number of alarms requiring any intervention with those not requiring any. In the end, sensitivity, specificity, true positive and true negative rate was calculated.
Results. A total of 1851 alarms was recorded. The alarms exceeding the limits were 1020 (55%); of these, 768 required a manual reset. Of the 831 remaining alarms, 652 were manually silenced, while 179 were automatically reset. A total of 1420 alarms was silenced by nurses, but only 479 (28.8%) indicated the need of intervention on the patient. 229(12.4%) of them, were true alarms because they exceeded the preset limits, while the remaining 250 (13.5%) were artifacts. Sensitivity was 30%, specificity 62%, false positive rate was 38 while false negative rate was 70%.
Conclusion. Present monitoring alarm system is poorly predictive of clinical events requiring nursing or medical staff intervention.

COMPUTER SYSTEM OF STEADY OBJECTIVE REGULARITY SEARCH IN DYNAMIC OF CRITICALLY ILL PATIENTS CONDITION

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Objectives: We studied various methods of receiving and editing of clinical datas in critically ill patients (different ethiology). 163 patients were investigated in Regional Intensive Care Center.
Methods : The following datas were studied : anamnesis , status praesens objectivus (organs and systems) , clinical and biochemical markers of critical condition , datas of EEG , Rheography . The medical information complex contained : 8-channel electroencephalograph, 4-channel roencephalograph, AD-converter (16 analog inputs, 12 bit resolution, 60 kHz), IBM 486 DX2, software includes set of routines for spectral EEG analysis, EEG-mapping, correlative analysis, and brain blood-stream REG-monitoring (written in Turbo Pascal 4.0), expert programs for estimation objective and humoral patient status (written in Clipper 5.0) and statistics.
There were used following programme-language instruments : Borland C++ 3.0, Nantucket Clipper 5.01, CA-Clipper Tools II.
As the methods of statistical processing of dates were used: T-Students criterion , Fisher criterion, methods of correlation analisis , calculation of the regression levels , dispersion analysis,
Results : There was created the optimal structure of hard and sofware complex of search steady objective regularity in dynamic of critically ill patients condition.
Conclusion : The created system allowed to value effectiveness of intensive care and give us new opportunities in study pathogenesis of systems disorders in critical condition .

A FIRST EVALUATION INTO THE COSTING OF INTENSIVE CARE PATIENTS

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Objectives
To design and implement a methodology for accurately collecting and calculating individual patient costs.

Methods
Over a five year period a Patient Data Management System has been installed which allows individualised patient data to be accurately collected.
Using this data a costing system has been developed which ascribes costs thus:
1. Direct Costs - drugs, fluids, consumables, interventions. These are ascribed to individual patients, according to data collected from the PDMS.
2. Indirect Costs - energy, depreciation, admin costs, maintenance etc. These are summed for the year and ascribed as an overhead per patient day.
N.B Staff costs contain an element of both cost types. The aim is to make as many costs as possible 'direct', hence 'activity costs' have been calculated which comprise staff time, drugs and consumables - these are direct costs.
These costs of patient care are then seamlessly integrated into the financial and budget management of the ICU environment.

Results
It was found that by calculating costs in this manner 50% of the total cost of ICU are captured within the 'direct' element, and so are able to be ascribed to individual patients. This is much more accurate than simply dividing the total costs of ICU by the number of patient days.
Temporal costs (variations during patient stay) and cross sectional costs (cost differences between admitting specialities) were also noted with interest.
Results of the initial analysis of data captured by the system will be presented.

Conclusions
Little is known about the resource costs (not simply cash costs) of ICU.
Even less is known about individual patient costs, with previous estimates of these costs varying widely. However, if cost effectiveness studies are to be undertaken accurate calculation of individual, group and total ICU cost is an essential prerequisite, which, via this system of costing, is now achievable.

Preferred method of delivery - Free Communication.

INTERNATIONAL INQUIRY ABOUT INTENSIVE CARE IN ANTICANCER CENTERS.

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Information about intensive care of cancer patients is limited in the literature, despite the increasing use of such facilities in oncology over the two last decades. In order to determine if and how critical care facilities can be used specifically for these patients, we performed a world-wide inquiry in anticancer centers selecting the hospitals by using the International Directory of Cancer Institutes and Organizations. We mailed a questionnaire to 146 centers and we received 84 responses (57.5 %). There was at least one oncological (i.e. with > 50 % of cancer patients) ICU in 59 (70 %). The main characteristics of 40 evaluable Occidental ICUs (Western Europe, Japan, North America) were the followings :

type of ICU	general	surgical	medical
n	17	14	9
Median number of beds	8	7	7
Prevalent medical director specialism	anesthesist	anesthesist	medical oncologist
- Qualification in oncology	2	5	8
Chief nurse qualification :			
- in critical care	12	9	8
- in oncology	6	5	7
Median RN number per bed	2.5	2.5	2.0
Critical care technics used :			
mechanical ventilation	17	13	6
hemodynamic monitoring	17	12	8
hemodialysis	6	5	4
central monitoring station	14	9	3
laminar-airflow room	1	2	7

In conclusion, ICU appear to be available in the majority of anticancer centers and are often managed by physicians and nurses qualified in both intensive care and oncology. These data suggest that oncological intensive care should be part of the training of oncologists and intensivists.

PLASMAPHERESIS AS TREATMENT OF LIFE-THREATENING THYROID STORM ASSOCIATED WITH THIONAMIDES-INDUCED AGRANULOCYTOSIS.

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An 18-year old woman with Graves disease presents with sore throat, vomiting, diarrhea, sinus tachycardia at 155/minute and a temperature of 40°c. Several weeks before, treatment with Propylthiouracil had been stopped (rash and fever) and replaced by Methimazole and Iodide prior to a minor surgery. However, both drugs were discontinued by the patient two weeks before admission. Shortly after arrival in hospital, patient's condition progressed to respiratory failure (upper airway edema), delirium and shock requiring ICU admission, intubation and resuscitation with fluids and vasopressors. White blood count was 1300/mm³ with 0 neutrophils. Patient's hemodynamic data showed initial hyperdynamic profile followed by low output state with decreased SvO_2 (59%) (N 70-80%) and cardiac index (2,37) (N 2,5-3). Echocardiogram confirmed cardiac chambers dilation as previously described in thyroid storm.
Lithium carbonate, corticosteroids, antibiotics and Beta-blocker perfusion were given. Plasmapheresis was started. Free T_4 (N=9,2-21pmo/L) went from 143,6 to 16,6 after the first two pheresis. After a remarkable clinical recovery, sub-total thyroidectomy was done 10 days after admission.
In life-threatening thyroid storm, plasmapheresis is a very effective therapy when anti-thyroid drugs are counterindicated.

PROGNOSTIC INDEX AND MORTALITY IN CRITICALLY ILL PATIENTS WITH ACUTE RENAL FAILURE TREATED WITH DIFFERENT DIALYSIS TECHNIQUES.

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PURPOSE: To compare the reliability of prognostic indexes in critically ill patients admitted in an Intesive Care Unit (ICU) who had acute renal failure (ARF) and were treated with different dialytic techniques.
MATERIAL and METHODS: 1087 patients were included in a prospective study from June 92 to November 94. 220 patients presented ARF defined by creatinin serum levels greater than 150 µmol/l and previous normal levels. Patients were divided in three groups. Group I (control): 156 patients with ARF who did not receive substitutive techniques. Group II: 21 patients under intermittent hemodialysis (HD) or peritoneal dialysis (PD). Group III: 43 patients under continuous hemodiafiltration (HF). The statistical analysis was Chi-square test and analysis of variance.
RESULTS: The table shows the results we obtained. We did not find any significant difference betwen the two groups of patients undergoing dialysis. Differences were observed only between Group I and the other groups as shown below. We did not find any significant association between the theoretical mortality predicted and the observed mortality according to SAPS in the three groups.

	GROUP I	GROUP II	GROUP III	P
AGE (years)	54,1 ± 13,6	56,4 ± 19,7	56,0 ± 14,1	0,001[a,b]
APACHE II	21,7 ± 7,6	22,9 ± 5,4	24,5 ± 9,0	NS
SAPS	13,9 ± 4,8	15,7 ± 4,5	16,4 ± 5,4	0,007[b]
UCI DAYS	14,9 ± 17,0	25,1 ± 22,7	17,8 ± 15,5	0,035[a]
HOSPITAL DAYS	25,5 ± 24,0	37,0 ± 39,4	23,2 ± 23,5	NS
DEATHS UCI	57pat (36,5%)	12pat (57,1%)	31pat (72,1%)	0,0001[a,b]
DEATHS HOSPITAL	67pat (46,9%)	14pat (66,7%)	32pat (76,2%)	0,0018[a,b]
CREAT (µmol/l)	260 ± 130	494 ± 209	441 ± 170	0,0001[a,b]

[a]: P<0,05 between group I and group II; [b]: P<0,05 between group I and group III; [c]: P<0,05 between group II and group III. Creat: Creatinin level peak.

CONCLUSIONS: 1st: On ARF patients, the use of dialytic techniques is associated with greater mortality. 2nd: Prognostic indexes have not been useful to correctly classify our patients with ARF. 3rd: HF does not involve greater mortality neither lengthening of stay compared to conventional dialysis.

ARE ALARM SIGNALS PROPERLY USED IN THE CRITICALLY-ILL PATIENT ?

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Objective: To assess if there is a control of alarm signals in the critically-ill patient adapted to fluctuations of his/her vital constants.
Patients and Methods: Between May and August 1994, data from 60 patients over 14 years of age who remained in the ICU for more than 24 hours were prospectively registered. For each patient, daily hemodynamic and respiratory vital constants as well as the limits of their corresponding alarm signals were recorded (340 registers). In order to avoid bias in interpreting the results, staff personnel were not informed about the study. The coefficient of variation (CV) defined as the mean standard deviation x 100, was calculated. The Student's t test for paired data was used for the comparison of the mean CV value of each parameter versus the mean values of its corresponding alarm signal.
Results: Mean values of CV for each variable and its alarm signal are shown in the table.

	CV variable	CV Alarm maximal	P	CV Alarm minimal	P
Heart rate	9.2	2.75	< 0.001	2.34	< 0.001
Systolic blood pressure	8.76	1.44	< 0.001	4.04	< 0.001
Respiratory rate	14.86	0.81	< 0.001	5.10	< 0.001
Oxygen saturation	1.30	0.04	< 0.001	1.64	NS
Volume per minute	6.37	9.67	NS	2.24	NS
Airway pressure	10.21	6.43	0.05	17.45	< 0.028

Conclusions: Some alarm signals of monitorization devices in the critically-ill patient are nor properly used.

EFFECTIVE DECISIONS IN CRITICAL CARE: MANAGEMENT ISSUES OF THE LONG STAY PATIENT

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Due to exposure to a wide variety of unpleasant stimuli, for example, tracheal suctioning, venipuncture and physiotherapy, most patients admitted to the ICU will require some form of sedation. This review will describe the suggested properties of an ideal sedative agent for use in the ICU and review the current limitations of some of the available agents from this perspective. Methods used to quantify the level of sedation, such as the Ramsay Score, Glasgow Coma Score, Newcastle Sedation Score and Visual Analogue Scores, and their deficiencies will be examined. Consideration will be given to defining the optimal level of sedation and the circumstances under which sedation might be varied over the ICU course will be discussed. Preliminary results from an ongoing study examining the role of light *versus* heavy sedation and ischaemia in a cardiac surgical ICU population will be presented. The pharmacoeconomics of ICU sedation will be briefly addressed. Finally, the role that sedation may play in increasing morbidity, particularly nosocomial pneumonia, in the ICU will be discussed.

ICU PATIENTS : THERAPY COST IN 1994

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Objectives : Therapy cost(TC) in ICU patients is a substantial component of total hospital care cost. Estimation of TC during this year, partitioning to various groups of drugs used and attempt to minimise it, were considered practically useful.
Methods : In collaboration with the Hospital Pharmacy we were able to have a complete report of all drugs used for ICU patients (including enteral and parenteral nutrition). Mean APACHE II severity score upon admission was 19.7 and mean length of ICU stay was 6.7 days. Price per drug unit and cost per group of drugs were also available Drugs were divided into two groups: antibiotics (1) cardiovascular drugs (2), gastrointestinal system drugs (3), enteral and parenteral nutrition (4), respiratory system drugs (5), sedative, analgesics and paralysing agents (6), parenteral solutions with electrolytes, vitamins and trace elements (7), anti-inflammatory agents (8), protein substitutes and immunomodulation agents (9), anticoagulative agents (10). Antibiotics were further subdivided into those "freely" prescribed (A) and those whose prescription and administration requires filling of a relevant form (B).
Results : I) TC for ICU patients/day was 30.530 Drs ($122). Total TC/patient was 295.195 Drs ($1.108.7). II) Partitioning total TC per group of drugs reveals : (1) 43%, (2) 2.7%, (3) 2.7%, (4) 9.2%, (5) 0.3%, (6) 8.6%, (7) 9.3%, (8) 1.3%, (9) 15.8%, (10) 2.5%. III) Concerning antibiotics which consist the major cost component, group A and group B contributed by 29.1% and 13.9% to the total ICU TC respectively. Group B were administered to 13.9% of all ICU patients.
Conclusions : I) For the above studied patient population antibiotics consist almost half of total TC followed by protein substitutes and immunomodulation agents. II) If TC control could be attempted in the ICU, prescription of both groups must be reviewed. Appropriate treatment should be prescribed and readily provided to any patient. Clinical significance of routine protein substitution, currently controversial, should be re-evaluated. New antibiotics (third & fourth generation cephalosporins, quinolones, carbapenems) should be prescribed on the basis of strict diagnostic procedures using modern technology available. Rationalisation of antibiotic therapy will lead to cost control, redistribution of ICU expenses and substantial contribution to infection policy in our country.

Monitoring of rSO2 in carotid artery surgery: initial experience

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Objectives:
1- To investigate the clinic efficiency of the monitoring of the rSO2 cerebral, in relationship to the stroke prevention, in patient undergoing carotid surgery.
2- To determinate the variations of the rSO2 during the different surgical and anesthetic procedures in these patients.

Methods:
Ten patients undergoing carotid endarterectomy.
Precise neurological exploration previously to the surgery and in the immediate postoperative period.
Angiography evaluation to the extend of carotid artery disease.
Invasive blood pressure, ECG, pulse-oximetry (pSO2) and rSO2 were collected previously to the induction of anesthesia. The premedication was administered intravenously - midazolam (50 mcgr/Kg) and fentanyl (1 mcgr/Kg) -.
Thiopental (4 mg/Kg),fentanyl (3 mcgr/Kg) and atracurium (0,5 mg/Kg) have been used for induction of anesthesia. CO2TE is monitoring after the orotraqueal intubation. The anesthetic maintenance is accomplished with Isofluorane (0,5 - 1,5%) and bolus of atracurium and fentanyl.
The surgical procedure is standard (without arterial shunt during the carotid cross-clamping).

Results:
We register each 5 minutes: blood pressure, cardiac frequency, pSO2, CO2TE and rSO2.
The rSO2 cerebral variate in relation with: the anesthetic induction, blood pressure, CO2TE, cross-clampping carotid and with the modifications of the head position.
The maximum decrease of rSO2 cerebral was in relation with the cross-clampping carotid (minimal value: 52).
No patient had neurologic complications and postoperative stroke after carotid endarterectomy were not observed.

UNUSUAL MISPLACEMENT OF A CENTRAL VENOUS CATHETER

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The monitoring of Central Venous Pressure is an established technique in all Critical Care Units al over the world, and the internal jugular vein is a common vein used for this purpose.

We report a case of misplacement of a jugular venous catheter into the dorsal subarachnoid space through an intervertebral foramen. The malposition is demonstrated on plain radiograph, and on both radiograph and computed tomographic examination after injection of ionic iodinated contrast material. The catheter was removed, and the patient recovered with no neurologic sequelae.

NONINVASIVE HAEMODINAMIC PATTERNS IN SURVIVING AND NONSURVIVING EMERGENCY SURGICAL PATIENTS

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Objectives: There are more than 8000 anesthesia in Chelyabinsk emergency hospital every year. To 80% patients of it emergency anesthesia is applied. More than 900 patients have ishemic heart disease (IHD), hypertension (HP) and previos miocardial infarction (PMI). More than 5% of all patients are old patients (OP). The resalts deep noninvasive bioimpedance monitoring (NBM) in surgical patients have been studied by us.

Methods: Our NBM system "KENTAVR" includes 21 parameters of cardiac and vessels function. It is realised by monitors in operation theatres and computer network. Moreover we are able to examine surgery patients before anesthesia and perioperatively by using special computers system for cardiovascular reflex control by Fast Fourie Transform (FFT) of 12 parameters simultaneously.

Results: 187 pathients extremly needed peryoperative monitoring of hemodinamics. From these 187 patients more 40% had stroke volume (SV) less than 30 ml, 18% - CO less than 2.1/mim/m2, 25% - ejection fraction (EF) less than 65% and 32% - puls bioimpedans microvessels (PBM) less than 10 mOm. 100 patient had intensive care in special department. 42 out of 187 died. Comparing with survived with these patients before operation HR was larger, SV,CO,EF, PBM and puls bioimpedance aortha was smaller. Much more of these patients were with IHD, PMI, HD, OP. Even with survived patients these parameters decreased the towards the end of operation. Surgery patients had different variability of 12 basic hemodinamical parameters with common tendency to increase power amplitude in low frequency by FFT.

Conclusions: Using of bioimpedance noninvasive parameters allows to have criteria for corrections (infusies, vasodilatators, inotrops and others) and then us the final goal, to have more sucssesful surgery. With survived patients was perioperatively and postoperatively care more intensive.

OSCILLOMETRIC BLOOD PRESSURE MONITORING IN ICU - ASSESSMENT OF ACCURACY WITH A SIMULATOR

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By using the PTB-oscillometric blood pressure cuff signal simulator, which replays and emits cuff signals, registered prior in patients and stored in the system, we examined the accuracy of two oscillometric blood pressure monitors: DINAMAP 1846 (Critikon) and HP M-1008B (Hewlett Packard).

Methods: 20 critically ill patients with varying catecholamine therapies, aged 30 to 66 (mean 46) years, were investigated. The need for written informed consent was waived due to the use of blinded routine clinical measurements and data. We simultaneously registered arterial blood pressure (BP), arterial pulse wave and cuff pressure together with cuff pressure oscillations. The invasive system used as the reference showed a cutoff frequency of 35 Hz and a damping constant of 0.21.

Statistics: Bias and precision. The error was defined as 2 standard deviations divided by the mean value.

Results: Mean arterial blood pressure ranged from 59 to 114 mmHg. From a total of 49 signal records DINAMAP 1846 was able to process 41 and HP M-1008B 47 signals.

BLOOD PRESSURE		DINAMAP 1846			HP M-1008B		
	mean [mmHg]	bias [mmHg]	precision [mmHg]	error [%]	bias [mmHg]	precision [mmHg]	error [%]
sys	139 (91 - 187)	-2.5	56	40	-8.5	50	36
dia	63 (40 - 84)	3.4	30	48	-5.2	38	60
mean	87 (59 - 114)	1.5	35	40	-5.6	35	40

Conclusion: Mean accuracy, expressed as the bias of this oscillometric blood pressure monitors, is sufficient in comparison to invasive measurement. But variation is unacceptably high, leading to a precision ranging from 35 to 56 mmHg and a consecutive error of 30 to 60 %. In severly critically ill patients, in which exact BP data is necessary, non invasive BP measurements should be interpreted very carefully and invasive monitoring is further advised.

COMPARISON OF INTRAMUCOSAL pH (pHi) WITH HEMODYNAMICALLY DERIVED TISSUE OXYGENATION PARAMETERS. IS IT BETTER ?.

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Objectives: The aim of the study was to compare the pHi with the hemodynamically derived tissue oxygenation indexes as: Oxygen delivery (DO2), Oxygen consumption (VO2), Cardiac index (CI), and arteriovenous difference in oxygen [(a-v)DO2].

Methods: 18 patients (15 males and 3 females) with major trauma or major abdominal surgery were studied. On admission, a nasogastric tube allowing pHi measurement was introduced and a pulmonary artery catheter was inserted for optimal hemodynamic management. Each pHi measurement was accompanied with a complete hemodynamic study comprising systemic and pulmonary artery pressures, blood gases, and cardiac output measurements with the thermodilution method. Derived parameters VO2, DO2, CI, (a-v)DO2 were measured according to the standard formula. Hemodynamic parameters were optimised as soon as possible with fluids, inotropes, and vasopressors according to repetitive hemodynamic measurements. All patients were under mechanical ventilation. After hemodynamic stabilisation pHi and hemodynamic measurements were repeated every eight hours. during a 24-hour study period. A total number of 52 measurements were obtained and compared.

Statistics: Results are presented as means ± SD, correlations were performed between pHi and the hemodynamically derived oxygenation parameters. A p<0.05 value was considered as significant.

Results: Mean values were pHi=7.19±0.1, DO2=984±313, VO2=181±71, C.I= 3.7± 1.2, (a-v)DO2 = 4.47±1.2. No correlation was found between pHi and DO2, pHi and VO2, pHi and C.I, pHi and (a-v)DO2. On the contrary in 14 patients pHi remained below 7.30 for more than 24 hours despite adequate hemodynamically derived tissue oxygenation parameters. Mortality in this group of patients was very high (85%).

Conclusion: No correlation was found between pHi and the hemodynamically derived tissue oxygenation parameters
Our data suggest that pHi is a better oxygenation indicator than the hemodynamically derived tissue oxygenation parameters, because it is closely related to the patient's outcome.

INFLUENCE OF PEEP ON HEMOGLOBIN OXYGENATION AND BLOOD FLOW VELOCITY IN GASTRIC AND DUODENAL MUCOSA

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Objectives: The pathogenesis of septic shock and multiorgan failure is believed to be related to tissue hypoxia of the gastrointestinal tract. Therefore new monitoring techniques, preferably organ specific, are required to establish the adequacy of tissue oxygenation. PEEP is used to reduce pulmonary shunt volume and improve blood oxygenation, but is accused to impair splanchnic perfusion. We studied mucosal oxygenation and perfusion on the capillary level in the stomach and the duodenum.

Methods: We used the Erlangen microlightguide spectrophotometer (EMPHO II) together with a specifically designed fibre probe (Bodenseewerk Gerätetechnik, Überlingen) in combination with a standard gastroscope. Measurements were performed on 9 ventilated, traumatized patients (ages 17 - 75 years), with no evidence of shock or severe infection, after informed consent was obtained from the relatives. All patients were hemodynamically stable without inotropic support. An area of 9 cm^2 was analysed in the gastric corpus, the antrum and in the duodenum. In three patients we simultaneously measured the mucosal blood flow using a laser Doppler flowmeter (Periflux 4001; Perimed Sweden).

Results:

$\%HbO_2$		CORPUS (Mean±SD)			ANTRUM (Mean±SD)			DUODENUM (Mean±SD)		
APACHE II		PEEP 5	p	PEEP 15	PEEP 5	p	PEEP 15	PEEP 5	p	PEEP 15
Pat.1	3	60,5 ± 3,5	---	57,2 ± 3,7	62,4 ± 3,5	---	49,7 ± 4,0	41,4 ± 4,9	n	40,7 ± 4,2
Pat.2	9	52,7 ± 2,3	---	45,0 ± 3,9	49,6 ± 2,0	---	44,7 ± 3,0	42,6 ± 3,8	n	41,6 ± 4,5
Pat.3	7	65,4 ± 2,7	---	61,2 ± 2,6	61,4 ± 4,0	---	54,3 ± 3,2	46,4 ± 3,5	..	43,9 ± 5,7
Pat.4	0	57,8 ± 3,4	---	46,0 ± 1,8	59,1 ± 2,4	n	59,2 ± 1,7	44,7 ± 1,6	---	50,2 ± 6,2
Pat.5	6	52,7 ± 4,1	.	52,0 ± 3,5	51,7 ± 5,3	---	62,8 ± 3,5	50,9 ± 2,5	---	37,0 ± 4,4
Pat.6	20	60,1 ± 3,9	---	62,0 ± 1,4	57,8 ± 3,2	---	62,8 ± 3,5	57,3 ± 3,9	---	52,3 ± 4,1
Pat.7	13	49,4 ± 3,9	.	48,4 ± 2,7	62,6 ± 6,1	---	49,7 ± 3,0	58,2 ± 7,5	---	43,9 ± 5,5
Pat.8	12	65,1 ± 3,2	..	58,8 ± 4,4	69,9 ± 3,6	---	66,9 ± 3,8	62,3 ± 3,9	---	51,8 ± 5,0
Pat.9	0	44,6 ± 1,6	---	62,8 ± 4,3	48,6 ± 1,4	---	60,5 ± 5,0	51,5 ± 3,8	n	47,0 ± 10

PEEP in cm H_2O; Wilcoxon Test: n = non significant, * = p<0,05, ** = p<0,01, *** = p<0,001

PU	CORPUS			ANTRUM			DUODENUM		
Mean±SD	PEEP 5	p	PEEP 15	PEEP 5	p	PEEP 15	PEEP 5	p	PEEP 15
Pat.3	382 ± 67	---	454 ± 36	276 ± 46	---	228 ± 75	205 ± 47	n	200 ± 31
Pat.8	443 ± 114	---	264 ± 79	357 ± 67	---	164 ± 41	300 ± 86	---	261 ± 91
Pat.9	251 ± 88	n	244 ± 69	166 ± 47	---	143 ± 32	174 ± 38	.	168 ± 47

PEEP in cm H_2O; PU = arbitrary perfusion unit

Conclusions: Mucosal oxygenation influenced by PEEP is not uniform throughout the stomach. In the duodenum we measured mostly lower levels of HbO_2 and laser Doppler blood flow velocity than in the stomach of the same patient. PEEP predominantly induced a decrease of capillary oxygenation and perfusion.

ASSESSMENT OF SAMPLES-RELATED BLOOD LOSSES IN CRITICALLY ILL PATIENTS

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Objectives: To assess blood losses related to blood samples performed for diagnosis or therapeutic monitoring in critically ill patients.
Methods: Prospective study, including all patients admitted in our 17-bed ICU during a 3 months period. For each patient, all blood samples were daily collected by nurses and reported on a special form. Results are expressed as mean ± SE. Statistical analysis was performed with Spearman correlation test.
Results: 185 (94 men, 91 women) patients, age: 58.5 ± 1.5 years, were studied. Mean length of stay was 6.9 ± 0.6 days. SAPS II score was 33.1 ± 1.6 and total omega score was 77.5 ± 9.7. Overall blood sample (OBS) was 152.3 ± 17.5 (0-1900) ml. Daily blood sample was 25.1 ± 1.5 ml and sample during the first day of admission (D1BS) was 45.5 ± 2.4 (0-194) ml. Samples devoted to biochemical analysis represented 43.3% of OBS, hematology 14.3%, arterial blood gases 12.2%, coagulation 11.4%, bacteriology 10.1% and miscellaneous 8.7%. OBS and D1BS were correlated (p=0.001), and both were correlated with SAPS II and omega 1 scores (p=0.0001). During the study period, no patient was transfused for blood samples-related anemia.
Conclusion: Although presenting a wide range, blood losses due to samples in ICU patients appear to be lesser than reported by previous studies and involved no significant anemia. Better use of samples with micromethods could decrease them again.

THE ROLE OF O_2-HB AFFINITY CHANGES IN THE MONITORING OF SvO_2 IN CARDIOGENIC SHOCK.

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Objectives: To investigate the influence of Hb-O_2 affinity in the monitoring of SvO_2 during improvement of Cardiac Index (CI) in Cardiogenic Shock.
Design: To state whether changes in SvO_2 were associated in changes in actual P_{50} (P_{50}) and standard P_{50} (P_{50}st) 22 consecutive measurements of artero-venous BGA, before and after therapy-induced changes in CI, were evaluated in 11 patients (mean age 73±7 y) suffering from cardiogenic shock, all under mechanical ventilation in PSV modality.
Methods: Together the hemodynamic measures, mixed venous samples were analysed at 37° C using the ABL500 Radiometer for PO_2, PCO_2 and pH, and the OSM3 Radiometer for HbO_2%, HbCO% and MetHb%. P_{50}st (i.e. the P_{50} at pH=7.40, PCO_2=40mmHg and temperature at 37° C) was calculated automatically by the instruments on mixed venous blood as was the P_{50}"in vivo" (i.e. the P_{50} at the patient's value of pH, PCO_2 and temperature), using Siggaard-Andersen's computerizated algorithm. Mean time between paired measurements was 6.1 ± 1.2 hours. The data were compared by Anova test for linear regression and t-test for paired samples.
Results: A close linear relationship was found between SvO2 and oxygen extraction ratio (OER), r=0.94,p=0.00000. The improvement of CI (1.41 ± 0.47 to 2.55 ± 0.5 L/min/m^2, p<0.0000001) induced a significant increase in SvO_2 (0.495 ± 0.131 to 0.636 ± 0.060 %, p<.0001). A significant decrease in P50 (32.5 ± 6.7 to 27.9 ± 2.5 mmHg, p<0.05) without any significant change in P_{50}st (29.1 ± 2.2 to 28.7 ± 2.3 mmHg, p=NS) was also found. These data show that either OER or the shift to the left of the oxygen dissociation curve account for increase in SvO2 occurring with restoration of systemic blood flow.

TIMBU: AN EXPERT SYSTEM IN INTENSIVE CARE UNIT.

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The program is intended to help the Intensive Care Unit interne providing him with a practical tool when making decisions concerning patients in a critical condition.
In his daily practice in Intensive Care Unit, in this case the interne of the Unit, uses this program for each patient as follows: on the first stage of data collection he should complete the following modules:(1)personal data (2)patient´s pathology (3)laboratory and monitoring data (4)drugs prescribed or toxic elements ingested. In this way, the system allows optionally the consult with a computerized data base about the drugs prescribed, standardized parameters and techinques performed by the central Laboratory.(5)reference to an antibiotics guide regarding bacterian sensitivety in our Unit, whitch es checked every six month (6) access to de questionnaired APACHE II to load up new data.(7) statistcs about patient´s Admission and Discharge.
Results: Once all data collection is finished the system performs the followin duties:(1)detailed drugs interactions, including toxic elements (2)diagnosis starting from the clinical, laboratory and monitoring data. In some cases, it also establishes therapeutic strategies, e.g. a coagulopathy (3) give the pharmacological incompatibilities between the drugs prescribed and the diagnosis established, and (4)perform dosage adjustments based upon the personal and pathological data.

POWER OF DISCRIMINATION OF A MULTIPURPOSE SEVERITY SCORE (SAPS) WHEN APPLIED TO LONG TERM POPULATION

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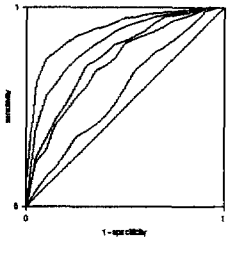
Objective: To assess the power of discrimination of a multipurpose severity score (SAPS) when applied to subgroups of patients (pts) according to their length of stay (LOS) in ICU.
Design: In order to compute the SAPS probability, a model derived from logistic regression was developed. Measures of calibration (goodness-of-fit statistics) and discrimination (ROC curve and relative Area Under the Curve) were adopted in developmental and validation set. The whole database was stratified in five groups ranked on LOS as follows: LOS = 2 days, LOS = 3-4 days, LOS = 5-7 days, LOS = 8-14 days, LOS ≥15 days. Area Under the Curve (AUC) was calculated for each group.
Setting: 25 Italian ICUs.
Patients: Of 10065 pts consecutively admitted during a period of three years (1990-1992), a total of 8059 was included in this study. Pts without SAPS, pts younger than 18 years, pts with LOS shorter than 24 hours were excluded from this analysis.
Interventions: none
Measurements and results: The logistic model developed gave good results in terms of calibration and discrimination, both in developmental set (g.o.f. χ^2: 9.24, P > 0.25; AUC = 0.79±0.01) and in validation set (g.o.f. χ^2: 8.95, P > 0.50 ; AUC = 0.78±0.01). AUC of each group showed a loss in discrimination (i.e., prediction) closely related with LOS, being 0.90±0.01 in pts with LOS = 2 days and 0.59±0.02 in pts with LOS ≥ 15 days (figure).



Conclusion: The logistic model that we developed meets high standards for discrimination and calibration. Accuracy of prediction is maintained at acceptable level in pts with LOS not greater than 7 days, but it is regrettable in long term pts (i.e., LOS ≥ 8 days). Our analysis suggests that a 7 day time point would be the most appropriate to evaluate the mortality risk in long term population.

ANALYSIS OF AGE, STAY, INDEX OF SEVERITY AND MORTALITY IN TWO GROUPS OF CRITICALLY ILL PATIENTS. COMPARISON TO SEX.

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OBJECTIVE: To analyze differences in age, mean-stay, index of severity (APACHE II) and mortality between males and females.
METHODS: We studied 1125 patients consecutively admitted of a 12-beds multidisciplinary ICU of a 450-bed Hospital (population ascribed 385,000 inhabitants). The patients were analyzed as a total group and as two separate groups: group A (625 patients), medical and surgical patients; group B (500 patients), acute coronary patients.
Students' T-test, X^2, and Fisher test were used for statistical analysis.
RESULTS:

	TOTAL 1125 ♂771(68.5%) ♀354(31.4%)	GROUP A 625 ♂379(60.6%) ♀246(39.3%)	GROUP B 500 ♂392(78.4%) ♀108(21.6%)
AGE ♂	54.5±15.8	51.4±18.3	57.4±12.3
♀	57.3±19.2 p<0.05	52.7±20.3	67.7±10.6 p<0.001
DAYS ♂	7.4±12.9	9.7±17.7	5.2±3.8
♀	6.8±9.2	7.5±10.6	5.2±4.5
APACHE II ♂	12.6±7.8	16.8±8.2	8.4±4.2
♀	13.7±7.2 p<0.05	15.3±7.5 p<0.05	9.9±4.7 p<0.01
MORTALITY ♂	114(14.8%)	85(22.4%)	29(7.4%)
♀	68(19.2%)	50(20.3%)	18(16.6%) p<0.05

CONCLUSIONS: Although females were older and had a higher APACHE score, mortality-rate was not statistically different from males but in the acute coronary group. Mean-stay was similar for both sexes.

DETERMINING OBJETIVES IN A POSTSURGICAL INTENSIVE CARE UNIT

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Following the present guidelines of integral management, in order to achieve optimization of sanitary resources and better use of facilities, we feel that the setting up of objetives is a key factor in the continuous process of improvement of quality care.
Postsurgical intensive care services maintain an interdepent relationship with other hospital services. Within the general plan of the hospital it's of the utmost importance to delegate autonomy to the various depertments and service units in determining and achieving objetives. It's also necessary to establish mechanism for coordination of the activities in order to assure the succes of the program.
The objetives cannot be improvised, they must be carried out in a specific manner in the following stages:
1.-Analysis of the present situation (Starting point). Where are we?.
2.-Determination of our goals (Final point). Where do we want to go?.
3.-Analysis of goal achievement. How much does it cost and what are its beneficts?.
4.-Design strategy. What is to be done and how is to be done?.
5.-Continual evaluation. How are we doing it?.
6.-Correction programs. What should be changed?.
Defining objetives and making explicit the activities and methods to achieve them is to anticipate the future; It is of the utmost importance to comunicate said plans to all whom affect by encouraging them to attain the desired results.
In the present paper we intend to show the guidelines to follow in carrying out a course of objetives.

CENTRAL VENOUS CATHETERIZATION COMPLICATIONS

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Most of the studies about central venous catheterization, refer to immediate complications of catheter placement.The purpose of this study is to document firstly the immediate complications of central venous catheterization and secondly the late complications that were observed during the central venous catheter stay.
Methods: A retrospective study of central venous catheterization was performed on ICU patients during the period 1/1/94 to 1/11/94. Placement site, unsuccessful attempts, immediate and late complications were observed. All cannulations were performed by experienced critical care physicians.
Results: 112 catheters were placed in 58 patients: 86 in subclavian vein (6 unsuccessful 7,5%), 20 in jugular vein (6 unsuccessful 42%) and 6 in femoral vein (1 unsuccessful 16%). The mean number of attempts was 2,2 for subclavian, 1,6 for jugular and 1 for femoral vein. Major complications were observed in 15% of the cannulations: Pneumothorax in 4 (3,5%), fever with positive catheter culture in 2 (1,7%) and artery punctures in 11 (9,8%). Late complications were observed in 14% of cannulations: Local infection in 2 (1,7%), catheter displacement by the patient in 4 cases (3,5%), catheter displacement during nursing care in 5 (4,4%) and malfunction in 5 cases (4,4%).
Conclusions: Central venous catheterizations are followed by immediate and late complications in almost the same percentage. Immediate complications' incidence was the same as reported in literature[1]. Well-trained and knowledgeable nurses are able to contribute in preventing the appearance of late complications of central venous catheterization.

1. Crit Care Med 1980;8:495

TITLE: QUALITY OF LIFE OF CRITICAL PATIENTS.

AUTHORS:G. VAZQUEZ MATA. PAEEC PROJECT.ICU, Hospital Virgen de las Nieves. GRANADA. ESPAÑA.

INTRODUCTION:We presents results related to the quality of life (QOL)of critical patients, from PAEEC Project data.
MATERIAL AND METHODS: The PAEEC Project is a multicentre study define the type of patients cared for in Spanish ICUs, and the therapeutic activity provided. Ninety-five ICUs from Spain are taking part. This study analyzes the QOL of critical patients prior to their ICU admission.For the evaluation of QOL a questionnaire designed by our team for critical patients was used, with 15 items grouped in 3 sub-scales: physiological functions (4 items); functional capacity (8 items) and subjective aspects (3 items). QOL is classified in 4 levels: normality (0 points); Slight deterioration (1-4 points);moderate deterioration (5-9 points); significant deterioration (≥10 points).
RESULTS: The sample was 9,283 patients, aged 57.91±17.46 years, 68.7% were male. Severity by APACHE II was 15.59±8.15 points. Their QOL score was 3.65±4.4 points. 3,322 patients had a normal previous quality of life (0 points); 2,904, slight deterioration (1-4 points);2,005,moderate deterioration (5-9 points) and 1,053,serious deterioration (≥10 points). Coronary care patients had a QOL score of 3.1±3.79 points, non-coronary medical, 4.6±4.86; surgical, 3.8±4.35 and polytraumatized patients 0.9±2.26 points.($P < 0.0001$ s.s differences between all groups).There is a worsening of QOL with the increase of age ($R = 0.30$, $p < 0.001$). Patients with worse QOL present more serious illnesses ($R=0.21$,$p < 0.001$).
CONCLUSIONS:ICU patients have a good quality of life, and only 15% present significant deterioration. Quality of life worsens with age,and patients with the worst quality of life present the most serious illnesses.Polytraumatized patients have the best previous quality of life.

TITLE: THERAPEUTIC ACTIVITY AND AGE IN CRITICAL PATIENTS.
AUTHORS:G. VAZQUEZ MATA. PAEEC PROJECT. ICU, Hospital Virgen de las Nieves. GRANADA, ESPAÑA.

We present results related to therapeutic activity in critical patients and their age, from the PAEEC Project.
MATERIAL AND METHODS: The PAEEC Project is a multicentre study to define the type of patients in Spanish ICUs, and the therapeutic activity provided. Ninety-five ICUs from Spain are participating. This study analyzes therapeutic activity in the first 24 hours as evaluated by TISS, and related factors.
RESULTS: The sample was 9,291 patients, age 57.91±17.46 years. Severity by APACHE II system was 15.59±8.15 points. The TISS score was 19.87±12.61 points, distributed as follows: I (<10 points): 14%; II (10 -19 points): 44%; III (20 - 39 points): 36%; IV (>39 points):5%.There is a positive correlation between the level of therapeutic activity and severity by APACHE II ($R = 0.46$, $p < 0.001$), and a very weak but negative correlation between TISS and age ($R = -0.048$, $p < 0.001$), so that an increase in age corresponds to a lower level of therapeutic activity.Patients $\leq$ 45 years old (N = 2075) present TISS of 20.47±13.3 points; between 45 and 60 years old (N = 2193), TISS score of 20.33±12.16; between 61 and 75 years old (N = 3796), TISS of 19.82±12.58, and over 75 years old (N = 1167), a TISS of 17.9±11.4; ($p < 0.0001$), s.s. differences between patients over 75 years and the rest.
The multivariate analysis of the relationship between TISS and age took into account: severity, existence of previous history, need for mechanical ventilation, size of hospital, diagnosis and mortality. It indicated that there continued to be a relationship between therapeutic activity and age, so that as age increased, therapeutic activity diminished.
CONCLUSIONS: Therapeutic activity performed on critical patients is less in the oldest patients, in whom excessively aggressive procedures are limited.

A relational data base management system in the ICU.

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Objectives: The introduction of the Information Technology in the I.C.U seems to be unavoidable because of the large amount of produced data and the need for their systematic analysis. Such an information system should be a) easy to use, b) friendly to the user, c) powerful and d) modular. On that basis, we created a patient data management system (PDMS) according to the expectations of the medical staff of an eighteen bed multidisciplinary ICU.

Methods: We selected Paradox for Windows V4.5 for the implementation of a relational data base because this program meets the above mentioned criteria. Informations regarding the patients include a) demographic data, b) previous medical history, c) diseases upon admission, d) complications during hospitalization and e) outcome data. The diseases' registration consists of 421 items classified in 15 categories upon the principal system affected. Specific informations about the need and duration of mechanical ventilation, nutrition, renal replacement, right heart catheterization and ICP monitoring are also available. An extension was added concerning ICU infections and related informations about antibiotic-resistant pathogens. All ICU pathogens can be matched to their resistance or sensitivity and cost of antibiotics. The program can perform queries and various statistical analyses based on complex criteria. New modules can be added later according to the future needs and remarks of the users.

Results: The program was well accepted by the medical staff and 300 patients were registered as a test. The first analysis of the data related a) observed mortality versus the APACHE II predicted mortality, b) mortality according to the age, gender, pathology and duration of ICU stay and c) pathology upon admission and ICU related complications.

Conclusions: The long term use of this PDMS can be an efficacious research tool. It can be used in retrospective or prospective studies by addition of necessary modules. The first data analysis revealed the lack of an international diseases' classification system. The development of a worldwide common classification system is essential for the compatibility of the data analysis among various ICUs. This will allow the realization of multicenter trials on a large scale.

Decision Support System (DSS) for treatment in the ICU environment

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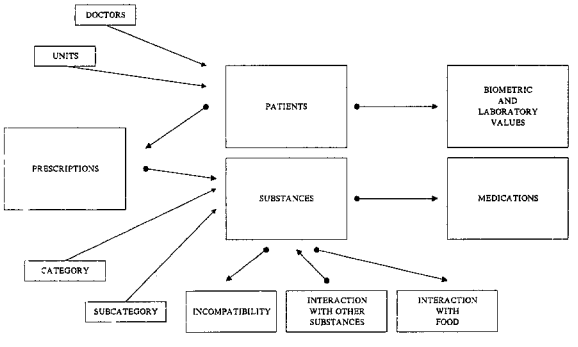
Dept. of Critical Care, University of Athens, Athens, Greece

The complexity of the cases submitted to an ICU, the variety of underline disease, the severity, as well as the large number of substances administered to each patient constitute obvious the need of support with an easy available DSS.

This system will assure the safety of the administered treatment will help to adjust the dose according to the situation of each patient and it will screen for possible interaction and incompatibilities between the administered drugs. The goal of the present effort is the design and development of a software system acting as a decision support tool to physicians of ICU.

The application is organised around a Relation DataBase Management System (RDBMS) that consist of: a) all available substances (1.850), b) all generic names of medications available in our country for each substance, c) incompatibilities (2.300 cases) and d) interactions with other substances (50.000 cases). The following figure shows the structure of the RDBMS.



Using the stored parameters for each patient the dose and the rate of administration of selected substances will be possible to calculate. The continuous monitoring of the treatment for each patient supports the medical staff to make the necessary changes of the prescriptions. The application is currently developing in wireless pen based computer systems which place patients at the centre of "islands of information" located throughout ICU.

In conclusion this DSS is a powerful and useful tool for ICU staff because it provides without additional work to the routine of daily practice, the currently available information for each order concerning drug interaction and incompatibilities as well as treatment monitoring.

DIFFERENCES IN HEMODYNAMIC AND OXYPHORETIC PARAMETERS IN CRITICALLY ILL PATIENTS

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Objective: The aim of this study is to observe, among 113 critically ill patients, subdivided following the diagnosis at the admission, the differences in the hemodynamic and oxyphoretic parameters between survivors [S] and non survivors [NS] and to test the possibility to have some survival criteria, as earliest as possible.

Methods: We made a retrospective study on 113 consecutive critically ill patients, subdivided in 3 series following the diagnosis at the admission: medical patients (29 S and 23 NS), surgical patients (19 S and 22 NS), and politraumas (14 S and 6 NS). Follow up was done at 20 days from the admission in ICU. All the patients were monitored with a pulmonary catheter and 18 hemodynamic and oxyphoretic parameters were collected at 7 times (T): at the admission (T0), at 12 hours from T0 (T1), at 24 (T2), 48 (T3), 72 (T4), 96 (T5) and 120 hours from T0 (T6). In each series, for every parameters, at all the times, mean and standard deviation was calculated both for S and for NS. Then between S and NS the means of each parameter were compared using t-test and $p < 0.05$ was considered statistically significant. In each series in the T where the most significative differences appeared between S and NS, we made a predictive criterion, assuming as predictive indices for survival the best values, higher or lower than the means of the parameters of all the patients, according to those ones statistically different between S and NS. Finally we compared among the 3 series the parameters of the survivors with the analysis of variance, to observe the possible different trend of such indices, following the diagnosis of admission: medical, surgical patient or politrauma.

Results: We could not find any predictive criterion for politraumas, perhaps because of the few number of patients. For high risk surgical patients the following criterion at T2 has a sensitivity of 100% and a specificity of 27.8%: SVI>32.89 ml/min/m^2, MAP>92 mmHg, PMAP<27 mmHg, CVP<10 mmHg, WP<14 mmHg, LVSWI>34 g M/m^2, SvO_2>67%, DO_2I>515 ml/min/m^2, O_2ER<31%. For medical patients at T5 the following criterion has a sensitivity of 100% and a specificity of 36.8%: CVP<7.5 mmHg, SaO_2>97%, SvO_2>74%, VO_2I<133 ml/min/m^2, O_2ER<25%, Shunt<19%. Survivors' data of the 3 series were significantly different, both for the hemodynamic and for the oxyphoretic parameters; moreover we observed that the values of hemodynamic and oxyphoretic indices were higher in politraumas.

Conclusions: According to the different pathologies, the patients' metabolic needs are different, so that it is justified to reach different therapeutic goals, following the type of pathology. Then criteria we found for high risk surgical patients and for medical patients assure, if satisfied, a good prognosis while, if not satisfied, the prediction of death is not good. Finally, about high risk surgical patients, according to what other Aurthors say, perhaps Shoemakers' therapeutic goals would seem inadequate, because they need a great physiologic and therapeutic effort in relation to the metabolic needs.

EUROPEAN PARTICIPATION TO THE INTENSIVE CARE LITERATURE: IMPORTANCE OF COUNTRY SIZE.

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Objectives: To assess the contributions to the intensive care literature of the individual European countries, in relation to their population.
Methods: We paged through all original articles and case reports published in 1989-1993 in 5 major journals: *Intensive Care Medicine, Critical Care Medicine, Chest, The American Review of Respiratory Disease. and Circulatory Shock.* The number of publications of each country was related to its size (number of inhabitants).
Results: The major contributors to the 5 journals were Switzerland, Sweden, Belgium, the Netherlands, Finland, Austria, Denmark, UK, France, Spain, Italy, Norway, and Germany (Figure 1). Thus, the smaller European nations had a greater participation than the larger ones, with the exception of Norway. A similar result was evidenced for contributions to *Intensive Care Medicine* (Figure 2). These findings can be explained by different submission policies and language barriers. However, there was no significant correlation with the gross national product of each country.
Conclusion: We conclude that the smaller European countries generally contribute more to international intensive care journals than the larger ones.

Figure 1

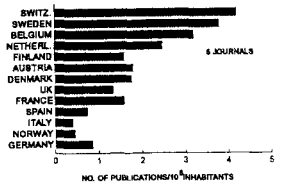
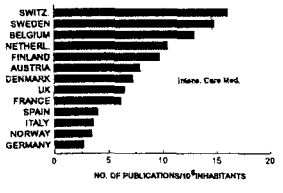


Figure 2



AGREEMENT BETWEEN SEVERAL METHODS MEASURING THORACOPULMONARY COMPLIANCE (Ctp).

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Objectives: To evaluate the agreement between a new and three old methods measuring Ctp and to assess their reproducibility. **Methods:** We studied 20 patients ventilated with a Siemens 900C respirator. We measured Ctp by dividing the tidal volume with the increase in airway pressure (Paw), either with the respirator setting used (Ca) or with a fixed setting (Cf). By modifing the inspiratory time (Ti) without changing inspiratory flow, we were able to deliver two series of 10 inflations (100, 200,... 1000 ml) before and after curarisation of the patient. The same volumes were also inflated in paralysed patients with a super syringe. At the end of each inflation a plateau of 3 sec was performed and Paw was recorded. The above three sets of pressure-volume (PV) points were used to reconstruct the corresponding PV-curves (C1, C2, C3). Ctp was finally measured with the conventional super syringe method (Css). The agreement and the reproducibility of methods measuring Ctp were assessed by Bland and Altman analysis. **Results:** The reconstruction of a PV curve without curarisation (C1) was impossible in only 3 out of 20 patients. Results are expressed as bias (d) and 95% limits of agreement (d±2SD).

Comparison	d	d±2SD		d	d±2SD
Css-C3	0.9	-11.6 to 13.4	C2-C1	0.1	-10.6 to 10.8
Css-C2	6.5	-16.7 to 28.5	Ca-Css	5.1	-28.3 to 38.6
Css-C1	5.1	-14.9 to 27.0	Ca-C1	1.2	-23.0 to 20.6
C3-C2	5.6	-14.5 to 25.6	Cf-Css	-1.6	-35.5 to 32.4
C3-C1	4.5	-14.1 to 23.1	Cf-C1	-2.9	-25.2 to 19.4
Reproducibility					
C1	2.3	-08.7 to 13.4	C3	0.2	-15.6 to 16.0
C2	-0.8	-06.0 to 04.4	Css	0.3	-10.2 to 10.8

Conclusions: The new method for Ctp measurement without a super-syringe had the best reproducibility in paralysed patients and gave similar results without curarisation in the majority of them. However, agreement between the methods tested was unacceptable for clinical purposes. Further investigation is required in order to improve the accuracy of Ctp measurement in ICU patients.

ACCURACY OF DRAWING COAGULATION SAMPLES FROM HEPARINIZED CENTRAL VENOUS CATHETERS

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Objective To determine the accuracy of activated partial thromboplastin time (aPTT) and activated clotting time (ACT) studies when samples are drawn through heparinized central venous catheters (CVC). **Methods** A total sample of 80 paired ACT/PTT values was analysed in 40 patients (28 m.,12 f.,66 ± 12 y.) for monitoring heparin therapy.All patients had a CVC (Certofix Trio,Braun,FRG) in the internal jugular vein receiving a continous infusion of 20.000 U heparin via the central catheter.ACT (HR-ACT,HemoTec,USA) and aPTT (Neothromtin, Behring,FRG) samples were drawn from the CVC using the double syringe technique (removing and discarding 5 ml blood before drawing the sample). These blood samples were compared to ACT/aPTT blood samples obtained by venipuncture (V.fem.) at the same time.ACT values were analysed directly in the intensive care unit (ICU),aPTT samples were measured in the hospital laboratory within 30 minutes.

Results

		ACT~ (~ACT/~PTT r = 0,62)	PTT~
CVC samples	132 ±34		88 ±22
V.femoralis samples	128 ±29		84 ±24
p-value	n.s.		n.s.

Conclusion There is no difference in heparin anticoagulation studies drawn from heparinized central venous catheters compared to those obtained by femoral venipuncture.Withdrawing 5 ml blood prior to obtaining the blood specimen is a safe way for eliminating heparin contamination.Not only the aPTT test but also the ACT test is a useful method for heparin anticoagulation assessment in the ICU.

HEPARIN USE IN CONTINUOUS RENAL REPLACEMENT PROCEDURES: THE STRUGGLE BETWEEN FILTER-COAGULATION AND PATIENT-HEMORRHAGE.

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Objectives: Evaluation of the delicate balance between filter-coagulation and patient-hemorrhage using heparin as anticoagulant in continuous renal replacement procedures.
Methods: From January 1991 through August 1994, we studied filter survival and hemorrhagic complications during 240 filter periods in 78 critically ill patients, treated with continuous arterio-venous hemo(dia)filtration, with special emphasis on the heparin dose, concurrent use of coumarins, systemic Activated Partial Thromboplastin Time(APTT), platelet count, mean arterial bloodpressure and the type of filter used.
Results: 141 Filters (59%) were disconnected because of coagulation. Mean survival of Multiflow AN69 filters was twofold shorter compared to survival of FH66 Gambro filters. A total of 48 hemorrhagic complications occurred of which three patients died at APTT values of respectively 39, 48 and 56 seconds. After adjustment for mean arterial bloodpressure, platelet count and the type of the filter, the risk for filter-coagulation decreased 25% (relative risk 0.76, 95%CI 0.68-0.85) for each ten seconds increase in APTT. The risk for patient-hemorrhage increased 50% (relative risk 1.50, 95%CI 1.38-1.64) at an APTT-increase of ten seconds. The occurrence of filter-coagulation and patient-hemorrhage was not correlated with the administered dose of heparin. Concurrent use of coumarines had a positive effect on filter-survival, without increasing the overall incidence rate of patient-hemorrhage.
Conclusions: The systemic APTT is a good predictor of the risk for filter-coagulation and patient-hemorrhage. Heparine therapy seems optimal at an APTT between 35 and 45 seconds, although one should realize that fatal hemorrhagic complications still can occur.

VASCULAR TONE AND SYMPATHETIC ACTIVITY IN PATIENTS WITH HEMORRHAGE

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Objectives: The alterations in vascular tone which are primarily regulated by adreno-sympathetic tone(AST) are compensatory responses in hemorrhagic patients. This study was designed to evaluate the correlation between vascular tone and AST in patients with hemorrhage. Methods: The vascular tone was expressed by volume elastic modulus (Ev) that is defined as; Ev = $\Delta p/(\Delta v/v)$ (Δp; the arterial pulse pressure, $\Delta v/v$; the volume change ratio). Ev was measured using a non-invasive transmittance infrared photoelectric plethysmography (TIPP) and a volume oscillometric sphygmomanometer . We prospectively studied 6 patients with hemorrhage. The initial Ev measurement was performed on arrival and repeated for a 48-hours duration. As a parameters of AST, serum concentrations of adrenalin (Ad), noradrenalin (Nor), plasma renin activity(PRA) were measured simultaneously. We analyzed the correlation of Ev and conventional parameters to AST by multivariate statistical analysis. Results: Ev values at Transmural pressure 40mmHg on admission and 48hours later were respectively 864.2 ± 249.5mmHg, 270.0 ± 92.0 mmHg (mean ± SD). Systolic pressure(Pas) and serum hormones on arrival and 48hours later were respectively, Pas; 96.5±20.4, 152±18.7mmHg, Ad; 1.21±1.02, 0.07±0.04 ng/ml, Nor; 1.60±1.48, 0.65±0.39 ng/ml, PRA; 26.6±37.8, 2.5±2.9ng/ml/hr. The Ev values correlated significantly with Ad (r=0.47, p=0.006, n=33), Nor (r=0.47, p=0.005, n=33), PRA (r=0.38, p=0.032, n=33). By multivariate statistical analysis, Ev correlated more significantly with Ad and Nor and PRA (p=0.00079) than the conventional parameters such as Pas, heart rate and pulse pressure. Conclusions: The alterations of Ev correlates closely with AST. The compensatory mechanism in hemorrhagic patients can be detected noninvasively by Ev monitoring.

COMPARISON OF AUTOLOGOUS BLOOD PROCESSING BY FILTRATION AND CELL WASHING

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Objectives and Method: Autologous oxygenator blood was processed at the end of cardiopulmonary bypass (CPB) by either hemofiltration (HF 60, 1,2 m², Fresenius) or by cell washing with a continous autologous transfusion system (CATS, Fresenius). Prospectively the blood of 10 patients for each group was processed and then retransfused intravenously to the patient. Besides, volume and time requirements, standard hematologic chemistry, coagulation and complement activation were measured.

Results (mean values for oxygenator blood at the end of CPB, and results of concentrate after processing by filtration or washing):

	CPB blood	Filtration HF60	Washing CATS
Blood volume (ml)	1071	598+	317+
Hemoglobin (g/dl)	7,9	15,2+	19,9++
Protein (g/l)	42,0	107+	12,8++
Albumin (g/l)	20,6	70,3+	2,9++
Potassium (mmol/l)	5,4	5,3	1,.8++

(+ p < 0,05 to CPB Blood; ++ p < 0,05 to CPB Blood and Filtration)

Both processing techniques show excellent hemoconcentration of the diluted CPB blood with a good transfusion effect for the patient. Filtration retains all plasma proteins and large molecular weight plasma bound waste products. In contrast, cell washing with CATS significantly depletes plasma proteins and waste products. The newely developped CATS machine gives consistant laboratory result in a fully automatic continuous processing mode.

In conclusion, both filtration and washing are effective for processing CPB blood. Filtration yields a highly concentrated whole blood, whereas CATS washing produces a high quality autologous erythrocyte concentrate.

A NEW CHROMOGENIC ASSAY FOR SOLUBLE FIBRIN IN PLASMA.

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Soluble fibrin has during the last years gained interest as a marker for the activation of the coagulation in connection with various clinical conditions, e.g. disseminated intravascular coagulation, deep venous thrombosis and myocardial infarction.

Elevated levels of soluble fibrin in plasma can be detected by the chromogenic assay Coaset Fibrin Monomer, relying on the ability of fibrin to enhance the tPA-catalyzed conversion of plasminogen to plasmin. Using this test, it has been shown that the level of soluble fibrin can be correlated to severeness of illness in critically ill intensive care unit patients.

A revision of the Coaset Fibrin Monomer kit has now been made and the new product, Coatest Soluble Fibrin, is considerably more convenient to handle and gives higher resolution at low fibrin levels. The test is performed by the addition of a buffer dilution of the plasma sample to a microstrip well containing the colyophilized mixture of tPA, plasminogen and the plasmin specific chromogenic substrate S-2403. The reaction is allowed to proceed at room temperature for 15 minutes before discontinuation. The absorbance at 405 nm, measured in a microplate reader, is proportional to the content of soluble fibrin in the sample. The assay is carefully standardized and calibration curves are provided in the kit.

The convenient and rapid assay procedure makes the Coatest Soluble Fibrin test well suited for single test analysis in acute situations.

BLOOD COAGULATION ABNORMALITIES IN HEAD TRAUMA: JUGULAR BULB VS. SYSTEMIC SAMPLES

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Objectives : Blood coagulation abnormalities have been reported in the systemic blood of patients with cerebral lesions. The physiopathology of such events is not yet completely understood. We compare the coagulation profile of blood from the right jugular bulb with systemic blood of patients with head injury.
Methods: We studied 4 patients, who were admitted to our Neurosurgical Intensive Care Unit between January and March 1995 with head injury and no other associated pathology (age 20-60 yrs), a Glasgow Coma Score <= 8, no abnormality in baseline coagulation profile and no history of coagulopaties. The patients did not undergo angiography. A one-way 16 gauge Certofix catheter was inserted through the right internal jugular vein up to the jugular bulb. An identical catheter was inserted through a subclavian vein. Blood was sampled from either catheter (a=atrial; j=jugular) 6-10 hours after trauma (T1) and 12 hours later (T2). Results are expressed as median(range).
Results: Plasminogen activator inhibitor-1 (normal values: 18±10 ng/ml): T1a=613(318-886); T1j=837.5(267-998.5);T2a=299.25(112-609.5); T2j=269.25(103-597).
Circulating thrombomodulin (n.v.: 29.3±4.7): T1a=25.75(20.25-56.25); T1j=23.625(22.05-54.8); T2a=26.525(22.95-36.1); T2j=24.825(22.45-27.2).
Activated C protein (n.v.: 1.89±0.5 ng/ml): T1a=6.53(3.45-11.83); T1j=8.770(3.62-13.7); T2a=3.705(1.85-7.75); T2j=2.58(2.04-9.18).
C protein-activity (n.v.: 67-150%): T1a=64(25-93); T1j=62.5(23-104); T2a=77(71-125); T2j=76(58-101).
C protein-antigen (n.v.: 62-143%): T1a=75(36.5-109.5); T1j=72(37.5-131.5); T2a=71(56.5-103); T2j=75.25(74.5-109).
Von Willebrandt factor (n.v.: 50-150%): T1a=471.5(300-551); T1j=431.5(360-561); T2a=498(439-505); T2j=439.5(323-534).
Thrombin-antithrombin III complex (n.v.: <4.1 µg/l): T1a=141.35(55.9-263); T1j=174.37(45.2-227); T2a=69.4(23.95-212.75); T2j=111.53(39.2-127).
Plasminogen (n.v.: 78-124%): T1a=65(38-81); T1j=74.5(43-83); T2a=82(60-99); T2j=80.5(64-83).
Antithrombin III (n.v.: 97-117%): T1a=74.5(53-100); T1j=74(54-104); T2a=83.5(73-98); T2j=85(72-93).
Fragment 1+2 (v.n.: <0.45 nmol/l): T1a=3.1675(0.61-4.33); T1j=3.7125(0.665-5.48); T2a=0.7725(0.35-1.69); T2j=1.31(0.275-1.815).
Tissue plasminogen activator (v.n.: 4.1±2.4 ng/ml): T1a=32.75(11.95-56); T1j=50.5(16.6-75.5); T2a=22.15(14.2-30); T2j=30(15.7-37.1).
Conclusions: Differences between atrial and jugular samples in PAI-1, TAT and F1+2 suggest that activation of the coagulation cascade occurs immediately after severe head trauma and takes place at the cerebral level. Twelve hours later a substantial tendency to normalization occurs.

INDOBUFEN VERSUS HEPARIN IN ANTITHROMBOEMBOLIC PROPHYLAXIS IN HIP AND KNEE PROSTHETICS SURGERY IN HAEMODILUTED PATIENTS

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The incidence of postoperative thrombotic and haemorrhagic complications were assessed in patients treated with indobufen, heparin calcine (HeCa), low mollecular weight heparin (LMWH) (Enoxheparin) and undergoing hemodilution, blood predepositing, intra and postoperative blood saving. The indobufen temporarily blocks platelet aggregation through selective inhibition of the cyclooxygenasis and thus arachidonic acid(1). The maximum effect occurs after 3 hours from the first administration and is still present after 24 hours.

Materials and Methods - 979 patients, mean age 62±11 yrs., weight 68±10 Kg were studied. 321 (32.8%) were male and 658 (67.2%) female. 858 underwent 713 hip prosthesis (7 previously plate and screw removal) 145 hip revision (10 stem, 33 cup and 102 stem + cup), 121 total knee prosthesis, in the 1st Anaesthesiology Dept. from 1-1-1992 to 30-6-1994. As for antithromboembolic prophylaxis, apart from hemodilution 668 pts were with treated indobufen (Indo), 199 with heparin calcium (HeCa) and 112 with low mollecular weight heparin (LWMH). At the slightest clinical and/or instrumental suspicion of deep vein thrombosis (DVT) or polmonary embolism(PE), a phlebogram or scintigram were respectively carried out.

Results - The incidence of homologous transfusions was significantly lower (p=0.0001) in the patients treated with indobufen (4.2%) compared with HeCa (14.5%). The contingency table shows statistical significance for the use of HeCa in patients with vein deficiency in the lower limbs, past DVT and/or PE, coronary heart disease (CDH), while there is no correlation for renal, cardiac or liver deficiency, obesity, systemic hypertension, arrhythmy, diabetes, chronic bronchitis and rheumatoid arthritis. By comparing the postoperative complications with the risk factors, there is a highly significant correlation (p=0.0001) between CDH and thrombotic and hemorrhagic complications (PE, death, hematoma, the use of homologous blood). These data show that heparin, preferred in patients with CDH, most likely for leagal-medical reasons, did not have the desired effect.

Conclusions - The stastistical analysis shows significantly different efficacy (p=0.0001) between the therapies (see table): it can be seen that in patients undergoing autotransfusion and hemodilution, indobufen produces a lower incidence of haemorrhagic complications compared to HeCa and LMWH and is more effective in the prevention of thrombotic complications at clinical evidence. The duration of postoperative hospital stay is significantly longer for patients transfused with homologous red cells and treated with HeCa (13.7±1.4 days) and LMWH (13.5±1.4 days) compared with Indo(11.8±1.4 days).

P=0.0001	No Compl	Haemat	DVT	DVT+ PE	Myoc Ischem	Other compl	Exitus
Indo	94.3%	3.3%	0.5%	0.9%	0.2%	0.6%	0.3%
HeCa	83.5%	11%	4%	0.5%	0.5%	0	0.5%
LMWH	85.7%	5.4%	5.4%	0.9%	0.9%	0.9%	0.9%

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MONITORING POSTOPERATIVE BLOOD LOSS IN HIP AND KNEE REVISION PROSTHESIS

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One of the main causes for postoperative complications in major orthopaedic surgery is postoperative bleeding with local effects in the operation site (hematomata, pain and delayed mobilization) and/or systemic and subsequent cardiocirculatory repercussions that are sometimes severe. The aim of this study is to assess the possibility to apply a new system of monitoring, control and saving postoperative blood loss from the drainage. The BT797 Recovery Dideco (Mirandola, Modena - Italy) was used since it is the only apparatus capable of doing this. The apparatus consists of a pressure transducer, adjustable from –100 a +50 mmHg, which activates a peristaltic pump connected to drainage tubes. The BT797 Recovery display shows hourly bleeding in the first 8 hours, total bleeding, time passed since the start of monitoring and subsequent salvage and the aspiration pressure on the drainage tubes; the latter is inserted at –10 mmHg and then modified according to bleeding/minute. Il BT797 Recovery also has an alarm that sounds automatically if: blood loss is more than 300 ml/hour; air is in the circuit; the batteries are running low.

Materials and Methods: 191 pts were studied (53 m and 138 f), aged 63.5±11.1years, basal hemoglobin 13.1± 1.3(range 7.8-16.6)g/dl, treated from 1st January, 1992 to 31st December, 1994 in the Ist Service of Anesthesia and Intensive Care unit of our hospital. The patients underwent the following surgical treatment: total hip revision (132pts), cup revision (44pts), stem revision (13 pts), total knee revision (2 pts). The average duration of the operations was 173±58 min. Intraoperative monitoring and blood salvage was applied to all patients. General anesthesia was used on 57 pts. and integrated (epidural analgesia + light general) on the remaining 134. Antithromboembolic prophylaxis consisted of external pressure bandage, isovolemic hemodilution with indobufen in 131(68.6%)pts., calcic heparin in 35(18.3%)pts., low molecular weight heparin in 25(13.1%)pts.; 1 pt did not give a predeposit of blood, 4 gave 1 unit, 45 pts 2 units, 110 pts 2 units, 31 pts 4 units. The data obtained was statistically analysed using contingency tables and ANOVA.

Results: Average intraop salvage was 420±345 ml, average postop salvage was 420±265 ml the average intra+postop 909±460 ml. Average postop loss was 677±359 ml. The global incidence of postop complications was: hematomata 5.2%, DVT 1.1%, pulmonary thromboembolism 1.1%, myocardiac ischemia 0.5%, acute myocardic infarction 0.5%, respiratory deficiecy 2.6%, arrhythmia 2%, cystitis 0.5% there were no complications in 86.4% of pts. Postop bleeding over 300 ml in under 60 minutes (with bleeding alarm activation) occurred in 30 pts (15.7%). This statistically correlates only with the type of operation performed (more frequently in total hip revision p=0.034) and with a significant decrease (p=0.003) in the prothrombic activity detected about 8 hours after the operation. This bleeding, also made the alarm sound, calling the attention of staff who could act accordingly, by making the drainage pressure positive and increasing the tension of the external pressure bandage.

Conclusions: Postop monitoring, control and blood loss salvage combined with predepositing and intraop salvage has enabled allogenic transfusions in 16% of cases to be avoided in operations with high postop blood loss like hip or knee revision. The usefulness of the system can be seen by the fact that in the 30 patients with so much bleeding to set off the alarm, there was no significant difference in the incidence of allotransfusions and complications.

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COAGULATION DISORDERS IN INTRACRANIAL HAEMORRHAGE

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An injury of the brain may result in various disorders of hemostasis caused by the release of thromboplastin into the circulation through a damaged blood-brain barrier.Disseminated intravascular coagulation(DIC) is one of these disorders.It is a freguent but relatively rare ly diagnosed complication of subarachnoidal haemorrhage.

The aim of this study was to evaluate some parameters of both blood coagulation and fibrynolisis in patients with SAH.In addition one wanted to find out whwther potential changes correlated with the patients condition in the acute phase of SAH and whether they influenced the course of this disease.

60 patients with SAH were studied.In 17 of them SAH was due to closed craniocerebral injury and in the rema ining 43 resulted from vascular malformation.

The following parameters were evaluated:the prothrombine time,the activated partial thromboplastin time, the thrombine time,level of factor V,fibrinogen degrada tion products and fibrin monomers.

The results let us show the presence of DIC in 3 patients with closed craniocerebral injury and in 14 with vascular malformation despite the lack of clinical symptoms The tests in 5 posttraumatic patients and in 6 patients from second group showed incomplete DIC.On admission patients with such changes in measured parameters were in poor condition.The course of the disease and the effe cts of treatment were also worse in these patients.

The results showed that in patients with SAH complex disorders of both coagulation and fibrynolisis occur, and they depend on clinical condition of the patient. They also influence the course of the disease.

DISSEMINATED INTRAVASCULAR COAGULATION IN CRITICALLY ILL OBSTETRICAL PATIENTS. An analysis of 40 patients.

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Introduction : Severe hemorrhagic disorders, preeclampsia and other critical ilnesses in obstetric patients (O.P.) are often associated with disseminated intravascular coagulation (D.I.C.). However there are limited data on D.I.C. in O.P. requiring critical care.

Objective : To examine 1) the course and the outcome of severe D.I.C. in O.P. 2) the change of biological parameters under treatment.

Methods : Charts of all patients admitted with D.I.C. over a ten year period (85-94) were reviewed. Diagnosis of DIC was based on the association of fibrinogen < 2 g/l - platelets <150 10^9/l - FPD > 40 µg/ml in the 24 hours of the admission.

Results : 40 patients - mean age 29±6 y - SAPS 8±5 - gestanional age 35±5weeks - the two first conditions associated with D.I.C. were placental abruption (35 %) and preeclampsia or eclampsia (22,5 %). Bleeding episode was present in 22 pts (55 %) and surgical treatment has always been necessary. 26 pts (65 %) were given packed red cells (12±10 u) and fresh frozen plasma (9±8 u). 6 patients were given platelets packs. Heparin was never administered. 6 pts required mechanical ventilation and two patients hemodialysis. All the 40 patients survived.

Correction of prothrombin time (P.T.) and fibrinogen (F) was quick (P.T. at $T24^h$ 69±22 % - F at $T36^h$ 2,60±1,5 g/l). But platelets count remained low (plat. at $T48^h$ 80 ±4210^9/l) - no difference was observed in patients who received platelets.

Conclusion : Prognosis of critically ill O.P. is good. Blood loss is the main complication. Correction of hypovolemia and anemia with concomitant surgical treatment are essential. The administration of coagulation factors or platelets is still under discussion.

EFFECTS OF ANTITHROMBIN III AND A PROTEASE INHIBITOR, GABEXATE MESILATE, IN DISSEMINATED INTRAVASCULAR COAGULATION

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Objectives: To evaluate the effects of antithrombin III (AT-III) and a protease inhibitor, gabexate mesilate (FOY), on the coagulation and fibrinolysis in disseminated intravascular coagulation (DIC).

Methods: After the approval of our institution and informed consent from patient's family, 40 patients with a DIC score (1988, Japan) more than 5 points (DIC or having a risk for DIC) entered this study. They were randomly divided into two groups, FOY (1-2 mg/kg/h for 7 days or more) treated group and no FOY group, each of 20 patients. Platelet count (Plt), fibrinogen (Fgn), AT-III fibrin degradation product (FDP), D-dimer (DD), fibrin monomer (FM), thrombin-antithrombin complex (TAT), plasmin-plasmin inhibitor complex (PIC), and prothrombin time ratio (PTR) were measured before the start of treatment (at admission) and 1, 3, 5 and 7 days after the admission. AT-III at 1500 units for 3 days was administered if the AT-III at admission was less than 70%. Finally the patients were divided into four groups: Group A, FOY (+) and the AT-III ≥ 70%; Group B, FOY (+) and the AT-III < 70%; Group C, FOY (-) and the AT-III ≥ 70%; Group D, FOY (-) and the AT-III < 70%, each of 7 patients, to match the patients for backgrounds. All parameters, DIC score and survival rate in a month following treatment were compared among the four groups.

Results: The AT-III and Plt from day 3 to 7 were significantly higher in Groups A and C than in Groups B and D. The FDP, DD, TAT, and PIC after treatment decreased significantly from the baselines in Groups A and C but not in Groups B and D. The Fgn and FM were not significantly different among the four groups. The PTR decreased in Groups C and D but increased in Group B. The DIC score decreased significantly in Groups A and C than in Groups B and D. Survival rates were 57%, 43%, 71% and 57% in Groups A, B, C and D, respectively, although not significantly different.

Conclusions: In patients with DIC or a risk for DIC, FOY had no expected effects but AT-III had suppressive effects on the coagulation and fibrinolysis mechanisms.

BLOOD CARBOXYHEMOGLOBIN DETERMINATION: A PROGNOSTIC FACTOR ?

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Carbon monoxyde intoxication is a classical complication of inhalation injury.
Carbon monoxyde is also physiologically produced during the heme metabolism: heme is conversed to bilirubin by the hemeoxygenase which is an intracellular stress protein.

20 ICU patients (pts) were studied prospectively for APACHE II score and carboxyhemoglobin (HbCO) arterial level to assess if HbCO level could be correlated with the severity of the pts.

APACHE II score and HbCO were determined with other ICU parameters (T°, Heart rate, ...) once a day during the ICU stay. Statistical analysis was performed by Mann Whitney test ($p<0.05$).

We observed a significant higher HbCO level and WBCcount between pts with APACHE II score >12 (1.88 ± 0.07 % - 13524 ± 3452 /mm3) and pts with APACHE II score <12 (1.42 ± 0.04 % - 10485 ± 2873 /mm3).

This observation suggests that HbCO levels could be related with the severity of illness of ICU pts.
Further studies are necessary to confirm this relation and to evaluate the clinical implications.

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A BREAKTHROUGH IN TRACHEOTOMY TECHNIQUES: TRANSLARYNGEAL TRACHEOTOMY

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Objective: To evaluate a new technique of non-surgical tracheotomy.
Patients: 55 adults, mean age 54 years and 11 children, mean age 18 months (2 mo.-5 yrs).
Method: Through a needle inserted in the trachea, a guide wire is retrogradely pushed out of the mouth and attached to a special device formed by a flexible plastic cone with pointed metal tip joined to an armoured tracheal cannula. This device is then pulled back through the oral cavity, larynx and trachea, and outwards across the neck wall by applying traction on the wire with one hand and counterpressure on the neck wall with the fingers of the operator's other hand. When the cone and 2/3 of the cannula have emerged, the cannula is cut off from the cone, straightened perpendicular to the skin, rotated and advanced caudally to its final position.
Results: Endoscopic control facilitates and improves the safety of all manoeuvres. The pointed cone easily pierces the tissues, and the cannula is extracted without difficulty since it has the same outer diameter as the cone. Tissue adherence around the cannula is absolute thus preventing local inflammation. The time in apnea required for dilation and cannula placement does not exceed 60 sec., and it is well tolerated because within safety limits in patients hyperventilated with oxygen. Only one case of bleeding occured in a patient on dialysis with severe coagulopathy. Autoptic findings in subjects who died due to progression of primary disease showed a very regular stoma with an almost complete lack of hematic and flogistic infiltration in recent tracheotomies.
Conclusions: Translaryngeal tracheotomy (TLT), by virtue of its greater inherent safety and lower tissue trauma than percutaneous techniques, can also be carried out in infants and children, a severe test bench for any tracheotomy technique. Further specific indications are recently sternotomized patients, since TLT is associated with a low rate of infection, and short term tracheotomies after laryngeal surgery, to prevent obstructive complications.
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INHALED NITRIC OXIDE (NO) IN PULMONARY EMBOLISM IN A HIPOXIC CANINE MODEL.

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BACKGROUND: Inhalation of NO has been shown to reverse hypoxic pulmonary vasoconstriction[1], to reduce pulmonary pressure in pulmonary hypertension of different origin[2] and to improve gas exchange[3]. In pulmonary embolism, pulmonary hypertension is caused by mechanical vascular obstruction and by reactive vasoconstriction. The effects of inhaled NO in pulmonary embolism has been partially studied[4]. The purpose of this study was to investigate and determine the effects of NO inhalation on pulmonary hemodinamics and gas exchange in a hypoxic canine model of pulmonary embolism.
METHODS: Two groups of adult mongrel dogs were studied: group 1 (control) 5 dogs and group 2 (NO inhaled) 6 dogs. Both groups were anestesized with tiopental, mechanically normoventilated with an hypoxic mixture of O_2 and N_2 (FiO_2 0,16) and instrumented (Swang-Ganz catheter, femoral artery catheter). Pulmonary embolism (PE) was induced by Fisher's method[5]. NO inhalation (80 ppm) in group 2 was started 15 min. prior to PE and kept constant throughout the experiment. NO inhaled concentration was analyzed by chemiluminiscence technique. Pulmonary artery pressure (PAP), central venous pressure and sistemic arterial pressure were continuosly recorded. Cardiac output, arterial PO_2 (PaO_2) and mixed venous PO_2 were measured in both groups under hypoxic conditions, before PE and 5, 15, 30 and 45 min. after PE. Pulmonary vascular resistance (PVR) and gas exchange (PaO_2/FiO_2 ratio), were calculate using standard formulas. Data were process and analyzed with non parametric test, and reported as mean ± SD and statistical significance was considered if $p < 0,05$.
RESULTS: NO produced an increase in arterial oxigenation (PaO_2/FiO_2 ratio) and reduced PAP before PE induction in group 2. After PE we found no significant difference with respect to the time course of PAP, PVR and gas exchange between both groups throughout the experiment.

	Before	Hipoxia	5 min.	15 min.	30 min.	45 min.
G. 1 PAP	16.1 ± 2.1	18.8 ± 2.3	50.7 ± 8.1	44.1±11.9	36.5±11.8	32.0 ± 7.8
G. 2 PAP	13.8 ± 2.1	14.2 ±3.0*	42.2 ± 1.9	32.0 ± 4.5	27.3 ± 4.9	25.5 ± 5.5

* $p<0.05$

CONCLUSION: Our data suggest taht, in pulmonary embolism induced by Fisher's method, NO inhaled not modify neither pulmonary hemodinamics nor oxigenation. Agree othres authors, inhaled NO improves hipoxia-induced pulmonary hypertension. Probably, the severe mechanical obstruction produced in pulmonary embolism masked the small effects of NO inhaled.
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AUTOMATIC ADMINISTRATION SYSTEM FOR LOW DOSE CARBON MONOXIDE IN THE MEASUREMENT OF CIRCULATING BLOOD VOLUME.

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Objectives: Blood volume measurement would be useful in critically ill patient management if it were easy to perform. This is not the case and current methods are based on radiolabelled red cell dilution. Inhalation and uptake of a known mass of carbon monoxide (CO) gas and measurement of carboxyhaemoglobin increase can give results accurate enough for clinical use. This requires a rebreathing system providing oxygenation and carbon dioxide removal, yet complete retention of all carbon monoxide administered, and so most authors hand ventilate with a bag and Waters soda-lime canister, adding oxygen as necessary. We aim to popularise this method by; i)Design of an automatic CO administration system driven by the ITU ventilator and ii)Writing of software for a portable computer to perform all necessary calculations.

Method: We show the computer is use estimating the CO dose required and later estimating the blood volume. We also show the new gas administration system. This is a fully closed circle attached to a "bag in bottle", driven by the ventilator. The novel feature is the mechanism by which driving gas (set to 100% O2) spills automatically into the circle, balancing O_2 uptake by the patient, yet allowing no CO loss.

Conclusions: This equipment is easy to use, reduces human error and allows optimum ventilator settings to remain. The operator merely administers the volume of CO determined by the computer and takes blood on two occasions. Carboxyhaemoglobin measurement is easy to perform, thus there is a cost saving also. With our modifications use of this technique may potentially become more widespread,

The video demonstrates the method in use in our ITU.

POSTINTUBATION LARYNGOTRACHEAL STENOSIS, SURVEY AND THERAPEUTICS OF 40 CASES.

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Objective: To evaluete the effectiveness of new treatments for postintubation laryngo-tracheal stenosis(PILTS).
Methods: Survey and therapeutics retrospective analysis of patients with PILTS, from January 1990 to December 1994.
Results: We have studied 40 patients, 24 men and 16 women, age 9 - 78 years.
- 10 (25%) underwent conventional surgical therapeutics. 9 (90%) with resection of tracheal stenosis with end-to-end anastomosis(RTS). 1 (10%) With broncoscopic dilatation. One patient died and the others still have stable patency(SP) without continued treatment.
- 29 (72,5%) have received endoscopic laser ablation with or without calibration tubes. 17 of them (58,6%) are receiving continued endotracheal treatment until now. 12 (41,4%) have SP wihout continued treatment.
- 1 (2,5%) endoscopic laser therapeutic case turned to RTS and is having SP.
Conclusion: Conventional surgical aproach has been progressively replaced in our Hospital by endoscopic laser ablation and silicone calibration tubes. This study suggests that these technics are effective and could be the elective treatment for iatrogenic stenosis.

NITRIC OXIDE ATTENUATES PLATELET TRAPPING IN HEPARIN BONDED HOLLOW FIBER MEMBRANE OXYGENATORS

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Objectives: Hemorrhagic disorders due to thrombocytopenia and thrombocytopathia remain one of the most serious complications during long-term extracorporeal membrane oxygenation (ECMO) in patients with severe acute respiratory distress syndrome (ARDS). In the presented study, nitric oxide (NO), kwown as a potent endogenous platelet antiadhesive, disaggregating and antiaggregating compound, was evaluated for its possible antagonistic effect on platelet trapping when added to the gas compartment of membrane oxygenators (MO).
Methods: Two parallel separated extracorporeal circuits, consisting of heparin bonded hollow fiber oxygenators (Minimax, Medtronic, Carmeda Bioactive Surface), tubing systems, low pressure reservoirs, and roller pumps were prepared. For each measurement, a pair of circuits was simultaneously filled blood from the same volunteer. Low-heparinized fresh warm blood was obtained from four healthy volunteers, who had no drugs for at least two weeks. The gas inlets of both oxygenators received dry gas (21 % oxygen, 5 % carbon dioxide, 84 % nitrogen); gaseous NO (20ppm) was added to the gas of one of the oxygenators (NO-MO), whereas the other one (MO) was used as control. After 270 minutes NO gas was switched off, so that the NO-MO received no more NO, and NO was added to the gas inlet of the membrane, which had no NO before. To assure intracircuit volume stability, drawn blood for measurements was replaced with saline, and platelet counts were corrected for dilution by hemoglobin values. The mean of four platelet counts (Coulter Counter) of each timepoint (start, 30, 90, 150, 210, 270, 330, 390, and 450 minutes) was used for statistical analysis (paired sample t-test).
Results: In the NO-MO platelets remained at 96 ± 3,2 % (percentage of baseline value, mean ± SD) until 270 min. In contrast, platelets of the MO continuously decreased after start and were significantly lower after 150 minutes (96,4 ± 3,5 % vs 90 ± 3,1 % ($p < 0.05$); 210 min. 95,9 ± 4,5 % vs 84,5 ± 2,2 % ($p < 0.05$); 270 min. 82,7 ± 2,5 % ($p < 0.05$). After switching of NO gas to the MO, further decrease of platelets was stopped and platelets remained at 81,4 ± 4,5 % until termination of circulation. Platelets of the former NO-MO decreased slightly after cessation of NO gas to 92,6 ± 5,4 % .
Conclusions: These data indicate that gaseous NO significantly attenuates platelet trapping in hollow fiber oxygenators, when added to the gas compartment. This might be a new therapeutical approach for membrane oxygenator induced thrombocytopenia during long-term ECMO.

MODULATION OF PLATELET CELL SURFACE ACTIVATION MARKERS BY NITRIC OXIDE

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Objectives: Nitric oxide (NO) plays a pivotal role in regulation of vascular hemostasis. Several studies elucidated the antiadhesive, antiaggregating, and disaggregating properties of endothelially synthesized NO to platelets. Additionally, agonist-induced NO production in platelets by the L-arginine-NO pathway was found as a negative feedback mechanism after platelet activation. Although NO-platelet interactions were intensively studied by several investigators, no data exist, about changes in platelet surface molecule expression in NO-modulated platelets measured by flow cytometry using monoclonal antibodies (MoAbs).
Methods: P-selectin (alpha-granule-membrane protein, GMP-140, CD62P) and glycoprotein 53 (GP53, lysosomal protein, CD63) are expressed only after platelet activation and degranulation. Activation was quantified in thrombin (0.4 U/ml) and ADP (0.1 mM) stimulated platelet rich plasma samples (PRP). Blood was obtained from healthy volunteers (n=7), who had no drugs for at least 14 days. For evaluation of NO-modulated activation, the spontaneously NO-releasing compound SIN-1 (0.1 mM) (3-morpholino-syndonimin-hydrochlorid) was added in parallel prepared samples prior to the addition of agonist. Platelet surface molecule expression was evaluated with MoAbs directed against CD41a (GPIIbIIIa, fibrinogen-receptor, phycoerythrin(PE)-conjugated), CD62P (FITC-conjugated), and CD63 (FITC). Only CD41a-positive signals were gated in side-angled light scatter, and assayed for activation marker expression (defined as percent of gated population).
Results: Basal P-selectin expression was 1.6 ± 0.7 %, and increased to 75.2 ± 12.2 % after thrombin-activation, and to 26.7 ± 5.3 % in ADP-stimulated samples. Addition of SIN-1 attenuated P-selectin expression to 34.0 ± 19.3 % in thrombin ($p<.001$, two-tailed paired t-test), and 5.2 ± 2.2 % ($p<.001$) in ADP-activated platelets. Basal GP53 expression was 1.7 ± 0.5 % and increased to 63 .0 ± 6.4 % in thrombin, and to 7.7 ± 3.4 % in ADP-stimulated samples. With SIN-1, GP53 expression decreased to 34.6 ± 10.4 % ($p<.001$) in thrombin, and 3.0 ± 1.4 (p .001) in ADP-stimulated samples.
Conclusions: These data implicate, that NO leads to a significantly reduced activation of surface molecule expression in thrombin and ADP-stimulated platelets. In addition, flow cytometry might be a useful tool for studying modulation of platelet activation by NO or NO-releasing compounds.

ACUTE RESPIRATORY FAILURE DUE TO CADMIUM INHALATION

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INTRODUCTION: Acute cadmium poisoning is very rare. On initial presentation may mimic metal-fume fever, but acute inhalation cadmium toxicity may produce fatal chemical pneumonitis.

CASE REPORT: We present a case of acute fatal respiratory failure secondary to cadmium-fume inhalation. A 53 year old patient was trasferred from another hospital with acute respiratory failure presumably due to pneumonia. The last days before he had had commom cold symptoms. He had been cutting with a welder during one hour without any respiratory protective measure. Three hours after exposure he developed progressive dispnea and was admitted to hospital. With presumtive diagnosis of respiratory infection, antibiotics were begun, however he failed to improve. All microbiological studies were negative. Chest x-ray showed bilateral diffuse infiltrates. On seventh day he needed intubation and mechanical ventilation and on 10th he was admitted to our ICU. Antibiotics were stopped and new microbiological studies were performed including brochoalveolar lavage and virologic studies. All results were negative. He developed progressive hipoxemia and hipercapmia and finally, multiorganic disfunction syndrome. He died 19 days after exposure. The metal he had been working with was a 10% cadmium alleation. Blood cadmium concentration 15 days after exposure was 0.34 mcg Cd/g Cr, and urine cadmium concentration was 16.9 mcg/L. On postmortem examination, tissue cadmium concentrations were: blood 175 ng/ml, liver 823 ng/g, kidney 3571 ng/g and lung 1143 ng/g. These values confirm that cadmium was the cause of the fatal respiratory illness in this patient.

CONCLUSION: This case evidences the considerable hazard of acute poisoning after inhalation of cadmium-fume and stresses the need of appropiated safety measures against metal-fume poisoning.

TIME-COURSE OF LACTIC ACIDOSIS IN ACUTE CYANIDE POISONINGS TREATED WITH OXYGEN AND HIGH DOSES OF HYDROXOCOBALAMIN

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Aim : Lactic acidosis is considered the hallmark of cyanide poisoning. However, the relationship between plasma lactate and blood cyanide levels has not been determined. The aim of this study was to determine the significance of plasma lactate concentration (PLC) during the course of cyanide poisonings.
Methods : The patients were included according to the clinical suspicion of pure cyanide poisoning at the time of presentation. Fire victims were excluded. Serial blood samples were collected before and after intravenous hydroxocobalamin (HOCo). Blood cyanide concentration (BCC) was measured colorimetrically. PLC was measured enzymatically.
Results : 8 patients were studied. *On admission*, PLC ranged from 4.8 to 53 mmol/L, and BCC from 12.7 to 256 µmol/L. Mean systolic blood pressure was 80 ± 56 mm Hg, mean arterial pH 7.34 ± 0.14, mean anion gap was 29.7 ± 7.7 mmol/L and mean PaO_2 32.2 ± 27.0 kPa. Three patients died. Before antidotal treatment, there was a significant correlation between PLC and arterial pH ($p = 0.008$), anion gap ($p = 0.008$) and BCC ($p = 0.016$) but not with heart rate, PaO_2, $PaCO_2$ and blood glucose, or blood pressure. *During the whole course of the poisoning*, a PLC ≥ 7 mmol/l was a sensitive and specific indicator of a blood cyanide concentration > 40 µmol/l. Sustained catecholamine administration reduces the correlation coefficient.
Conclusion : Baseline measurement of PLC allows assessment of severity of acute cyanide poisoning. Thereafter, PLC may be used to assess the adequacy of antidotal treatment, more especially in patients not requiring sustained infusion of catecholamines.

CLINICAL SIGNIFICANCE OF PLASMA LACTATE CONCENTRATIONS IN A CASE OF CYANIDE POISONING

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Aim: the aim of this case report was to study the correlation between the plasma lactate levels and several clinical, biological, and toxicological parameters serially measured during the course of a cyanide poisoning treated with a high dose of hydroxocobalamin.
A 63-year-old male ingested potassium cyanide leading to cardiac arrest. CPR was performed prior to hospital arrival where the patient received 10 g hydroxocobalamin. SBP rapidly returned to normal allowing withdrawal of epinephrine. The patient remained comatose and died from brain injury 12 days after the ingestion.
Methods Plasma lactate and blood cyanide levels were measured serially. Blood cyanide levels were measured using a colorimetric method. Plasma lactate levels were measured using an enzymatic method. For correlation Spearman rank correlation test was used.
Results. Initial plasma lactate and blood cyanide levels were 53 mmol/L and 256 µmol/L, respectively. There was no overall correlation between SBP and either blood cyanide or plasma lactate levels. Similarly, there was no overall correlation between arterial-venous oxygen saturation difference with either blood cyanide or plasma lactate levels. In contrast there was a strong correlation between blood cyanide and plasma lactate levels ($R=0.976$, $P<0.0001$). The time-course of the blood cyanide concentrations was described by a mono-exponential decay ($R2=0.968$) with a blood half-life of 1.14 h. Similarly, the time-course of plasma lactate levels was described by a mono-exponential decay ($R2=0.986$) with a blood half-life of 3.94 h.
Discussion. In this case of acute human poisoning, SBP was a much poorer indicator of continuing cyanide effect both before and after antidotal treatment, than was lactate production. This suggests a potential clinical role for following serial plasma lactate levels as a marker of the evolution of cyanide toxicity.

TOLERANCE OF HIGH DOSES OF HYDROXOCOBALAMIN (HOCo) IN FIRE VICTIMS

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Aim : Cyanide (CN) poisoning in fire victims is frequent and rapidly fatal. In a prospective study we tried to assess the clinical tolerance of a high dose of hydroxocobalamin (HOCo) administered at the scene of the fire in fire victims suspected of CN poisoning.
Methods :
Inclusion criteria : Soot in mouth or sputum plus any degree of neurological impairment. **Exclusion criteria :** children, pregnant women, burns of total surface body area > 20 %, multiple trauma. **Protocol design** following examination and the collection of a blood sample in dry heparin, a 5 g dose of HOCo (10 g in case of cardiovascular collapse) was administered intravenously over 15 min. The systolic blood pressure was monitored before and after the administration of HOCo, and one hour later.
Results : there were 28 females and 22 males. The mean blood CN concentration was 83 ± 73 µmol/l. The mean blood carbon monoxide was 3.2± 2.1 mmol/l. Nineteen fire victims eventually died. Among the non-CN-intoxicated patients (blood CN < 40 µmol/l), there was no significant change in arterial blood pressure. In the 33 CN-intoxicated patients (blood CN > 40 µmol/l) a significant increase in blood pressure was observed both immediately ($p < 0.001$) and 1 hour later ($p < 0.001$) after the admistration of HOCo. No allergic reactions were observed.
Conclusions : In fire victims with cyanide poisoning, the administration of a high dose of hydroxocobalamin was associated with an improvement in systolic blood pressure. Hydroxocobalamin is well tolerated in fire victims without CN poisoning.

IS THE ELECTROCARDIOGRAM USEFUL IN THE EVALUATION OF TRICYCLIC ANTIDEPRESSANT POISONING ?

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Objectives: Tricyclic antidepressant (TCA) overdose can lead to serious complications including cardiac arrhythmias [1]. Because of the known risk of early deterioration and the implication for management, emergent evaluation is essential. We determined the diagnostic usefulness of the electrocardiogram (ECG) in TCA poisoning.
Methods: Retrospective study of all patients with TCA intoxication (pos. toxicology screening in urine and/or pos. history) in a 800-bed-university hospital from 1989 through 1994. The severity was graded with mild= no symptoms or agitation; medium= disorientation, somnolence, tachycardia, or convulsions; and severe= coma, significant arrhythmias or death. We analysed the first ECG after admission with a special emphasis on QRS- and QTc-intervals and the terminal 40ms frontal plane QRS-vector (tQRS), which was reported to lie typically between +130 and 270° [2].
Results: 35 patients met the inclusion criteria, 24 (69%) female, mean age 42 years (range 21-75). The first ECG was recorded 4.4 ± 3.7 h (mean ± SD) after ingestion of TCA.

severity group	mild n=16	medium n=9	severe n=10
HF (b/min)	92 ± 20	88 ± 19	118 ± 32
QRS (ms)	81 ± 8	88 ± 12	131 ± 29
QTc (ms)	430 ± 39	469 ± 52	526 ± 67
tQRS (°)	176 ± 114	89 ± 106	220 ± 113
dose TCA (mg)	798 ± 310	915 ± 453	5609 ± 4093

The best correlation with severity grade was found with QRS- and QTc-duration ($p=0.0001$), the TCA-dose ($p=0.0003$) and HF ($p= 0.027$); tQRS did not correlate. 2 patients died (5.7%).
Conclusion: QRS- and QTc-prolongation in the admission ECG, and the reported dose of ingested drugs are useful predictors for severity of poisoning due to tricyclic antidepressants. We did not find additional benefit in determining the terminal 40ms frontal plane QRS-vector.

Lit.: [1] Frommer DA et al, JAMA 1987; 257: 521-26
[2] Niemann JT et al, Am J Cardiol 1986; 57: 1154-59

ACUTE POISONING WITH AMPHETAMINES (MDEA) AND HEROIN: ANTAGONISTIC EFFECTS BETWEEN THE TWO DRUGS

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Objectives: Since treatment of amphetamine poisoning is usually symptomatic and often associated with a fatal outcome, a search for specific drugs to help the amphetamine-intoxicated victim is sorely needed.
Methods: We report a case of a suicidal ingestion of large amounts of the amphetamine-derivative 3,4-methylenedioxy-ethamphetamine (MDEA) and heroin (diacetylmorphine) and present the hypothesis that the two drugs produce opposing clinical effects.
Results: A 25 year old caucasian male was admitted to the emergency ward because of acute-onset confusion. At presentation, he was agitated and showed increased muscular rigidity. He had taken 40 tablets of "Eve" (MDEA, approx. 4 g) and 12 g of "Smack" (heroin) by oral route approximately 2 h before admission. Because of rapidly progressive tachypnea and exhaustion, the patient was intubated and ventilated. The serum concentration of "Eve" on admission was 1400 ng/ml (lethal range 950-2000 ng/ml). Trace amounts of cocaine and substantial amounts of heroin (115 ng/ml; mean value in heroin-related deaths: 190 ng/ml) were also found in the serum. The patient was successfully weaned from the ventilator by day 4 and recovered without persistent neurobehavioral disturbance. Despite high serum levels of both drugs, the patient did not present with the classic signs and symptoms normally seen during intoxication with these drugs. Amphetamines in general, and MDEA in particular, have opposite clinical effects to heroin or diacetylmorphine. None of these were however present in the case presented despite the high ingested doses and the serum levels in the lethal range.
Conclusions: The fascinating fact that, apart from the respiratory depression, none of the clinical signs reported after massive overdose with these two drugs were present, might be attributed to the opposite pharmacological effects of MDEA and heroin. We believe that the patient unwittingly saved his own life by the oral co-ingestion of both MDEA and heroin. Our clinical data raise an interesting point about the pharmacological treatment of acute poisoning with amphetamine-derivatives.

Intensive therapy of the intermittent porphyria (AIP)

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Introduction: The acute attack of AIP still carries a significant risk of mortality of around 10 %. A succesful outcome depends on early diagnosis, removal of pricipitating factors and provision of intensive supportive therapy.

Objectives: Twenty one patients (20 females, 1 male) with documented AIP were seen over a 10-year period in the University hospital. 1 patient was in clinical remission and 20 were with the acute attack of AIP. Among them 4 with respiratory paralysis were required artificial lung ventilation and 4 – assistant ventilation with PEEP.

Pathologic treatment during the attack was normosany, Adenil, androgenes, glucosa, Riboxin parenteral and enteral nutrition via nasogastric tube. Symtomatic treatment – pethidine, propranolon, antibiotics, bronchoscopia.

Methods: Intermittent phasmapheresis was performed on 15 patients. The following measurements were peformed: level of porphobilinogen (PBG) in the wire and delta-aminolevulinic acid in the blood. Hematological and routine chemical evaluations, hepatic, hemodynamic and respiratory function.

Results: After plasmapheresis the median PBG excretion (normal range 1–2 mkg per/1 kgr creatinine) fill from 188 mkg on admission 140.8 mkg, then on 3–5 day raise to 193 mkg and then during treatment with normosong and Prasmapheresis lowest level was 32.9 mgk.

Fatalities occured in two females during attacks with proforma cerebral involvement and 13 patients attained clinical remission.

Conclusion: After therapy with plasmapheresis normosong we found that there was consistently reduce the urinary excretion of PBG and shortening the duration of the acute attack.

EFFECTS OF PULMONARY EMBOLISM ON VASCULAR IMPEDANCE IN DOGS AND MINIPIGS

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Objectives: Pigs has been reported to present with a higher pulmonary arterial pressure (Ppa) and stronger pulmonary vascular reactivity than many other species, including man. Aim of the present study was to compare pulmonary vascular impedance (PVZ) before and after embolisation in weight-matched adult dogs and minipigs.
Methods: We investigated PVZ spectra in 6 anaesthetized and ventilated (FiO_2 0.4) minipigs and 6 dogs. After baseline measurements the animals were embolised with autologous blood clots to reach a Ppa above 35 mmHg.
Results: Flow (Q) and Ppa matched PVZ data (mean±SEM) are shown in the table. [Z_0 = 0 Hz impedance (Z; {dyn.sec.cm^{-5}}); Z_1 = first harmonic Z; Z_C = characteristic Z; Z_1 phase = first harmonic phase angle {radians}; F_{min} = frequency of PVZ the first minimum; *, *f* p at least < 0.05 between dog and minipig, and before vs. after embolisation respectively].

Variables	Before embolisation		After embolisation	
	dog	minipig	dog	minipig
Q (l.min^{-1})	2.2±0.3	2.2±0.1	2.2±0.2	2.2±0.2
Ppa (mmHg)	15±1	24±1	40±1 *f*	40±1 *f*
Z_0	578±74	902±66 *	1513±124 *f*	1520±168 *f*
Z_1	85±11	139±21 *	153±9 *f*	210±24 **f*
Z_C	98±11	117±7	97±6	171±13 **f*
Z_1 phase	-0.4±0.1	-0.9±0.1 *	-0.9±0.1 *f*	-0.9±0.1
F_{min} (Hz)	2.3±0.1	4.9±0.6 *	7.4±0.7 *f*	6.7±0.7 *f*

Conclusions: Higher low- and high-frequency impedance at the same mean flow and pressure suggest increased elastance and/or wave reflection in minipigs and contribute to the increase of the hydraulic load to the right ventricle.

MASSIVE PULMONARY EMBOLISM AND PATENT FORAMEN OVALE: EFFECTIVENESS OF SELECTIVE rtPA THROMBOLYSIS

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Case Report: A 53-yr-old woman affected by legs recurrent thrombophlebitis, was admitted in Medicine Department for tachypnea, chest pain, tachycardia and cyanosis. Before starting two-dimensional transesophageal echocardiography (TEE) to confirm the suspicion of pulmonary embolism, she suddenly had ventricular fibrillation. Resuscitation and defibrillation were readily performed. When sinus rhythm was reinstituted she was in superficial coma with preserved corneal and light reflexes, right hemiplegia, poor perfusion and hyposphygmia of the left arm. TEE showed dilation of rigth ventricle (RV), incomplete occlusion of pulmonary artery (PA) at its bifurcation, severe rigth-to-left shunt through a patent foramen ovale, paradoxical embolism with incomplete occlusion of left subclavian artery. Mechanically ventilated with Vt=800 ml, RR=12/min, FiO2=1, the patient had pH=7.28, PaO2=57 mmHg and PaCO2=45.1. Systemic BP was 130/80 mmHg and HR=80 b/min with low dose epinephrine (0.12 g/Kg/min). A thrombolytic infusion (rTPA: 100mg/2h) through a peripheral vein was started. TEE imaging and clinical status 3 hours later were unmodified. A new rTPA infusion was performed through the pulmonary hole of a Swan-Ganz catheter with the tip close to the embolus. One hour later PA pressure decreased from 46/30 mmHg to 36/25 mmHg, ETCO2 increased from 26 to 30 mmHg and SaO2 improved from 89% to 96%. Three days later the patient, spontaneously breathing and with normalized TEE scans of RV and PA, was transferred to Rehabilitation Service to perform physical therapy.
Conclusions: Massive pulmonary embolism in a patient with patent foramen ovale, paradoxical embolism and refractory hypoxaemia was unaffected by systemic rTPA infusion, while intrapulmonary rTPA administration dramatically improved gas-exchange, hemodinamics and the general conditions of the patient. The presence of a large rigth-to-left atrial shunt and the rapid rTPA metabolism could likely explain the effectiveness of its intrapulmonary administration in front of failure of systemic thrombolysis.

NORADRENALINE AS A VERY USEFUL DRUG IN SHOCK DUE TO PULMONARY EMBOLISM. A CASE REPORT.

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Introduction. Cardiogenic shock during massive pulmonary embolism (MPE) is due to an acute increase of right ventricle (RV) afterload and possibly RV ischemia causing a failure of RV pump function. The recommended therapeutic strategies are: volume augmentation in order to increase RV pre-load, adrenergic drugs to increase contractility and maybe coronary perfusion, fibrinolytic drugs to determine clot lysis. There have been several reports of noradrenaline (NA) as a useful drug in this setting for its strong α, but also β, properties.

Case report. An obese 75 years old woman was transferred to our ICU for tetanus. She was given the usual antibiotic and immunoglobuline therapy. Two thoracic epidural catheters were put in place at different levels and replenished with marcaine qid. A continous infusion of sedation (diazepam +fentanyl) was started together with mechanical ventilation. Curarization was given occasionally. Fraxiparine 0.3/die was used for prophylaxis of thrombotic disease. On day 8th at 11.00 a.m. she started to be hypoxic (SaO2 90%), tachycardic (110 b/min.), her blood pressure(BP) dropped from normal values to 69/53 mm/hg, the central venous pressure (CVP) raised from 16 to 27 mm/hg and the end tidal CO2 was 7mm/hg lower than one hour before. The physical examination of the chest revealed a clear bilateral ventilation and the chest X-ray was normal apart from an elevation of the diaphragm as compared to the previous. An E.C.G. showed sinus tachycardia, right bundle branch block and a possible inferior necrosis (which was already present on admission). A trans-thoracic echo-cardiography was performed which showed "an acute overload of the right ventricle with remarkable dilatation. Tricuspidal regurgitation ++. Paradoxical movement of septum. Small left ventricle with normal wall kinetics". The cardiac enzymes were later shown to be normal. An acute massive pulmonary embolization was assumed to be present.. A bolus of streptokinase 750 x 10^3 U. was given followed by a continous infusion . Two liters of colloids were also given in a short time. Two hours later the patient was still deeply hypotensive, hypoxemic and anuric(BP 54/32 mm/hg, CVP 23 mm/hg, Spo2 90%) despite a continous infusion of dobutamine 20 μg/kg/min and adrenaline 0.5 μg/kg/min. At this stage a bolus of noradrenaline 20 μg was given followed by a continous infusion of 0.05 μg/kg/min. An immediate improvement of the hemodynamics was noticed and one hour later the BP was 149/77 mmhg, the CVP 24 mm/hg, the SaO2 100% and a brisk diuresis started. The hemodynamics kept stable and weaning from vasoactive drugs was achieved within two days. One month later the patient was discharged home in good conditions..

Conclusion. NE administration may help to restore RV coronary flow and pump function during MPE.

CLINICAL, ROENTGENOGRAPHIC AND ARTERIAL BLOOD GAS ANALYSIS IN PATIENTS WITH ACUTE PULMONARY THROMBOEMBOLISM AS PRIMARY LUNG DISEASE MANIFESTATION

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Acute pulmonary thromboembolism (PTE) could be manifestated with either respiratory or cardiovascular syndromes or both. The aim of the study was to establish leading respiratory symptoms, frequency and form of the roendgenographic (rtg) changes as well as blood gas disturbance degree in acute PTE with dominant respiratory disease appearence. The study includes retrospective analysis of 114 PTE patients (Pts), 63 males (average age 47,7 yrs) and 51 females (average age 53,2 yrs). They were admitted at university clinic with suspection of pleuropulmonary disease, including PTE. Final diagnosis of PTE was based on evident risk factors in 94,7% of the cases (deep venous thrombosis, surgery, trauma, imobilisation, malignancy etc), acceptable clinical, rtg, scintigraphic and laboratory findings, as well as deep veins examination by Doppler-sonographic and radioisotopic venography. Respiratory symptoms appeared in all cases: sudden pleural pain (79%), dyspnea (64%), hemoptysis (49%), cough (39%) with association of two or more symptoms in 93%. Chest x-rays findings were abnormal in 92% with diaphragmal elevation (74,2%), lung opacities (69,5%), atelectasis (48,5%), pleural effusion (35,2%), main pulmonary branch asimetry (22,8%), oligemia (19%), heart shadow changes (10,4%) and pulmonary arteries "cut off" (6,6%). The association of two or more abnormalities was found in 92,1% while normal chest x-rat was found in 8% of the cases. Hypoxemia with PaO2<10,4 kPa was found in 64,4% followed with hypocapnia and respiratory alcalosis in 34,6%. In 27,8% of the gas exchage analysis were within normal limits. Among cardiovascular symptoms short syncopa appeared in 10,5%, ECG changes-S1Q3T3 type in 21,6% . Results show high frequency of positive rtg findings in PTE Pts that is opposite to oppinion that chest x-ray in acute PTE is the most often normal. Leading symptoms are pleural pain and dyspnea, while hemoptysis were found in a half of the study group. Blood gas changes were present in two thirds of the cases.

BLOOD SAVING TECHNIQUE AND PREVENTION OF POSTOPERATIVE VENOUS THROMBOEMBOLISM: A CLINICAL STUDY.

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Kakkar, in his classic work ,clearly demonstrated the efficiency of low doses of heparin in prevention of deep vein thrombosis (Lancet 2:669,1971).After this first study the application of heparin prophylaxis became more and more diffused until to be considered a routine in many surgical departement.Actually application of blood saving technique induces postoperative hemodilution effect. In that condition prophylaxis routinely applied seems a nonsense and can be at risk for postoperative hemorrhage .

Methods: To analize this problem we compared 100 patients arrived in our intensive care unit (I.C.U.) in 1980: (Group A) with 100 arrived in 1994:(Group B).Every patient was operated for major abdominal surgery.In each one we considered the hemoglobin (Hb) value,hematocrit(Hct), and coagulation pattern (C.P.) at the arrive in I.C.U. and 24 hours later. The patients was also divided in those receiving heparin prophylaxis (I) from not treated patients (II)

Results:The application of blood saving technique clearly appears from the Hb and Hct level wich have a mean value of 11,4 +/- 1,8 (Hb) and 34 +/- 2 (Hct) in Group A while in Group B mean value are 9,7 +/- 1,2 (Hb) and 29 +/- 2(Hct).Patients of Group A (II) are the only one where a pathologycal C.P. with statistical significance has been demonstrated.In this Goup we got four cases of evidence of venous thrombosis and one of pulmonary embolism.In patients of Group B(I) we encontered the incidence of two cases of severe hemorrhage despite the absence of statistical significance in C.P.modifications.

Monitoring oxygen saturation during pulmonary lavage in alveolar proteinosis

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The treatment of choice in patients with alveolar proteinosis consists of pulmonary lavage. This procedure requests the introduction, through the working channel of a fiberoptic bronchoscope, segment by segment, of aliquots of saline solution at 37 C, subsequently gently reaspired, in order to remove the proteins deposited in the alveolar spaces.

The method is very similar to that used in bronchoalveolar lavage, a diagnostic procedure used to obtain cells and substances from ELF (Endoalveolar lining fluid), which is related to interstitial medium.

As known, bronchoalveolar lavage induces oxygen desaturation, because of shunt effect.

Understandably, one lung lavage has remarkably more deep effects on pulmonary function than bronchoalveolar lavage, for the amount of fluid introduced, the length of the procedure and the conditions of controlateral lung.

In this report the Authors present the result of oxygen saturation monitoring in a patient who underwent pulmonary lavage for alveolar proteinosis.

In the lavage performed without supplement of oxygen a severe fall in the oxygen saturation was observed during the late phase of the procedure. If supplementary oxygen was delivered during bronchoscopy, since its beginning, only slight modifications of the curve were detected.

As conclusion the Authors strongly reccomend the subministration of supplementary oxygen in pulmonary lavages, also in patients with excellent respiratory conditions.

Oxygen desaturation during broncho-alveolar lavage: role of oxygen saturation monitoring in prevention of acute respiratory insufficiency

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The broncho-alveolar lavage is a diagnostic procedure employed in interstitial diseases of the lung. It requests the introduction through the working channel of a fiberoptic bronchoscope, after occlusion of a segmentary bronchus, of aliquots of saline solution at 37 C, subsequently gently reaspired, in order to remove cells and proteins from ELF (Endoalveolar lining fluid), which is related to interstitial medium. Bronchoalveolar lavage induces deep effects on pulmonary function:

- Lowering of the alveolar surface of exchange;
- Shunt effect, depending on the perfusion of non-ventilated districts;
- Increased pulmonary arterial pressure, due to hypoxic vasoconstriction;
- Decrease of lung compliance.

In this report the Authors present the result of oxygen saturation monitoring in a group of patients with interstitial lung disease, who underwent diagnostic broncho-alveolar lavage.

In most patients with severe interstitial involvement, the lavage performed without supplement of oxygen induced a severe fall in the oxygen saturation during the late phase of the procedure. If supplementary oxygen was delivered during bronchoscopy, since its beginning, only slight modifications of the curve were detected. In patients without thickening of interstitium, in whom the lavage was performed in order to obtain material for bacterial or cytologic examination, no modification of oxygen saturation was observed in standard procedure.

As conclusion the Authors strongly reccomend monitoring oxygen saturation in patients with radiologic evidence of interstitial involvement also in patients with no evidence of dyspnoea.

Reverse plasmophresis in complex treatment of ishemic insult

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Objectives: detection of plasmophoresis's influence of results in treatment of ishemic insult.

Methods: We ve investigate 25 patients with ishemic insult, treated with reverse plasmopheresis in complex treatment. After primary infusive therapy we took 400 ml of patients' blood and separated it within 15 min with rotation frequensy of 2000/min. After separation of erythrocytes from plasma, the latter has been returned to patients. We made 3–4 procedures during 3–4 days. Hemoglobin, hematokrit, time of blood coagulation were determinated. The brain blood flow in internal carotid arteries, regional volum brain blood flow and total brain blood flow were evaluated with tetrapolar chest rheography and tetrapolar rheoencephalography. Obtained date were comparised with control group after traditional treatment.

Results: It was found that after reverse plasmopheresis the hemoglobin and hematokrit levels decreased significantly in studied patients' plasma (from 140 ± 3.2 g/l to 120 ± 2.3 g/l and from 44 ± 2.1 % to 35 ± 1.8 % respectively). The time of blood coagulation by Lee-White has increased by 2–2.5 times (up to 10–12 min).

The level of brain blood flow has been increased significantly after reverse plasmopheresis in comparison with control group. The following tests of brain blood flow have been increased: a) the total volume brain blood flow from 480.7 ± 34.6 ml/min to 625.4 ± 35.4 ml/min ($p < 0.05$); b) the regional brain blood flow from 52.2 ± 2.8 ml/min to 87.1 ± 6.2 ml/min ($p < 0.01$); c) the brain blood flow in internal carotid arteries from 166.1 ± 12.2 ml/min to 206.3 ± 14.6 ml/min ($p < 0.05$).

Conclusions: The use of reverse plasmopheresis in complex treatment of patients with ishemic insult allows to improve rheological blood patterns, helps to increase volume brain blood flow. It results in quicer reparation of neurological functions.

Plasmapheresis in treatment of haemorragic syndrom

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Objectives: detection of plasmapheresis's influence to main biochemical figures in patients with haemorrhagic syndrom.

Methods: We've investigated 74 patients with haemorrhagic syndrom, treated with plasmapheresis. Indications for the plasmapheresis have been development of haemorragic syndrom and insuffiency and enhancing of the level of metabolites with toxic proterties.

Results: Study of haemostasis in these patients has showed deep disturbances of blood coagulation. Fibrogen level has reduced to 0.62 ± 0.03 g/l, fibrinogen and/or fibrine degradation products concentration have enhanced to 0.40 ± 0.04 g/l, monofibrin soluble complex concentration to 0.08 ± 0.04 g/l, blood plasmin level was enhanced to 34.0 ± 0.2 mmol/l, plasminogen proactivator level was also enhanced to 153.0 ± 0.60 mm, plateletes aggregation has decreased to 52 %.

After plasmopheresis aggregation was decreased in 1.6 times. It has been connected with decrease of fibrin and/or fibrinogen degradation products level and level plasmin in 1.7 times, and plasminogtnt activator level in 4.6 times. At the same time we have observed increase in total antifibrinolitic activity of blood in 1.3 times. Activity of activators plasmine and plasminogene proactivators has decreased in 1.2 times and in the same time activity of activation inhibitors and antiplasmines has increased in 7 times.

Conclusions: Plasmapheresis leads to considerable improvement of a general condition and reduction of the haemorrhagic syndrom's sings (controlling of gastrointestinal haemorrage, reduction of intensity of subcutaneons haematoma).

USE OF CONSTANT INFUSION VERAPAMIL AS PROPHYLACTIC TREATMENT FOR ATRIAL FIBRILLATION AFTER LUNG SURGERY

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Objectives: a prospective evaluation of the efficacy of continuous infusion of verapamil in reducing the incidence of postoperative atrial fibrillation after pulmonary surgery.

Methods: A total of 199 consecutive patients, 100 on verapamil, 99 on placebo was included after lobectomy or pneumonectomy. A loading bolus of verapamil (10 mg over 2 minutes) was followed by a rapid loading infusion (0.375 mg/min) for 30 minutes and finally a maintenance infusion (0.125 mg/min) for 72 hours.

Results: A mean plasma level of verapamil of 150 ng/ml was obtained only after more than 24 hours. Atrial fibrillation occurred in five out of 78 patients who tolerated the verapamil infusion, and in 15 out of 99 patients on placebo ($p = 0.08$). Verapamil infusion was not tolerated in 22 patients because of hypotension or a heart rate of less than 50/min, within 6 hours of the start of the therapy. When atrial fibrillation occurred, the ventricular response, mean $\pm$ SD, was not significantly slower during verapamil infusion (132 ± 22) compared to placebo (147 ± 20).

Conclusions: Because of its frequent side effects and the only modest efficacy verapamil should not be considered for prophylactic therapy of atrial fibrillation after pulmonary surgery, and is probably not a good first choice for slowing the heart rate in case of rapid ventricular response once atrial fibrillation has occurred in these patients.

CONTINUOUS CARDIAC OUTPUT MEASUREMENT USING THERMODILUTION TECHNIQUE IN THE CRITICALLY ILL

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Objectives: Evaluation of continuous cardiac output (CCO) monitoring based on thermodilution technique in 35 critically ill patients.

Methods: Cardiac output (CO) was monitored continuously using a modified pulmonary artery (PA) catheter, on which a heating filament is located and by which energy is transmitted to the circulating blood. A microprocessor calculated CO by a new algorithm. Standard bolus thermodilution technique (10ml of ice-cold saline solution) was used to compare CCO with intermittent bolus cardiac output (ICO) measurements. The following subgroups were prospectively studied: 1. heart rate (HR) >120 beats/min, 2. cardiac output >10 l/min 3. cardiac output <4.5 l/min, 4. rectal temperature >39.0°C, and 5. PA catheter was inserted for more than 4 days.

Results: A total of 404 pairs of ICO and CCO measurements were obtained from the 35 patients. Bias (ICO measurement minus CCO measurement) of all measurements were 0.03±0.52 l/min and the 95% confidence limits (mean difference±2SD) were -1.01/1.06 l/min. Also in the subgroups, CCO measurement agreed closely with ICO measurement (CO >10 l/min: bias=0.16±0.57 l/min; CO <4.5 l/min: bias=-0.17±0.50 l/min). Elevated temperature and prolonged lay-days of the PA catheter did influence agreement of CCO measurement with ICO measurement neither (>39°C: bias=0.09±0.51 l/min).

Conclusions: Monitoring of CCO using a modified pulmonary artery catheter with a heated filament has proven to be accurate and precise also in the critically ill when compared with `standard` intermittent bolus thermodilution technique. This method enhances our armamentarium for more intensive monitoring of these patients under various circumstances.

CORONARY BY-PASS WITHOUT EXTRACORPOREAL CIRCULATION.

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Background: The number of patients who need coronary artery surgery (CAS) grows every year. Most of these surgical operations are with extracorporeal circulation (ECC). Since January 1994, this surgery is made without ECC in selected patients in our hospital. This technique is exceptional in Spain. This type of surgery has proved useful in patients requiring revascularization of the left anterior descending, circunflex or right coronary artery (not for grafting the posterior descending branch).

Methods and Results: Since 1994, 30 patients aged 54 to 77 years (mean 66 years) underwent CAS without ECC. The mortality in programmed surgery was 0%. No patient was reexplored for hemorrhage. The mean values of some clinics parameters were: a) blood requeriments: 2 units per patient, b) need of mechanical ventilation: 13,6 hours, c) postoperative bleeding: 900 cc, d) days at ICU: 2,5. We used the student's *t* test or Fisher's exact test to compare these results with the mean values of surgery with ECC: a) blood requeriments 4 per patient ($p<0,0001$), b) need of mechanical ventilation: 29 hours ($p<0,0001$), c) postoperative bleeding: 1300 cc ($p<0,004$), d) days at ICU: 4 ($p<0,001$), e) programmed surgery mortality: 7% ($p<0,05$).

Conclusion: Our limited experience shows that this surgery is an alternative in the treatment of coronary disease, especially for aged patients with associated pathology and in Jehova's witness. The need of mechanical ventilation, days at ICU, blood requeriments and morbi-mortality were fewer than surgery with ECC.

ENALAPRIL IN ACUTE MYOCARDIAL INFARCTION: HEMODYNAMIC AND ANTIARRHYTHMIC IMPACT

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Objectives: To study the hemodynamic and antiarrhythmic influence of ACE-inhibitor enalapril in acute myocardial infarction (MI).
Methods: Holter ECG monitoring, heart rate variability analysis, echocardiography (3 and 10 days after beginning of the treatment), stress-echocardiography and stress ECG (8-10-th day after the onset of MI). Enalapril was included into the treatment of 42 pts with MI (study group), with normal or increased blood pressure, from the 1-st day of the disease. The data were compared with 30 pts treated without enalapril (control group).
Results: Silent ischemia during stress-test was registered in 6 pts of the study group and 8 of control group, the arrhythmia episodes during stress test - in 5 and 8 pts and episodes of silent nocturnal ischemia - in 7 and 12 pts correspondingly. Enalapril importantly attenuated the hypertensive reaction to stress test. In 10 pts of the study group the number of perifocal hypokinesis zones decreased; in the control group it didn't change. The quantity of ventricular extrasystoles in the patients of the study group decreased by 25%; the heart rate variability indices improved as well; in the control group the character of ventricular arrhythmias, heart rate and its variability didn't change significantly.
Conclusions: The inclusion of enalapril into the treatment of MI is a useful tool to improve hemodynamic parameters and decrease the incidence of ventricular arrhythmias.

THE TEST WITH PERORAL CAPTOPRIL AND LEFT VENTRICULAR SYSTOLIC FUNCTION IN ACUTE MYOCARDIAL INFARCTION

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Objectives: To study left ventricular (LV) systolic function in the patients with acute myocardial infarction (AMI) before and after peroral captopril test.
Methods: The original echocardiographic parameter of LV contractility, "coefficient of effective systolic function" (CESF), was proposed in the study. CESF is calculated from LV stroke volume (SV), obtained from Doppler aortic flow in LV outflow tract and LV end-diastolic diameter (EDD): CESF =SV/EDD. The study included 60 patients with AMI, who had local LV dyskinesia and global LV systolic dysfunction (EF<45%). Besides CESF, the ejection fraction was calculated before and after administration of 25 mg captopril (on the fifth day of AMI) by methods of Bullet and Simpson.
Results: The dynamics of these parameters, as well as heart rate (HR) and mean blood pressure (BP), is shown in the table.

Parameters	Before captopril	After captopril	P
EF (Bullet)	32.12 ± 2.51	35.88 ± 2.64	NS
EF (Simpson)	35.41 ± 3.05	37.29 ± 2.81	NS
CESF	8.83 ± 0.35	10.38 ± 0.54	< 0.001
HR (per min)	80.0 ± 2.0	78.6 ± 2.0	NS
SV (ml)	52.49 ± 3.83	60.6 ± 4.02	< 0.001
EDD (cm)	6.1 ± 0.18	5.96 ± 0.2	< 0.05
Mean BP (mmHg)	89.2 ± 6.9	70.3 ± 5.9	< 0.05

Conclusions: Captopril improved LV contractility in the patients with AMI. CESF was the most sensitive echocardiographic parameter to register the improvement of LV systolic function in the patients with local LV dyskinesia.

CYTOKINE REACTIONS AFTER EXTRACORPORAL BLOOD PROCESSING

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Objectives: Acute phase response-like syndrom (APR) due to production of cytokines is described during some detoxication extracorporal blood processings (EBP). To clear up the possibility of EBP to activate immunocompetent cells, we analised similar reactions in patients underwent ultra-violet blood explosure (UVBE), discrete plasmapheresis (DP) and haemocarboperfusion (HCP).
Methods: EBP included UVBE (195 procedures), DP (217 proc.) and HCP (68 proc.) were provided in three patient groups: I-chronic obstructive pulmonary diseases (92 patients), II-destructive tuberculosis (57), III- lung gangrene and abscesses (41).
Results: We observed APR coincided with chilling, fever, arterial hypertension, tachicardia in I group of patients in 30% after UVBE, 13% after DP and 42% after HCP; in II group - in 23% after UVBE, 9% after DP, 27% after HCP and in patients from III group - in 14% after UVBE, in 15% after DP and 13% after HCP. Development of APR-like syndrom has associated with clinical improvement in I and II groups, while in III one acute reaction were unfavourable.
Conclusions: We suppose that immunomodulatory effects of EBP are mediated by production of inflammatory cytokines but high cytokine concentrations are able to cause lung injury in some patients.

ADVANCED HEMODYNAMIC MONITORING IN CARDIC SURGERY INTENSIVE CARE BY THE COLD SYSTEM

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Introduction: The COLD system is a monitoring system for measurement of right (COpa) and left (COart) ventricular cardiac output, cardiac function index (CFI), right ventricular ejection fraction (RVEF), right ventricular enddiastolic volume (RVEDV), intrathoracic blood volume (ITBV), global enddiastolic volume (GEDV), lung water (ETV) and excretory liver function (PDR).

Patients and methods: 41 pts have been monitored by the COLD system. Above mentioned parameters are measured by thermal dye dilution and a fiberoptic femoral artery catheter. COpa, RVEF and RVEDV measurements additionally were compared to measurements by the Baxter EXPLORER.

Results: Perioperative development of the parameters (* = significance p<0.05)

	Pre-Op	Post-Op	6h	12h	24h	48h
GEDV (ml/m2)	743	589 (*)	486	490 (*)	659	701
ITBV (ml/m2)	966	643 (*)	489 (*)	558 (*)	703	869
CFI	3,1	4,5 (*)	4,5	4,9 (*)	4,9 (*)	5 (*)
RVEF (%)	29,2	33,5	32,8	35,2	37,7 (*)	40,7 (*)
ETV (ml/kg)	8,7	10,2	8,6	8,5	7,9	6,9
PDR (%)	12	8 (*)	9	7 (*)	12	19 (*)

Comparison COLD versus EXPLORER (CoV = coefficient of variation):

Measurement	CO	RVEDV	REF
Correlation r=	0.95	0.95	0.96
CoV (%) COLD	5	15	9
CoV (%) EXPLORER	6	13	11

GEDV, ITBV and PDR showed a significant decrease during the first 12-24h after the operation, CFI and RVEF significantly improved after 48h, wheras ETV showed a increase in the early postoperative phase and fell to normal ranges at 48h. Comparison of COLD/EXPLORER measurements showed good correlations.

Discussion: Concerning monitoring of right ventricular function COLD and EXPLORER can be seen as equal. RVEF gives an actual report about the performance of the right ventricle without use of echocardiography. Measuring ITBV and GEDV can improve management and control of the volume status, monitoring ETV helps preventing lung edema. PDR shows good correlation to liver blood chemistry and is bedside available. Thus the COLD system offers additional parameters for comprehensive monitoring of pts. after cardic surgery.

MECHANICAL CLOT DISSOLUTION : NEW CONCEPT.

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Objectives : Completely occlusive iliac clots are rarely lysed by thrombolytic therapy. The purpose of the study was to determine the efficacy of mechanical thrombolysis in cases of occlusives thrombosis.

Methods : we selected 15 patients (average age, 46 years) with occlusive iliac vein thrombosis. A temporary vena cava filter was placed to prevent migration of fragments.The Rotational Thromboliser (RT) was positioned percutaneously after puncture of the occluded vein through an 8.5 Fr introducer at the level of the clot, via an 8 Fr guiding catheter over a flexible guide wire. The high speed rotation (100.000 rpm) uses the effect of centrifugal strenght to open the distal strips, shaping a soft spiral advanced by to and for movements through the clot which is pulverized into small fragments. Mechanical thrombolysis was followed by the injection of urokinase during 24 hours (2400 U/Kg/H).

Results : Control venography showed good recanalization in 13 cases, two reobstruction rapidly after the procedure. No complications occured during and after the procedure.

Conclusion : Severe trophic venous sequelae constitute frequent and major consequences of deep phlebitis, especially when the phlebitis is occlusive. We think in such cases, that mechanical thrombolysis improve immediately anterograde flow through the iliac vein and allow a better efficacy of systemic thrombolysis.

1. Moughabghab A.V., Socolovsky C. Treatment of an ilio-caval thrombosis by mechanical thrombolysis. Int Care Med 1995 ; 21 (in press).

CARDIOVASCULAR RESPONSE TO THE INCREASE IN OXYGEN DEMAND DUE TO THE INCREASE IN TEMPERATURE IN CRITICALLY ILL PATIENTS.

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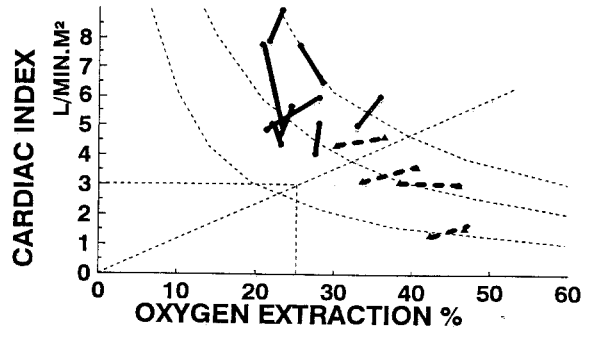
Objectives: To evaluate the influence of an altered cardiac function on the cardiovascular response to the increase in oxygen demand induced by an increase in core temperature.

Methods: This preliminary study included 12 adult critically ill patients monitored by arterial and pulmonary artery catheters in whom thermodilution cardiac index (CI) and arterial and mixed-venous blood gases measurements could be obtained before and after an acute change in core temperature of at least 0.5°C (max 60 min apart). The patients were separated in two groups according to their cardiac function: 4 patients had an impaired cardiac function as defined by a history of cardiac disease and an ejection fraction below 45% and 8 patients had normal cardiac function.

Results: Individual data are shown in the figure. In contrast to the control group (continuous line) in which CI increased without changes in oxygen extraction (O2ER), the O2ER in patients with impaired cardiac function (dottled line) increased without changes in CI.

Conclusions: The increase in oxygen demand associated with changes in temperature is met by an increase in CI in patients with unaltered cardiac function and in an increase in O2ER in patients with altered cardiac function. Temperature should be taken into account in the assessment of the adequacy of cardiac output in patients with impaired cardiac function.



CARDIOVASCULAR RESPONSE TO PHYSIOTHERAPY IN ICU PATIENTS.

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Objectives: To define the hemodynamic and metabolic response to physical therapy(PT) in relation to the type/level of sedation and the cardiac status in ICU patients.

Methods: We studied 34 mechanically ventilated ICU patients (64±13 years) in stable hemodynamic status (no change in vasoactive treatment for at least 2 hours), separated in 4 groups: Group 1= deep sedation, cardiac dysfunction required dobutamine (N=5), Group 2= deep sedation (barbiturates), unaltered cardiac function (N=10), Group 3= moderate sedation, altered cardiac function (N=7) and Group 4= moderate sedation, unaltered cardiac function (N=12). Complete hemodynamic data, arterial and mixed venous blood gases, respiratory gas analysis (Metabolic Cart CCM, Medgraphics) were obtained at baseline (2x) and twice (g.10 min) during leg mobilization. Data were analyzed by ANOVA.

Results:

GR	VO2 ml/minM2		CI L/minM2		O2ER%	
	before	during	before	during	before	during
1	126±13	137±22	2.43±0.25	2.53±0.34	35.0±5.9	36.5±5.0
2	159±37	163±40	3.47±0.82	3.55±0.71	29.1±4.5	29.1±4.9
3	155±25	175±18*	2.78±0.50	2.92±0.68	34.5±9.9	36.4±9.1+
4	170±42	191±38*	3.82±1.57	4.12±1.62*	29.9±10.5	29.6±8.4

+p<0.05 *p<0.01

All variables remained stable in the deeply sedated patients. In the moderately sedated patients, the increase in oxygen consumption (VO2) was associated with an increase in blood lactate level (from 1.30±0.39 to 1.42±0.43 mEq/L in group 3 and from 1.35±0.42 to 1.47±0.48 mEq/L in group 4(both p<0.05).

Conclusions: Both the degree of sedation and the underlying cardiac function influence hemodynamic and metabolic response to PT. In patients who are moderately sedated, the cardiovascular response depends on the underlying cardiac status.

CLINICAL RELEVANCE OF THE IMPEDANCE CARDIOGRAPHIC INDICES REFLECTING DIASTOLIC FUNCTION IN DIFFERENT CIRCULATION PATTERNS

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Objectives:Left ventricular diastolic function can be well evaluated by the diastolic changes of the amplitude and time interval of the impedance cardiography(ICG)derived curve.
Methods: Introduction of the four ICG diastolic indices: 1.diastolic amplitude-time index (DATI) 2. diastolic index (DI ohm/sec^2),3.relaxability index (RI ohm/sec^2),4.compliance index(DAI) asseses the changes of relaxability and compliance. The indices were studied in different circulation patterns of patient groups. In 25 healthy volunteers the indices measured on a tilting table by preload changes were as follows.
Results: In supine position DATI: 2.5±1.8,DI: 9.0±4.5, RI:6.9±3.4, DAI:1.31±0.69,in Trendelenburg position DATI:4.1±2.8, DI: 24.7±11.1, RI:11.7±5.8, DAI:2.11±1.00,in anti-Trendelenburg position DATI: 1.8±1.0, DI:2.7±1.1, RI: 2.8±1.0,DAI:0.95±0.46.The decrease of diastolic indices occurs in heart failure, acute myocardial infarction,dilative cardiomyopathy and in cases of the inferior v. cava compression caused by laparoscopic cholecystectomy and Cesarian section.
Conclusions: Left ventricular diastolic functional impairment can occur at DATI<2, DI<7, RI<5,DAI<1.The assesment of the exact values, however requires further studies. Diastolic indices can be successfully used in clinical practice.

VOLUME REPLACEMENT AFTER CARDIAC SURGERY: COMPARISON OF RINGER, HES 6%, AND GELATINE 3,5%

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Objectives: After cardiac surgery the fluid shift between interstitial and intravasal space may be marked. This is due either to the intraoperative volume loading by the extracorporeal circulation or the increased postoperative diuresis. Therefore, infusion of a large amount of fluids is necessary during the first postoperative hours. It still remains unclear which of the substances at disposal is the best for this purpose. Aim of the present study was to compare the different fluids with special regard to postoperative bleeding and rheological behaviour.
Methods: 93 patients undergoing CABG-surgery were investigated and randomizedly distributed to three different groups of postoperative volume replacement to stabilize the mean arterial pressure at 80 mm Hg. 1. ringer's solution, 2. 3.5% gelatine solution, 3. 6% hydroxyaethylstarch (mean m.w. 70.000). We evaluated the following parameters within intervals of 30 min: arterial and central venous pressure, heart rate, postoperative bleeding, urinary output, volume replacement.
Results: There was no statistically significant difference between the groups with regard to urinary output and bleeding. In spite of larger amounts of fluids necessary in the ringer treated group patients of this group showed symptoms of hypovolemia. Hematocrit was increased in the ringer patients. This was statistically significant.
Conclusions: The substances under investigation are equally effective with regard to diuresis and postoperative bleeding. The change caused by the different fluid distributions explains the increased haematocrit occuring in the ringer group.

INTRATHORACIC BLOOD VOLUME AS INDICATOR OF CARDIAC PRELOAD IN CRITICALLY ILL PATIENTS.

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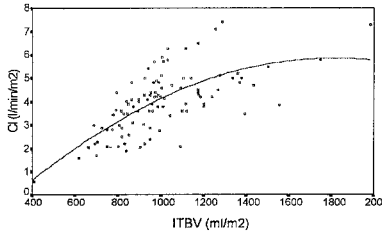
Introduction: Pulmonary wedge pressure (PCWP) and central venous pressure (CVP) are frequently used as parameters for cardiac preload, although it is known that both are poorly correlated to the cardiac index (CI). It has been claimed that intrathoracic blood volume (ITBV) measured with the thermal dye dilution method reflects cardiac preload better than PCWP and CVP. We studied the correlation between ITBV and CI in a mixed population of critically ill patients.
Methods: In 17 consecutive patients (6 sepsis/SIRS, 2 acute heart failure, 3 ARDS, 6 transjugular intrahepatic portosystemic shunt) monitored with a pulmonary artery catheter, ITBV was measured on regular intervals using the Pulsion COLD Z-021 system (Pulsion, Munich, Germany). CI, PCWP, and CVP were recorded simultaneously.
Results: A total of 101 measurements was made. PCWP and CVP did not correlate to CI, nor did ΔPCWP or ΔCVP correlate to ΔCI. ITBV was correlated to CI in a non-linear fashion (F = 139, DF = 99, p < 0.001, (Figure)). ΔITBV was correlated to ΔCI in a linear fashion (r = 0.76, F = 134, DF = 99, p < 0.001).



Conclusion: ITBV is significantly correlated to CI and may be used as an indicator of cardiac preload in critically ill patients.

LEFT HEART BYPASS IN THE PIG WITH PERCUTANEOUS CANULA

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A rapid and efficient circulatory support system may save a patient in cardiogenic shock. Left heart bypass with percutaneous and transseptal placement of the aspiration canula simplifies the circuit and avoids the need for an oxygenator. We assessed this preclinical set-up in 5 anaesthetized pigs using a centrifugal pump with a 14 F arterial catheter and a 16 F left atrial aspiration line. Animals were supported for two hours at a mean flow of 3.1 liter (3'680 RPM), a mean hematocrit of 29% and low heparinisation (ACT double baseline). Hemodynamic and laboratory samples were taken at baseline (A), 10 minutes (B), one hour (C) and 2 hours (D) on support. Results (mean values):

		Pressures (mm Hg)				
Time	Pulse	A.Syst	A.Mean	A.Dias	LVED	CO
A	94	90	69	57	4	6.1
B	74	79	68	63	11	6.5
C	74	78	65	60	12	6.3
D	82	71	59	54	16	6.9

Turning the pump on (0 - 3 litres) there usually was a decrease in heart rate, systolic pressure, left ventricular pressure with unchanged cardiac output (non failing model). Potassium increased from 3.9 - 4.2 mmol/l, and plasma haemoglobine from 6,0 - 18,2 mg/dl. Thrombocytes decreased from 187 - 155 10^9/l. In conclusion, this preclinical support study has demonstrated the feasibility of an efficient (3 litres/minute) short time left heart bypass support with percutaneously implantable canula.

THE CARDIOVASCULAR RESPONSE TO AGITATION IS INFLUENCED BY THE UNDERLYING CARDIAC FUNCTION IN CRITICALLY ILL PATIENTS.

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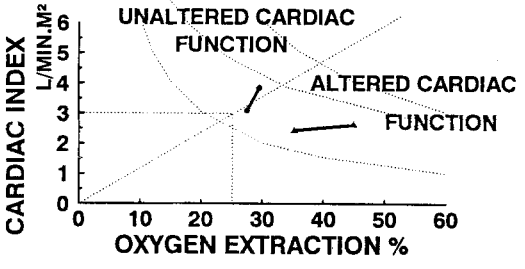
Objectives: To evaluate the influence of an impaired cardiac function on the cardiovascular response to the increase in oxygen demand induced by agitation.
Methods: We prospectively studied 21 adult critically ill patients monitored by arterial and pulmonary artery catheters in whom thermodilution cardiac index (CI) measurements and arterial and mixed-venous blood gases could be obtained before and during an agitation episode (max 60 min apart). Group A included patients with impaired cardiac function (history of cardiac disease, ejection fraction blow 45%) and group B the other patients. Statistical analysis was performed by ANOVA.
Results: While quiet, CI tended to be lower in group A than in group B (2.43 ± 0.84 l/min.M² vs 3.07 ± 0.84 l/min.M², $p=0.1$) but oxygen extraction (O2ER) was higher in group A (35.3 ± 9.4 vs 27.6 ± 4.5%, $p<0.05$). Hence VO2 was similar in the two groups (114 ± 32 vs 120 ± 26 mL/min.M²). During agitation, VO2 increased similarly in the two groups (to 155 ± 47 and 158 ± 39 mL/min.M² respectively). In group B, CI significantly increased ($p<0.05$) without changes in O2ER while in group A, O2ER significantly increased ($p<0.01$) without changes in CI (figure).
Conclusions: The increase in oxygen demand due to agitation is met by an increase in CI in patients with unaltered cardiac function and in O2ER in patients with altered cardiac function. The response to agitation can reflect the cardiac competance of the critically ill patients.



ABNORMAL PULMONARY ENDOTHELIAL ANGIOTENSIN CONVERTING ENZYME ACTIVITY IN HUMAN PULMONARY HYPERTENSION

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Pulmonary hypertension (PH) usually involves obliteration and loss of functional pulmonary microvasculature. The microvascular endothelium normally acts as a major metabolic organ, converting angiotensin I to angiotensin II via the angiotensin-converting ectoenzyme (ACE). It is unknown whether the loss of functional vasculature and altered pulmonary blood flow seen in PH will affect lung ACE metabolic activity. We therefore estimated pulmonary vascular ACE activity in 9 patients with PH of various causes: 2 primary; 1 post atrial septal defect closure (ASD); 2 chronic thromboembolic (TE); 1 anorexigen; 1 IV drugs; 2 collagen disease. Single-pass transpulmonary hydrolysis of the specific ACE substrate ^{3}H-benzoyl-Phe-Ala-Pro (BPAP) was measured and expressed as % metabolism (%Met). We also calculated an index of perfused functional capillary surface area (Amax/Km). All patients with PH had an abnormality of %Met or Amax/Km, or both. As compared to 9 control humans (mean %Met = 71.4% ± 11.3% S.D.), the mean %Met in PH patients was 54.3% ± 14%. The %Met in PH patients correlated inversely with cardiac output ($r=0.74$), possibly reflecting more complete BPAP hydrolysis with longer pulmonary transit times. Amax/Km was markedly decreased in PH (1663 ± 536 ml/min) as compared to controls (4225 ± 1018 ml/min), consistent with a significant loss of functional capillary surface area. Patients with collagen disease, ASD and anorexigen-induced PH had the most marked abnormalities. In conclusion, patients with pulmonary hypertension have decreased pulmonary endothelial angiotensin converting enzyme activity, likely due to a loss of functional or perfused pulmonary microvasculature.
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ADRENOCORTICAL FUNCTION IN PATIENTS WITH RUPTURED ANEURYSM OF THE ABDOMINAL AORTA.

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Objective: To investigate adrenocortical function in patients with ruptured aneurysm of the abdominal aorta (RAAA).
Studies investigating adrenocortical insufficiency in critically ill patients report an incidence ranging from 20% to less than 1%. This may in part be explained by difference in methods used (single cortisol measurement vs short ACTH stimulation test) and populations studied (heterogenous groups of patients with great individual variation in underlying disease as well as duration and severity of illness).
Methods: We investigated the adrenocortical function in 32 patients with (RAAA).A short ACTH stimulation test (Synacthen test; 250 ug 1-24 ACTH iv) was performed at 0800 hrs within 24 hrs of admission. Plasma cortisol was measured before (cort basal) and after stimulation (cort stim). A plasma cortisol level ≥ 0.55 umol\L before or after stimulation was considered normal. Severity of illness was assessed using APACHE II.
Results: Of the 32 patients investigated 6 died and 26 survived. Mean cort basal in nonsurvivors was significantly ($P<0.004$) higher than in survivors; 1.03 (range 0.72-1.29) vs 0.69 (range 0.24-1.14). This difference between nonsurvivors and survivors was also present for cort stim but lacked significance; 1.30 (range 0.96-2.25) vs 1.00 (range 0.57-1.53). While 8 patients showed a cort basal < 0.55, no cort stim <0.55 was found. There was no significant difference in mean age or APACHE II score between survivors and nonsurvivors; 70 vs75 and 19 vs 21.
Conclusions: Single plasma cortisol levels were inadequate to assess the adrenocortical function in the patients studied.
Judged by a short ACTH stimulation test, our investigation in patients with RAAA showed no adrenocortical insufficiency.
Mortality in RAAA is associated with elevated plasma cortisol levels.

CENTRAL VENOUS OR WEDGE PRESSURE IN ACUTE MYOCARDIAL INFARCTION?

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Objectives: Mortality in acute myocardial infarction (AMI) principally depends on hemodynamic impairment. Thus, patients (pts) with elevated pulmonary wedge pressure (PWP) present high in-hospital mortality. However, the complete right heart catheterization is laborious, so the central venous pressure (CVP) alone is frequently used to assess the severity of AMI. The accuracy of CVP in estimating pts with AMI was tested in this retrospective study.

Methods: 131 pts, aged 68±14 years, admitted to our CCU from 1992 to 1994 with their first AMI, were included in this study. All had undergone right heart catheterization because of overt or suspected heart failure. Swan-Ganz catheters (7F, 85cm, Abbott, IL, USA) had been used. Every treatment had been temporarily interrupted 1h before the catheterization. Based on ECG findings the pts were retrospectively divided into 3 groups. In group A we included 54 pts with anterior AMI, in group B, 30 pts with inferior AMI, and in group C, 47 pts with inferior and right ventricular AMI. The initial values of CVP and PWP were considered for the linear regression of the PWP variable on CVP and $p<0.05$ was accepted as statistically significant.

Results: In group A, the CVP and PWP values were 8±3 mmHg and 14±7 mmHg respectively. Despite the signifant correlation ($p<0.01$) between the two variables, it was not possible to predict the exact value of PWP based on CVP value. 19 pts (35%) presented CVP>8 mmHg and 16 of these (84%) had PWP≥15mmHg. In group B, the CVP was 11±8 mmHg and the PWP, 13±6 mmHg. Significant correlation ($P<0.05$) between the two variables also existed, however it was impossible to predict the PWP value. 6 pts (20%) had CVP>8 mmHg but only 2 of these (33%) had PWP>15 mmHg. Similar was the relation between CVP and PWP in group C ($P<0.01$). CVP averaged 12±6 mmHg, and PWP, 17±8 mmHg. 33 pts (70%) had CVP>8 mmHg and 25 from these (76%) presented PWP≥15 mmHg.

Conclusions: A single measurement of CVP in AMI does not ensure an accurate assessment of PWP. Because every pt with AMI needs optimal values of PWP in order to prevent pulmonary congestion or manifestations of low preload, the significance of complete right heart catheterization becomes apparent.

PREDICTION OF MAXIMAL OXYGEN CONSUMPTION (Vo_2 max) IN PATIENTS WITH ADVANCED HEART FAILURE (HF)

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In patients (pts) with advanced HF the need and the prognosis for heart transplantation (HT) can be predicted from Vo_2 max. Indirect measure of functional capacity with the six-minute walk test (6-MW) can also predict survival in moderate HF.

Objectives: To predict Vo_2 max from indirect estimations of functional capacity such as 6-MW, pulmonary and heart function tests, and to assess the predictive value of the above parameters in HF pts survival.

Methods: We evaluated 35 pts (age 48±12 years NYHA class: 12 II, 15 III, 8 IV) with HF for HT. They underwent a progressive exercise test on cycle ergometer for Vo_2 max determination, a 6-MW, a right heart catheterization and a spirometry and Dlco estimation.

Results: The Vo_2 max was 13,7±3,5 ml/kg/min, 6-MW 303,9±111,4 m, LVEF 22,2±7,5% (m±SD). Multivariate analysis of patients characteristics, resting hemodynamics, pulmonary function tests and 6-MW (mean pulmonary artery pressure [PAPm], cardiac index [CI], wedge pressure [Pw], PVR, LVEF, vital capacity [VC], forced expiratory volume in 1 sec [FEV_1], Dlco, maximal inspiratory Pi and expiratory P_E mouth pressure, PaO_2 and $PaCO_2$) identified the 6-MW as the best predictor of Vo_2 max (r=0,055 P<0,001). In 10 pts who had died in waiting list the Vo_2 max, 6-MW, LVEF were lower and the Pw significantly higher when compaired with resiprocal values of 17 pts who are still alive (8 underwent HT).

Conclusion: In pts with advanced HF evalueted for HT the distance ambulated during 6-MW predicts Vo_2 max. The 6-MW and Vo_2 max were significantly higher in pts who survied in waiting list.

CARDIAC TROPONIN I AS A MARKER FOR PERIOPERATIVE MYOCARDIAL ISCHAEMIA IN NONCARDIAC SURGICAL PATIENTS

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Objectives: Episodes of perioperative myocardial ischemia (PMI) occur in 18 to 74% of noncardiac surgical patients with or at risk for coronary artery disease (CAD). Patients suffering from PMI are at higher risk for adverse postoperative cardiac outcome. Early assessment and treatment of PMI may improve outcome in these patients. We studied the diagnostic value of cardiac troponin I, a new marker specific for cardiac muscular injury.

Methods: After institutional approval and informed consent, 33 selected patients (65±9 years) undergoing peripheral vascular surgery (n=17) or carotid endarterectomy (n=16) were investigated. Patients included had either documented CAD (n=18) or two or more (n=15) risk factors (age >65 years, smoking, diabetes mellitus, hypertension, hypercholesterolaemia >240 mg/dl). 12-lead ECG recordings were carried out preoperatively, on arrival in the postanaesthetic care unit, and 20 h, 48 h, 72 h, and 84 h postoperatively. ECG recordings were analysed by an independent blinded cardiologist for signs of PMI (new ST segment depression >0.2 mV and/or new T inversion). In addition, blood samples were taken preoperatively, and 8 h, 20 h, and 72 h postoperatively for the measurement of cardiac troponin I levels (Stratus^R Cardiac Troponin-I Fluorometric Enzyme Immunoassay; Baxter Diagnostics Inc., Deerfield, IL, USA).

Results: 22 of the patients investigated developed ECG-documented PMI, 86% occurring in the immediate postoperative phase. Troponin I levels >1.6 ng/ml were found in 19 of these 22 patients. In contrast, only one of the 11 patients without ECG-documented PMI had troponin I levels >1.6 ng/ml (Table). Thus, comparing a cardiac troponin I cut-off level of 1.6 ng/ml with intermittent 12-lead ECG recordings, we found a sensitivity of 86% and a specificity of 91%.

Table	12-lead ECG - PMI -	12-lead ECG - No PMI -
Troponin I >1.6 ng/ml	n = 19	n = 1
Troponin I ≤1.6 ng/ml	n = 3	n = 10

Conclusions: Cardiac troponin I is a highly sensitive and specific marker of PMI documented by intermittent 12-lead ECG recordings in patients undergoing noncardiac surgery who are with or at risk for CAD. Thus, measurement of cardiac troponin I may be useful for the identification of CAD patients at risk for adverse postoperative cardiac outcome.

UNEXPECTED HEART "HYPERTROPHY" A FEW DAYS AFTER BRAIN DEATH

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Introduction: Brain death causes myocardial impairment by mechanisms that are not well understood yet. The aim of this work was to assess the echocardiographic features found in these patients from the clinical onset of brain death to somatic death.

Methods: Seven brain dead patients were studied (patients' relatives refused to allow them to be used as donors). Mean age was 23.5 (18-32) years old. Four of the patients were female. None of the patients had any history of cardiac disease. Transthoracic echocardiogram (echo) and electrocardiogram (ECG) were obtained at the onset of clinical brain death and were repeated every 24 hours until somatic death. We compared the first echo (A) to the last one (B). We measured the dimensions of the left atrium (LA) and left ventricle (LV), the thickness of the interventricular septum (IVS) and posterior wall (PW) as well as the left ventricular mass (LVM) with its index (LVM-I). We assessed left ventricular contractile performance by ejection fraction (EF) measurement.

Results: The main results (x±SD) are summarized in the table.

	IVS (mm)	PW (mm)	LVM (gr)	LVM-I (gr)	LV (mm)	LA (mm)
A	8.7±0.9	8.3±0.8	137±41	78±17	43.9±4.6	28.9±3.2
B	12.7±2.2*	11.2±2.1†	194±64*	110±24*	4.0±6.5	31±5.2

*p<0.01
†p<0.05

We detected severe diffuse hypokinesia (EF<50%) in 2 patients and mild hypokinesia in 3 others (EF 50-60%). Systolic function was strictly normal in only 2 patients. Corrected QT interval (QTc) in ECG was 54.6±5.5 msec (normal range 38-43 msec) just before somatic death (B).

Conclusion: In patients with brain death we observed a significant increase of left ventricular mass due mainly to IVS "hypertrophy" without any important change in the dimensions of the left ventricle. To our knowledge, this finding has never been reported before and its importantance in heart transplantations may be of particular interest.

CALCIUM CHANNEL BLOCKERS IN HEMODYNAMIC REGULATION OF THE HYPERTENSIVE SURGICAL PATIENT

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Calcium channel blockers were used in complex preoperative preparation of 59 hypertensive surgical patients. Patients were allotted to 3 groups based on their hemodynamic profile: hypokinetic: ejection fraction (EF)<0.6, 29 patients; eukinetic (EF>0.5),16 patients and hyperkinetic (EF>0.6),14 patients. The most noticable change in hemodynamics was in the hypokinetic group: EF and cardiac output (CO) were significantly decreased ($p<0.001$) while systolic arterial pressure (SAP) ($p<0.05$) and peripheral resistance (PR) ($p<0.01$) were elevated. The results showed that in hypokinetic patients on nifedipine EF ($p<0.001$) stroke volume (SV) ($p<0.01$) and CO ($p<0.001$) were increased while PR($p<0.01$), SAP($p<0.001$) and diastolic arterial pressure($p<0.05$) were decreased. Eukinetic type patients also showed an increase in EF,albiet to a lesser extent,than in the hypokinetic group. Increased SV and CO($p<0.01$) were observed in eukinetic patients though this was to a lesser extent than in the hyperkinetic group. In the hyperkinetic group of patients nifedipine had no effect on the aforementioned parameters except for a decrease in SAP($p<0.01$). Nifedipine increased EF in all hypokinetic patients. Comparative results show that isoptin was less effective than nifedipine in decreasing peripheral vascular resistance and had a depressive effect on the myocardium.

It can be concluded that the action of calcium channel blockers normalizing the circulation in the hypertensive surgical patient depends on: the condition of myocardium, the patients hemodynamic profile and their pharmacological properties. They were most effective in the hypokinetic group.

PERCUTANEOUS ECHO-GUIDED PERICARDIAL DRAINAGE IN CARDIAC TAMPONADE WITH NUMEROUS ECHO DENSE LINEAR BANDS ACROSS THE PERICARDIAL SPACE.

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Introduction : Surgical is the optimal treatment for loculated effusions and the preferable procedure when multiple bands are seen in the pericardial sac by echo.
Patients : 6 patients, 4 post cardiac surgery , 2 uremic (3men, 3 women) with large pericardial effusion and clinical or echocardiographic findings of tamponade or both. These particular patients displayed numerous linear echo-dense bands and strands crossing the pericardial space (in one of them a loculated effusion compressed the left ventricule). One had aPTT increased, four were mechanically ventilated.
Technique : A 8Fr polyurethane catheter with end and multiple side holes over 18 Ga needle was echo-guided to the ideal site (fluid abundant and closest to the transducer). The catheter was attached to a close system with a Heimlich valve for continuous drainage (pneumothorax kit). Subcostal entry was selected in one patient and chest wall in five. The patient's position was changed every hour at least. (We believe that the small changes in the position of the catheter and the mechanical breaking of the bands in relation with the movement of the heart assist the pericardial fluid to remove).
Results : In all cases only a small quantity of fluid was withdrawn in the first minutes(30-70ml) with some clinical and echo-findings improvement. The fluid was bloody or serosanuginous with high protein content (Ht=15% ,Protein 5,1gr/dl) in all cases . In first 24 hours the mean volume of fluid removed was 550ml (350to 720ml) . In that period echo showed no residual fluid. The catheter remained within the pericardium 1 to 3 days . . No complications are mentioned.
Conclusion : Cardiac tamponade due to hemorrhagic high protein pericardial effusion in uremic and postcardiac surgery patients,, as it is revealed by echo dense bands, can be faced by 2-D echo guided pericardiocentesis. A 8-Fr Polyurethane catheter with multiple side holes, attached to a Heimlich valve was effective to evacuate the pericardial fluid . No catheter was occluded though heparin infusions were not used.
Multiple changes of the patient's position may be fundamental. This 2-D echo guided pericardiocentesis performed in intensive care unit seems to be useful , safe and quick technique.

HEMODINAMYC EFFECT OF DOBUTAMINE ET DOPAMINE ON HEART RATE IN PATIENTS WITH AORTOCORONARY BY PASS

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Determining the best inotropic drug represents a very serious problems. The use of more selective and potential inotropic and vasodilatative drugs does not always lead to improvement of hemodynamic parameters in patients with low cardiac output syndrome.
This paper presents patients with ACBP who need an inotropic support after extracorporeal circulation in first 24 hours. The patients were divided into Dobutamin et Dopamine groups. The heart rate (HR), mean sistemic arterial pressure (MAP), central venous pressure (CVP), and termodilution cardiac index (CI) were measured. The measurements were without using inotropic drugs, and then using them after 5 min, 30 min, and finally with one hour rate, within first 24 hours.
The statistical analysis shows that both drugs lead to an increase in HR in the first hour of the application. The final effect of dobutamine is no change in HR, whereas the effect of dopanime is very significant increase in HR. Thus, an absence of tachycardic response selects the dobutamine as a better choice.

BEDSIDE ASSESSMENT OF HUMAN PULMONARY CAPILLARY ENDOTHELIAL ANGIOTENSIN CONVERTING ENZYME ACTIVITY.

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Background: Pulmonary vascular endothelium possesses major metabolic functions, which when altered contribute to the development of serious pathologies such as ARDS. One such function is the conversion of angiotensin I to angiotensin II, catalyzed by angiotensin converting enzyme (ACE), located on the luminal surface of the endothelial cells. ACE activity has been extensively studied in animals *in vivo*, by means of *indicator-dilution* techniques, providing: i) under toxic conditions, an early index of lung injury, and ii) under normal conditions, estimations of dynamically perfused capillary surface area (PCSA).
Objectives: To validate the use of these techniques in man: i) for pulmonary endothelial function assessment, and ii) for PCSA estimation.
Methods: ACE activity was estimated in ten adult human volunteers, with no pulmonary medical history and normal pulmonary artery pressures, undergoing cardiac catheterization for coronary artery disease assessment. Single-pass traspulmonary hydrolysis of the specific ACE substrate ^{3}H-benzoyl-Phe-Ala-Pro (BPAP; 30μCi) was measured by means of *indicator-dilution* techniques, and expressed as %metabolism (%M) and v=-ln(1-M). BPAP was injected as a bolus i) into a main pulmonary artery, and ii) inside the right atrium, to assess ACE activity in one and both lungs. We also calculated A_{max}/K_m, an index of PCSA. Pulmonary plasma flow (F_p) was determined by thermodilution. F_p in one lung was estimated as $0.5xF_p$.
Results: Similar values of %M (69.6±3.8 vs 68.9±3.5), and v (1.29±0.16 vs 1.25±0.15) were observed in both and one lung respectively. A_{max}/K_m decreased from 4185±306 ml/min (both lungs) to 2122±175 (one lung).
Conclusions: i) Pulmonary endothelial ACE activity and thus pulmonary endothelial function may be assessed in humans by means of *indicator-dilution* techniques, ii) our data denote homogeneous pulmonary capillary ACE concentrations and capillary transit times in both human lungs, iii) the 50% reduction of A_{max}/K_m in one lung suggests that this procedure can be used to quantify PCSA in man. (Supported by the Fonds de la Recherche en Sante du Quebec and the National Health System of Greece).

ANTIOXIDANT ACTIVITY AFTER INTRAVENOUS THROMBOLYSIS FOR ACUTE MYOCARDIAL INFARCTION

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Objective: Verify whether antioxidant activity is higher in reperfused than in no-reflow myocardium after i.v. thrombolysis for acute myocardial infarction (AMI).
Methods: 37 patients with AMI were included. Blood for estimation of catalase (Cat), glutathione peroxidase (GPx) and Mn-superoxide dismutase (SOD) was drawn before initiation of i.v. thrombolysis (t0), thenafter at 2, 4, 8, 12, 24 hours and then once daily till day 10. 18-lead EKG readings were also taken simultaneously. Patients were grouped into "reperfusion" and "no reflow" based on dynamics of EKG (reduction of ST segment elevation by ≥50% after 2 h), serum myoglobin (peak within 4 h) and creatinin phosphokinase (peak within 12 h)as well as reperfusion arrhythmias.
Results: It was found that all three enzymes were elevated in both reperfusion (R) and no-reflow (N) patients, dropping over 10 days to almost normal values. There was no statistically significant difference between the two groups (p 0.05).

*	t0 R/N	2 h R/N	24 h R/N	day 10 R/N
Cat(U/l)	112/97	122/138	117/124	75/97
GPx(U/l)	96/142	142/208	476/276	194/165
SOD(ng/ml)	186/104	165/154	140/145	154/122

(* Results are mean values.)
Conclusion: The mechanism of myocardial cell defence against free radicals is probably identical in both reperfusion and no-reflow phenomena. Therefore, antioxidants cannot be used as reperfusion markers.

IMPLANTATION OF A CHRONIC LEFT VENTRICULAR ASSIST DEVICE (LVAD) : HEMODYNAMIC PARAMETERS ARE UNABLE TO PREDICT RIGHT VENTRICULAR OUTCOME.

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Patients with end stage cardiomyopathy can now be supported with implantable and wearable LVAD for extended periods. One of the major limitations of the concept of left ventricular support is the risk of acute right heart failure. At our institution, 3 patients, aged 44, 47 and 49 years have been implanted with the wearable Novacor^R (Baxter) LVAD. Hemodynamic data before implantation are given in table :

PTS	*1*	*2*	*3*
H.R.(bpm)	*133*	*100*	*99*
BPmean (mmHg)	*65*	*68*	*74*
PAP syst (mmHg)	*50*	*48*	*43*
PAP dia (mmHg)	*24*	*25*	*27*
PAP mean (mmHg)	*32*	*32*	*33*
C.V.P.(mmHg)	*10*	*7*	*12*
PAOP (mmHg)	*23*	*23*	*27*
Cardiac index (l/min/m2)	*1.9*	*2.3*	*1.7*
S.V.I. (ml/m2)	*14.2*	*22.9*	*18.3*
P.V.R. (dyne.s.cm^{-5})	*163*	*187*	*156*
S.V.R. (dyne.s.cm^{-5})	*1 181*	*895*	*1 224*
Right vent.ejection fraction	*12 %*	*13 %*	*N.A.*

CONCLUSION

Pt 1 was unable to come off bypass in spite of maximal inotropic support and required mechanical right ventricular support for 72 hours. Pt 2 required high doses dobutamine and adrenaline to separate from extra-corporeal circulation; inotropic support could be gradually decreased over 72 hours. Pt 3 required only moderate inotropic support to come off bypass and inotropes were necessary for 15 hours. None of the preoperative parameters (C.V.P., pulmonary pressure or gradient, pulmonary vascular resistance, right ventricular ejection fraction) are different enough among the patients to predict the 3 different evolutions. Hemodynamic data obtained with a pulmonary artery catheter are thus not discriminant enough to evaluate and predict right ventricular behaviour.

CORRELATION OF SERUM PROCAINAMIDE LEVELS WITH CLINICAL OUTCOME: A RETROSPECTIVE ANALYSIS.

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Purpose: To determine if a correlation exists between measured serum Procainamide levels and clinical outcome in the treatment of arrhythmias.
Background: The efficacy of conventionally accepted "therapeutic range" for Procainamide (4-10mg/lt) in predicting clinical outcome has been debated in the literature.
Design: A retrospective study of 78 inpatients, accounting for 136 eligible serum levels (>12 hours following admission or dose adjustments). In the event of more than one level per patient, each level was entered and analyzed separately. A favorable clinical outcome was defined as conversion to normal sinus rhythm, in the absence of cardiac symptoms or signs of drug toxicity.
Methods: Demographic, clinical and ECG data were analyzed. 53.8% of patients were male; 46.2% female. CAD was the most common underlying cardiac disease (85.7%) and 56.4% underwent open heart surgery. 69% received Procainamide for supraventricular and 31% for ventricular arrhythmias. 27% received a loading dose. Maintenance was provided by IV route in 36.8% and by PO in 63.2% (40.8%SR and 22.4% IR). 40.4% of patients were obese. CRCL was <20ml/min in 10.3%, 20-60ml/min in 66.2% and >60ml/min in 23.5%. Favorable clinical outcome was observed in 48.5% of cases, unsuccessful in 45.6%, while in 5.6% the drug was discontinued due to toxicity. Overall mortality was 10.2%.
Results: No significant difference in serum Procainamide concentrations was found between the patients who achieved a favorable clinical outcome and those who did not (95% CI 4.80-6.19 vs. 4.87-6.24, $\bar{x}$: 5.49±2.83 vs. 5.55±2.69, p=0.90). The number of levels "within therapeutic range" was not different between the two groups (40/66 vs. 40/62, p=0.78). Subgroup analysis confirmed no influence of gender, obesity, post-op status, CRCL or type of arrhythmia. In contrast to other studies, we did not find significantly different levels attained in successfully converted patients from VT and SVT/AF ($\bar{x}$: 5.97±3.28 vs. 5.44±2.85, p=0.57). IV administration resulted in a trend toward a more consistent, yet not statistically significant, correlation between serum levels and clinical outcome ($\bar{x}$: 6.30±2.81 vs. 5.56±2.47, p=0.36), rather than PO ($\bar{x}$: 5.33±2.72 vs. 5.46±2.98, p-0.85), regardless of SR or IR brands.
Conclusion: Our study, despite the inevitable limitations of a retrospective analysis, along with conflicting reports from the literature, suggests a need for prospective evaluation of serum Procainamide monitoring in a larger sample to increase statistical power.

"Right ventricular function following cardiopulmonary bypass: Is important the mode of myocardial protection?"

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Objective: To compare the right ventricular function post cardiopulmonary bypass (CPB) with cold cardioplegia Vs warm cardioplegia in patients undergoing coronary artery bypass grafting (CABG).

Methods: 32 patients undergoing CABG with CPB. 2 groups: COLD group (C): myocardial protection with hypothermic (4 °C) intermittent, retrograde, blood crystalloyd cardioplegia, 15 patients, WARM group (W): myocardial protection with normothermic (> 34 °C) continuous, anterograde-retrograde blood crystalloyd cardioplegia, 17 patients.

We have registred: heart rate (HR), blood pressure (Bp), pulmonary artery pressures (PAp), central venous pressure (CVP), pulmonary capillary wedge pressure (PCWP), pulmonary and systemic vascular resistances (PVR, SVR), right ventricle end-diastolic end end-systolic volume (REDV, RESV), right ejection fraction (REF), right sistolyc ventricular work (RSVW) and cardiac output (CO) using a thermodilution thechnique and a microprocessor (model REF-1; Baxter-Edwards Laboratory); duration of CPB and aortic clamping, and the requirements of haemodynamic support after CPB.

Results: In the C group an increase post-CPB of the Fc ($62 \pm 13 \rightarrow 95.8 \pm 18.4$, $p < 0.01$) was produced without significantly changes in the REDV, RESV, REF, RSVW neither CO. In the W group, HR increased from 58.5 ± 8.8 to 79.9 ± 8.6 ($p < 0.01$); REDV was reduced from 227.7 ± 76 to 139.14 ± 36.4 ($p < 0.05$); RESV was reduced from 142 ± 68.7 to 82 ± 35.3 ($p < 0.05$). There were not changes in the other haemodynamyc parameters. There was a trend (no significantly) to an increase of REF in the W group (40.07 ± 9.7 ® 57.07 ± 4.7) compared with the C″group (39 ± 10.9 ® 38.3 ± 8.5) post-CPB. The need for haemodynamic support was similar in both groups.

Conclusions: The warm, continuous, anterograde-retrogade myocardial protection has obtained a decrease of preload, HR, and a trend to an increase in the REF, making an improvement in the right ventricular global performance when is compared with the classic form of cold myocardial protection.

EFFECT OF DOBUTAMINE ON pHi AFTER CARDIAC SURGERY

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Objective: To evaluate the effect of dobutamine on gastric mucosal pH (pHi) after coronary artery bypass surgery.
Design: Prospective study in a university hospital intensive care unit (ICU).
Subjects: 20 elective cardiac surgery patients.
Interventions: Dobutamine was infused at 4 ug/kg/min for 3 hours immediately after admission to the ICU. Hemodynamics were measured every 30 minute periods until 3 hours and again 2 hours after stopping dobutamine.
Results: There were no significant differences in mean gastric pHi between the groups but mean pHi decreased in both groups during the study period. Oxygen delivery and consumption both increased during dobutamine infusion but decreased to the control group level after stopping the dobutamine infusion. Lactate levels did not change.

		Baseline X±SD	**90 min** X±SD	**180 min** X±SD	**300 min** X± SD
pHi:*	Dobut.	7.37±.05	7.33±.05	7.34±.05	7.29±.05
	Contr.	7.33±.03	7.32±.04	7.29±.06	7.28±.04
pH-gap**		.06±.03	.05±.02	.05±.05	.08±.05
		.09±.04	.06±.04	.09±.04	.11±.05
CI[#] (l/min/m2)		3.1±.5	4.1±1.1	4.3±.9	3.7±.4
		2.9±.6	2.9±.7	3.5±.9	3.4±.5
O2-extr.[##]		.27±.03	.22±.02	24±.03	.30±.04
		.32±.05	.32±.04	31±.04	.31±.05
Lactate (mmol/l)		1.0±.22	.71±.12	.81±.16	.88±.27
		.80±.27	.78±.28	.84±.22	.89±.37

Change within groups *p<.001, **p<.015. Group by time interaction #p<.01,##p<.001 (MANOVA).
Conclusions: Increasing cardiac output by dobutamine does not prevent the postoperative decrease in pHi.

THE COMBINED USE OF INTRAAORTIC BALLOON PUMPING AND MECHANICAL VENTILATION MIGHT IMPROVE SURVIVAL IN CARDIOGENIC SHOCK.

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Objectives: The aim of the study was to evaluate the usefulness of a low dobutamine dose in conjunction with intraaortic balloon pumping and mechanical ventilation in cardiogenic shock.

Methods: We studied 21 patients 58.9± 14.4 years of age suffered of post infarction cardiogenic shock characterized by a systolic arterial pressure≤ 80mmHg, urine output< 20 ml/h and mental confusion or purpueral signs of low output, non responded to dobutamine infusion up to 9 μg/kg/min. All patients underwent mechanical assistance by the Intra-aortic Balloon Pump (IABP). Five patients were additionally placed on mechanical ventilation due to blood gases disturbances. The end points in our study were: reversion of cardiogenic shock, improvement of patients survival or both on the 15th post infarction day and 6 months later.

Results: Three patients refused IABP treatment and 0/3 survived on the 15th day. On the 15th day 3/13 supported by the IABP and 5/5 that underwent mechanical ventilation plus IABP were alive ($p<0.01$). On the 6th month 2/13 supported by the IABP and 5/5 that underwent mechanical ventilation plus IABP were alive ($p<0.01$).

Conclusions: In conclusion, the combined use of mechanical ventilation and IABP assistance in severe cardiogenic shock might improve survival.

PHRENIC NERVE INJURY FOLLOWING CORONARY ARTERY BYPASS GRAFTING (CABG) WITH LEFT INTERNAL MAMMARY ARTERY (LIMA)

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Objectives: To evaluate the precipitating factors of hypothermic phrenic nerve injury following CABG with LIMA.

Methods: Fifty two consecutive patients (8 females), with a mean age of 59±8 (mean ±SD) years were studied. During the ischemic arrest time topical hypothermia was obtained in all patients with ice slush and no cardiac insulation pad was used. All patients received a LIMA graft, with or whithout additional vein grafts. Supramaximal, bilateral phrenic nerve stimulation was performed percutaneously preoperatively and whithin 24 hours postoperatively. Square wave stimuli of 0.1 msec duration were applied at the posterior border of the sternomastoid muscle. The compound muscle action potential of the diaphragm was recorded using surface electrodes on the anterior chest wall. The time interval from the application of stimulus to the onset of diaphragmatic activity, phrenic nerve conduction time (PNCT), was measured. Values exceeding 9.75 msec were considered as abnormal.

Results: Preoperatively, all patients had normal (mean±SD) PNCT, 7.69±0.9 msec for the left nerve and 7.98±0.7 msec for the right nerve. On the first postoperative day, right PNCT was normal in all patients (7.93±0.6 msec), whereas left PNCT was normal in 45 patients (7.86±0.9 msec) and abnormal in 7 patients (incidence 13.5%). In 6 patients the left phrenic nerve was inexcitable and in 1 patient left PNCT was prolonged (10.50 msec). Comparing patients with normal and abnormal PNCT there was no difference in age, gender, number of grafts used, aortic cross-clamp and bypass time. However, patients with abnormal PNCT had a lower preoperative ejection fraction (45±9 vs 53±9%, p=0.03). Moreover, in all of them LIMA was dissected from its origin ligating all upper arterial branches, which provide the blood supply to the left phrenic nerve, whereas in those with normal PNCT the small vessels originating from the upper 2 to 3 cm of LIMA were preserved (p=0.001).

Conclusions: A hypoperfused left phrenic nerve seems to be more susceptible to hypothermic injury during CABG with a LIMA conduit.

UNSTABLE CORONARY CONDITIONS: VALUE OF ADENOSINE SCINTIGRAPHY IN THE ACUTE PHASE

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Objectives: Adenosine (A) is widely used for Thallium (Tl^{201}) scintigraphy in patients (pts) with stable coronary artery disease (CAD). We underwent this study in order to examine its safety and usefulness in pts with unstable coronary conditions (unstable angina UA, acute myocardial infarction AMI).

Methods: We studied 32 pts who presented with an acute ischaemic syndrome (17 with AMI - Group A, 15 with UA - Group B) and 74 patients with stable CAD (Group C). The mean age for Group A was 54 ± 16 years, for Group B 64 ± 11 years, and for Group C 59 ± 13 years. A history of previous myocardial infarction was present in 6 pts of Group A, in 3 of Group B and in 54 of Group C. Three pts in Group A, 5 in Group B and 15 in Group C had previous coronary artery bypass grafting. The median time between the onset of symptoms and A was 5 days (2 - 19) for Group A, 11 days (2 - 33) for Group B and 83 (25 - 150) for Group C. We used a continuous fixed intravenous A infusion at a dose of 140 γ/kgr/min during 6 minutes with 3mCi Tl^{201} being injected at the fourth minute.

Results: Results were obtained by comparison with coronary arteriography (CA) expressed in terms of sensitivity (SN) and specificity (SP). Systolic blood pressure (SBP) dropped from 126 ± 16 to 122 ± 13 mmHg (NS) and heart rate (HR) increased from 68 ± 8 to 74 ± 10 beats per minute (bpm) in Group A ($p = 0.002$). In Group B SBP dropped from 122 ± 19 to 118 ± 21 mmHg (NS) and HR increased from 70 ± 12 to 83 ± 13 bpm ($p = 0.004$), and in Group C SBP dropped from 140 ± 21 to 132 ± 22 mmHg (NS) and HR increased from 66 ± 9 to 75 ± 11 bpm ($p = 0.002$). In Group A all pts had irreversible defects (D) and 5 pts in addition had mixed D (reversible and irreversible) in other territories. In Group B 10 pts had reversible D and 6 had also irreversible D. In Group C, 27 pts had fixed D, 19 had mixed D, 21 had reversible D and 7 had normal scans. The SN was 100% in Groups A and B, 98% in C, and SP 100% for Group A, (fixed defects included) and 50% for Groups B and C.

There was no difference of side effects among groups: Chest pain (1 pt - Group A, 2 pts - Group B, and 8 pts - Group C), transient hypotension (1 pt - Group C), headache (5 pts, Group C), dyspnea (1 pt - Group A), while ST depression was seen in 2 pts of Group B and in 2 pts in Group C. The rate of A infusion was decreased to 70 γ/kgr/min in one Group B pt due to development of chest pain.

Conclusions: We conclude that A is safe for detecting ischaemia in pts with AMI and UA, and provides important information for the management of these high risk pts.

CARDIOPULMONARY BYPASS: A PLAY WITH MICROCIRCULATION AND OXYGEN CONSUMPTION

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Objectives: To test if necessary interventions on systemic vascular resistance (SVR) along with preset pump flow (Q) during CPB could adversely affect autoregulatory response and cause VO_2 shifts.

Methods: We studied 26 males (55±7 yrs) who underwent CPB for cardiac surgery. At oesophageal temperature 27-28°C we set pump flow at 2.1 $l.m^{-2}.min^{-1}$. When MAP was higher than 85 mmHg we calculated VO_2 by using Fick equation. Then we infused sodium nitroprusside (SN) to control MAP at 55-65 mmHg for 10 min and we calculated VO_2. Without changing the SN infusion rate we set Q at 2.5 $l.m^{-2}.min^{-1}$. Ten min later we measured VO_2. We took VO_2 changes into consideration if greater than 15%. Statistical analysis using students-t-test for paired data and analysis of variance was used as appropriate.

Results: Depending on the biphasic VO_2 response to SN infusion during low and high Q we classified pts in four groups (table). **I.** VO_2 increases with SN and increases further during high Q unmasking hypoperfusion and supply dependency. **II.** VO_2 increases with SN but the addition of high Q results in systemic shunt. **III.** VO_2 increase during high Q proves that vasodilatation can turn flow insufficient. **IV.** VO_2 does not change with any intervention. The small number of pts and the wide standard deviation did not allow any statistical significance.

		VO_2 at 28°C		
		A (Q=2.1)	B (Q=2.1, SN)	C (Q=2.5, SN)
I	n=5	39 ± 11	46 ± 16	52 ± 13
II	n=6	50 ± 12	55 ± 13	48 ± 9
III	n=11	42 ± 9	37 ± 9	44 ± 10
IV	n=4	45 ± 12	44 ± 11	45 ± 10

VO_2 = ml. $m^{-2}.min^{-1}$, **Q** = l. $m^{-2}.min^{-1}$, **SN** = sodium nitroprusside.

Conclusions: CPB is an interesting model for the behavior of microcirculation. Intervention on SVR and Q can improve or impair effective regional oxygen delivery, resulting in either better perfusion or systemic shunt. VO_2 monitoring seems necessary during CPB.

PREOPERATIVE CARDIOVASCULAR OPTIMIZATION IN PATIENTS UNDERGOING VASCULAR SURGERY

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Preoperative cardiovascular optimization (OPT) to CI $\geq$ 2.8 L/min/m^2, 8 $\leq$ PAOP $\leq$ 18 mm Hg,and SVRI $\leq$ 30 mmHg/L^{-1}/min/m^2 decreases cardiac events (EVENTS) and mortality (MORT) in peripheral vascular surgery patients (PVS).
Objectives: to determine if OPT to the same endpoints decreases EVENTS in patients undergoing abdominal aortic aneurysm repair (AAAR) and to study their predictive value in PVS patients.
Methods: 44 AAAR patients and 41 PVS patients were admitted to the SICU, monitored with a PA and arterial catheters and treated to achieve OPT. Patients underwent surgery independent of success of OPT. Data included demographics, incremental risk factors, laboratory and hemodynamic data pre, intra, and postoperatively, EVENTS, and MORT. EVENTS included arrhythmias requiring treatment or prolonging the SICU stay > 24 hours, a ST depression > 1 mm or T wave inversion, an acute MI defined by a new Q wave > 0.03 sec or CPK-MB > 5%. Results are presented as means $\pm$ SD.

Results:	PVS		AAAR	
	No EVENTS	EVENTS	No EVENTS	EVENTS
PAOP	14.0$\pm$ 7.2	16.0$\pm$ 8.8	11.0$\pm$ 3.9	9.0$\pm$ 4.2
SVRI	29.6$\pm$ 8.5	34.8$\pm$ 11.5	26.1$\pm$ 5.9	27.0$\pm$ 7.6
CI	3.2 $\pm$ 0.8	2.6 $\pm$ 0.7*	2.9 $\pm$ 0.6	3.2$\pm$ 0.5

* = p<0.05 vs No EVENTS (t-test and Fisher's exact test)

OPT was achieved in 32 of 41 (78%) and in 36 of 44 (82%) in the PVS and AAAR group, respectively. EVENTS did not differ between groups: 9 of 41 (21.9%) and 12 of 44 (27.2%) in the PVS and AAAR group, respectively (p>0.05). MORT was 0 of 41 (0%) and 1 of 44 (2.2%) in the PVS and AAAR group, respectively (p>0.05). While there was no difference in endpoints of OPT between patients with and without EVENTS in the AAAR group, there was a significant difference in CI between patients with and without EVENTS in the PVS group. Of note, 8 of 9 (89%) patients who developed EVENTS in the PVS group had a CI < 2.8 in contrast to 4 of 12 (33%) in the AAAR group. The positive and negative predictive value were 89% and 97% in the PVS and 50% and 75% in the AAAR group.
Conclusions: 1. the endpoints of OPT used for PVS patients cannot be used to reduce EVENTS in AAAR patients; 2. PVS patients who have not achieved OPT are at extraordinary risk of perioperative EVENTS; 3. preoperative cardiovascular OPT in AAAR patients makes no difference in cardiac related EVENTS.

THE "NORMAL" CENTRAL VENOUS PRESSURE/PULMONARY CAPILLARY WEDGE PRESSURE RATIO (CVP/PcwP RATIO) AFTER CARDIAC SURGERY

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Background : Comparison of the right and left filling pressures (CVP/PcwP ratio) is considered as a useful diagnostic clue : the normal ratio is $\leq$ 0.6; ratio $\geq$ 0.8 may suggest right ventricular infarction while equalization of the CVP and PcwP is a classic sign of tamponade (1). However after cardiac surgery, many conditions (diastolic dysfunction, pulmonary hypertension, positive pressure ventilation) are susceptible to modify the "normal" CVP/PcwP ratio.
Material and method : We determined CVP/PcwP ratio in 100 consecutive patients (pts) after uncomplicated cardiac surgery (78 coronary artery bypass grafts; 22 valvular replacements). Measurements were made before and after tracheal extubation.
Results :Cardiac Index : 3.2 $\pm$ 0.7 l/min/m^2; lactate : 144 $\pm$ 68 mg/l; CVP range : 4-17 mmHg; PcwP range : 2-16 mmHg. Mean CVP/PcwP ratio before extubation is 0.94 (95 % confidence interval : 0.86-1.02) and after extubation, 0.93 (95 % confidence interval : 0.83 -.1.03), (NS, paired t-test). In 25 % of the pts, CVP was higher than PcwP. There are no correlation between the CVP/PcwP ratio and CI before (r = -0.04) and after extubation (r = -0.09) nor between the CVP/PcwP ratio and mean pulmonary arterial pressure (MPAP), before (r = 0.08) and after extubation (r = -0.13).
Discussion : Cardiac performance is adequate according to CI and lactate. However the CVP/PcwP ratio is markedly higher than the "normal" ($\leq$ 0.6) ratio. This difference is not related to mechanical ventilation because the ratio is similar before and after extubation, nor to pulmonary hypertension because of absence of any correlation with MPAP. Post-CPB diastolic dysfunction of the right ventricle could be an alternative explanation. In this group of pts, increased CVP/PcwP is not associated with any impairment of cardiac performance (absence of correlation with CI).
Conclusions : CVP/PcwP ratio as high as 1 within a large range of CVP (4-17 mmHg) and PcwP (2-16 mmHg) may still be considered as normal after cardiac surgery. This emphasizes the limitations of the hemodynamic monitoring after cardiac surgery (in comparison with echographic technics). Careful analysis of the morphology of the CVP and right ventricular pressure curves (x descent, y descent, dip-plateau) is mandatory rather than relying on the quantitative assessment alone.
Reference : (1) LOPEZ-SENDON J. et al. : Circulation, 1981, 64:515-25.

REDUCTION IN DELAY OF FIBRINOLITIC TREATMENT IN ACUTE MYOCARDIAL INFARCTION: THE ROLE OF THE AUDITOR AND PROTOCOL OF PROCEDURES.

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Introduction. Fibrinolitic Treatment (FT) permits the treatment of acute myocardial infarction (AMI) addressing the etiology, thereby leading to improved ventricular function and a marked reduction in mortality. The main clinical problem is the reduced time of application. Delay in hospitalization, which can be from 50 to 120 minutes, is potentially the most avoidable delay.
Method. To reduce delays in hospitalization, the following was carried out in two phases.
1 Audit: Analysis of the time lapse from onset of symptoms to start of FT, showed that during the period 1 June to 31 December 1994, 79 patients with chest pains were treated within a period varying from 30 minutes to 6 hours from onset of symtoms. Ages ranged from 33 to 86 (average 64,4), being 49 males and 30 females. They were given initial ECGs to determine ST increases suggesting AMI. Median time for this procedure was 10 m.. 204 potential AMI patients were then admitted to the Coronary Unit. 103 patients, under age 75 with no contraindications received FT. The median time lapse from admission to Coronary Care and administration of FT was 15 minutes (12, 17). The total median delay was 58 minutes (40 - 1h.45min.)
Delays in start of this procedure are grouped as follows:
Extra-hospital delays (from onset of symtoms to arrival at hospital)
Diagnostic delays (from hospital arrival to ECG).
Treatment delays (from diagnosis to FT).
2 Objectives: protocol of procedure to implement a fast-track method. A protocol was drawn up with the object of reducing diagnostic delays to 8-10 minutes and treatment delays to less than 15 minutes
Results. Following implementation of this protocol in January 1995, 30 FTs were given, with an over all average delay of 24 minutes. This fast-track method did not reveal any inappropriate FT or any increase in complications.
Conclusions: Detailed study of the various times taken for diagnosis and treatment of AMI patients, showed up weaknesses in the system and improvements through the protocol based on performence procedures which led to a 59% reduction in the start of FT.

FAST TRACK: ANALYSIS OF DELAY REDUCTION TO THROMBOLYTIC TREATMENT OF ACUTE MYOCARDIAL INFARCTION.

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Background: The importance of the early use of thrombolytic agents in acute myocardial infarction (AMI) is based in the better remaining ventricular function and smaller mortality rate because of the greater reperfusion and smaller infarction size. Therefore, it is very important to apply this treatment to the maximum number of patients without thrombolytic contraindication, and within the minimun period of time. The "thrombolytic fast track" implementation allows to optimize the time to administrate thrombolytic agents avoiding multiple delays.
Methodology: We analize the application of thrombolytic agents to 73 patients with suspect of AMI from the begining of September 1994 until the end of February 1995. In this time there are two different periods, during the first 4 months thrombolytic agent were administrated at Intensive Care Unit (ICU), and during the second period we carried out a protocol of quick detection and thrombolysis therapy in susceptible patients at the emergency room in order to reduce the time to treatment. Main *results* are shown in the following table.

Different delays	Thrombolysis (Classic route)	Thrombolysis (Fast Track)
Extrahospital delay	2 h 38m	2 h 27m
Diagnostic delay	10m	10m
Therapy delay	58m	24m

h=hours m=minutes

The implementation of the fast track does not need supplementary personal or equipment but a protocolized approach and training of the personal involved. The main problem detected was the usual attendance overload of the emergency department that makes difficult to follow many structurated actions.
Conclusions: Protocolized changes in the management of AMI can significantly reduce the delay in the administration of thrombolytic agents. It is not necessary to complet the procedure in the emergency department, as the use of bolus schedules allows to begin the treatment in this area and to transfer the patient to ICU afterwards.

7.5% NACL HYPERTONIC SALINE SOLUTION (HS) IN THE HEMODYNAMIC IMPROVEMENT OF PATIENTS SCHEDULED FOR ABDOMINAL AORTIC SURGERY.

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Objective: to evaluate the efficacy and the safety of HS in the hemodynamic improvement of patients scheduled for elective surgical repair of infrarenal aortic aneurism.
Methods: HS 3.5 ml/kg infused over 15 min in patients with preoperative CI<2.5 l/min/sqm and PWP<12 mmHg. Hemodynamic evaluation performed at the end of the infusion(T1), and 30(T2), 120(T3), 180(T4) minutes later, with simoultaneous control of Na, Cl, K, H2CO3, pH and HT.
Results: in the ten patients studied, CI, MAP, MPAP and SVI were statistically increased over the basal values at all the times of observation. HR increased only at T1; TSR, SVR and PVR decreased significantly only at T1; PWP and CVP did not change. Sodium and chloride were significantly increased, starting from T1 to T4; potassium decreased at T1; HT decreased at T1 and T2; pH remained constant.
Conclusions: HS is effective and well tolerated in volume loading of patients submitted to aortic surgery. An immediate and transient reduction of TSR and SVR coupled with a longer-lasting increase in contractility seem to be the main mechanisms responsible of the observed improvement of hemodynamics.

PERIOPERATIVE CONTINUOUS MEASUREMENT OF CARDIAC OUTPUT USED TO OBTAIN SUPRANORMAL OXYGEN DELIVERY IN HIGH RISK PATIENTS UNDERGOING MAJOR ABDOMINAL SURGERY

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Background: Cardiovascular depression due to anaesthesia, old age and major gastrointestinal surgery is becoming an increasingly frequent challenge to the anaesthesia-surgery team. Deliberate preoperative manipulation of haemodynamics and oxygen transport parametres towards predetermined optimal values may prove to be effective in reducing morbidity and mortality in high risk surgical patients[1,2]. A new concept of using continuous perioperative measurement of cardiac output to obtain and maintain supranormal oxygen delivery (DO_2I) is presented.
Methods: Continuous measurement of cardiac output is a relatively new form of on-line monitoring, in which trains of impulses are emitted from a thermal filament mounted on a pulmonary artery catheter. Computer software recognizes patterns generated by minute changes in blood temperature and calculates cardiac output every 30-60 seconds. Cardiac output and mixed venous blood oxygen saturation are displayed graphically on line[3]. In this study cardiac output was measured continuously by Vigilance™ cardiac output computer (Baxter). Preoperative haemodynamic optimization was performed with the goal of increasing DO_2I to at least 600 ml/min/m² according to Shoemaker's algorithm[1]. This was done by infusing colloids (albumin or hydroxy ethyl starch (HAES-steril®)) until the desired DO_2I was reached. Infusion was stopped if cardiac output ceased to increase with infusion, if there were signs of pulmonary oedema or if wedge pressure reached 18 mmHg. Vasoactive or inotropic drugs were infused if the desired DO_2I was not reached by infusion alone. Anaesthetic technique included continuous thoracic epidural and isoflourane anaesthesia. Expected morbidity and mortality rates were calculated by the "POSSUM" score using preoperative clinical and paraclinical estimates of organ function as well as surgery characteristics[4].
Materials: 15 ASA group III-IV patients with a mean age of 75 years (range 60-92) and a mean weight of 67 kg (range 36-93)) scheduled for major abdominal surgery were included.
Results: 2 patients were excluded because DO_2I could not be raised at all. Mean DO_2I was increased from 488 ml/min/m² (range 384-610) to 688 ml/min/m² (range 490-967). Mean volume of preoperatively infused colloid was 954 ml (range 0-2000). During surgery 1230 ml (range 500-2300) of colloid was infused. Mean length of surgery was 150 minutes (range 60-300). Mean blood loss was 920 ml (range 0-4800). Expected mortality and morbidity rates ("POSSUM") were 56% and 92%, respectively, whereas patient follow up upon discharge or at death revealed mortality and morbidity rates of 8 % and 54%, respectively.
Conclusion: Based on experience from the present study, continuous measurement of cardiac output has proved to be a valuable tool for perioperative optimization of DO_2I in ASA group III and IV patients during major surgery. However further studies including a greater number of patients are necessary to confirm the promising preliminary findings.
Literature: 1. Shoemaker WC Chest 1988;94:1176-1186 2. Boyd O JAMA 1993;270:2699-2707 3. Yelderman M J Clin Monit 1990;6:322-332 4. Copeland GP Br J Surg 1991; 78:356-360

PREDICTIVE FACTORS OF SWAN GANZ CATHETER REQUIREMENT DURING CARDIAC SURGERY

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Objectives: The study was aimed at analysing predictive factors of Swan Ganz pulmonary catheter (PC) requirement during elective cardiac surgery according to the need of sustained inotropic support after surgery.
Methods: Three hundred patients (aged from 27 to 85; 89 females and 211 males) were consecutively operated on for elective coronary artery bypass surgery (CABG, n=179), valvular replacement (VR, n=98), combination of both (VR-CABG, n=15), or others (n=6) and retrospectively included in the study. Each patient had preoperative invasive cardiac investigation with calculated ejection fraction (EF). Anaesthesia, cardiopulmonary bypass (CPB) and cardiac arrest managements were similar in all patients. PC requirement was estimated from the need of either dobutamine, adrenaline, dopamine or enoximone use during the first 48 hours after cardiac surgery. Demographic data, ASA and NYHA classifications, preoperative EF and treatments, type of surgery, CPB and aortic cross clamping (AXC) times, and postoperative incidence of complications were compared in patients with or without inotropic support using either Student's t test or χ_2 with continuity correction when appropriate.
Results: Seventy-three patients (24.5%) required inotropic support after surgery. AXC and CPB times, mean stay in ICU were significantly longer in patients with inotropic support ($p<0.001$). Type of surgery, preoperative EF, and NYHA classification are the first 3 significant factors related to inotropic support ($p<0.005$). Most patients operated on for double-VR or VR-CABG required inotropic support (57 and 60%, respectively). Postoperative mortality was higher in patients receiving inotropic support (8,2% vs 0,9% overall mortality, $p=0.003$).
Conclusions: Since PC insertion is most often justified because inotropes are required, these results suggest that elective rather than routine systemic PC insertion could be helped by considering several but selected preoperative factors.

Use of Inotropic Agents, Vasodilators, Diuretics and AV-Filtration in Patients with acute Left Heart Failure.

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We studied the hemodynamic effects of three different combinations of positiv inotropic agents, vasodilators, diuretics and AV-filtration (AV) in 16 patients (pts) with severe left heart failure (left ventricular filling pressure (LVFP) >25 mmHg) due to acute myocardial infarction. Hemodynamic measurements (intravascular pressures (LVFP), thermodilution (Cardiac Index (CI)) were made before (control) and after each therapy. In 11 Furosemide (F) + Dobutamin (D) + Nitroglycerin (Ni) reduced LVFP and a small increase of CI occurred. In 6 of these pts (Group A) Nitroprusside (Np) instead of Ni increased CI significantly. in the other 5 pts adding of Amrinone (A) resulted in a pronounced increase of CI. Group C (n=5): The combination of Ni and AV reduced LVFP but did not increase CI which was achieved by AV+D+Ni.

Group A:	control	F+D+Ni	F+D+Np
LVFP(mmHg)	35	23*	20*
CI(l/min/m²)	2.0	2.3	2.8*
Group B:		D+F+Ni	D+F+A
LVFP(mmHg)	32	25*	22*
CI(l/min/m²)	2.1	2.5*	2.9*
Group C:		AV+Ni	AV+D+Ni
LVFP(mmHg)	31	22*	19*
CI(l/min/m²)	1.8	1.9	2.5*

(* $p<0.05$ versus control)

In order to optimize the treatment of acute heart failure a combination of inotropic agents, vasodilators, diuretics and AV-filtration should be used guided by hemodynamic monitoring.

NORADRENALINE PLASMA LEVELS AFTER TRHOMBOLYSIS IN ACUTE MYOCARDIAL INFARCTION WITH REPERFUSION CRITERIA DEPENDING ON INFARCT SIZE AND LOCATION

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OBJECTIVES: To evaluate the variation in noradrenaline (NA) plasma concentrations in patients with acute myocardial infarction (AMI) after thrombolytic therapy with noninvasive reperfusion criteria (clinical, electrocardiographic and enzymatic), in relation to infarct size and location.

METHODS: 42 consecutive patiens with AMI, from October 1, 1994 to February 28, 1995, admitted within 6 hours after onset of symptoms, undergone successfull systemic thrombolysis. 21 of them were anterior (Group A) and 21 inferior (Group B). Noradrenaline plasma levels at 0 (NA1), 60 (NA2) and 240 (NA3) minutes after admission were compared with CK-peak plasma levels by linear regression. Differences were tested for significance by Student-t-test for paired and unpaired values. NA plasma concentration was measured by high-presssure liquid chromatography.

RESULTS: Are shown in the following table:

	GROUP A (n=21)	GROUP B (n=21)	p<
NA1	867.6 ± 96.6	525.7 ± 52.6	0.01
NA2	746.1 ± 91.4	495.3 ± 66.8	0.05
NA3	601 ± 51.8	391.7 ± 49.6	0.01
CK-peak	3330.5 ± 395.3	1925.2 ± 409.0	
NA3/CK-peak	p< 0.05 / r =0.48	NS	
	p<	p<	
NA1 / NA2	0.05	NS	
NA1 / NA3	0.001	0.01	
NA2 / NA3	NS	NS	

means ± SEM (Normal limit for our laboratory: NA < 370 pg/ml; CK < 170 U/l)

CONCLUSIONS: 1. The NA plasma levels at admission (NA1) are more increased in anterior than inferior AMIs, probably in relation to infarct size. 2. The decrease in NA is more evidence in AMIs with anterior location. 3. This decrease is probably due to the major efficacy of thrombolytic therapy in AMIs with anterior location.

REPERCUSSIONS IN NORADRENALINE PLASMA LEVELS OF THROMBOLYTIC THERAPY IN THE ACUTE MYOCARDIAL INFARCTION

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OBJECTIVES: The aim of this study is to compare the plasma concentrations of noradrenaline (NA) between patients with acute myocardial infarction (AMI), treated with and without systemic thrombolysis.

METHODS: 74 consecutive patients with AMI were studied from October 1, 1994 to february 28, 1995. They were divided into three groups: Patients who received systemic thrombolysis with noninvasive (clinical, electrocardiographic and enzymatic) reperfusion criteria: Group A (n=42), without reperfusion criteria; Group B (n=10); and Group C (n=22) under conventional treatment. Blood samples for CK and NA analysis were taken at 0 (NA1), 60 minutes (NA2) and 240 minutes (NA3) after admission and compared. Differences were tested for significance by Student-t-test for paired and unpaired values. NA plasma concentration was measured by high-pressure liquid chromatography.

RESULTS: Are shown in the following table:

	GROUP A (n=42)	GROUP B (n=10)	GROUP C (n=22)
NA1	752.2 ± 80.5	463.8 ± 115.9	620 ± 83.8
NA2	648.0 ± 82.8	505.9 ± 126.2	565.1 ± 81.9
NA3	476.1 ± 82.8	373.1 ± 79.7	568.2 ± 83.0
	p<	p<	p<
NA1/NA2	0.05	NS	NS
NA1/NA3	0.001	0.1	NS
NA2/NA3	0.05	NS	NS

(means ± SEM. Normal limit for our laboratory: NA<370 pg/ml.)
Differences for unpaired values intergroups were NS

CONCLUSIONS: This study suggest that: 1. The successfull thrombolytic therapy in AMI (Group A) produce a clearly significant decrease in NA plasma levels compared with AMI without reperfusion and AMI with conventional treatment. 2. There is a trend to decrease in NA in AMI without reperfusion criteria (Group B), probably due to certain degree of reperfusion. 3. There is not significant variation in NA in conventional treated AMI (Group C).

Autologous platelet rich plasma for open heart surgery

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Objectives: Our task was to improve the technique of preservation of platelet rich plasma.

Methods: 38 patients scheduled for multiple cardiac valve replacement in 1994 were divided into two groups: group I (10 patients) – without PP; group II (28 patients) – PP was performed preoperatively. The first PP was made ten days and the second – 3 days before the operation. PRP was preserved by cryoconservation. Our technique of cryoconservation is distinguished by the speed of freezing (17–18 °C/min) and absence of DMSO. This made it possible to preserve 90 % functionally active platelets during 20 days. The PRP was transfused back after heparin neutralization. The Hospital Ethics Committee approved the investigation.

Results: The blood loss through the 1st p. o. d. was significantly greatest in the group I (725 ± 97 ml) and all the patients required transfusion of the donor blood (480 ± 112 ml) whereas the blood loss in group II was 489 ± 75 ml and olny 12 patients required the donor blood. The number of platelets on the 1st p. o. d. was $107 \pm 12 \cdot 10^9$/L (group I) and $153 \pm 19 \cdot 10^9$/L (group II), $p < 0.05$.

Conclusions: Our technique of PRP cryoconservation makes it possible to avoid the crystallization phase during freezing of PRP. Thus the infusion of PRP may improve hemostasis after open heart surgery and limit the use of the donor blood.

DETERMINANTS OF PROGNOSIS FOR WOMEN AFTER ACUTE MYOCARDIAL INFARCTION

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In-hospital outcome of women suffering an AMI is generally considered worse than that of men, but it is still debated whether female sex is per se a negative prognostic factor or is merely associated with other negative determinants of prognosis.

The purpose of the present study is to evaluate the independence of the association between female sex and mortality (in the 567 patients of the Swiss Centers) and in the 36381 patients randomized in the ISIS-3 trail
Mortality rate in women was 14.8% (1421/9600) compared to 9.1% (2417/26480) in men; in Switzerland: in-hospital mortality for women was 15.5% (20/129), for men 7.1% (31/438).

The table shows the results of ISIS-3 in terms of odds ratios and their 95% confidence intervals either after unadjusted analysis or after adjustment for age, known to be the major confounding variable when prognosis of women after myocardial infarction is considered, and for all the available clinical and epidemiological characteristics collected at trial entry:

	ISIS-3 CH 567 pts			ISIS-3 36381 pts		
	OR	95%CI	p	OR	95%CI	p
Unadjusted analysis	2.79	1.41-5.55	<.001	1.82	1.68-1.96	<.0001
Adjusted for age				1.20	1.11-1.29	<.0001
Adjusted for all variables				1.14	1.15-1.23	=.002

These observations suggest that there is a small but independent effect of female sex on short-term mortality after acute myocardial infarction.

PULMONARY SHUNT DURING CORONARY SURGERY AND POSTOPERATIVELY

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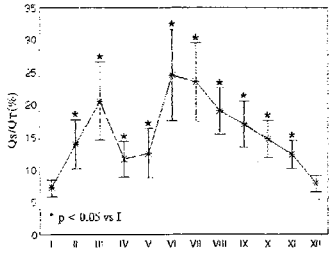
Objectives: Different factors may have influence on pulmonary function during and after cardiopulmonary bypass (CPB). The aim of this study was to evaluate changes in pulmonary shunt (Qs/Qт) during coronary surgery (CS) and postoperatively.
Methods: 40 patients (pts) (mean age 55 ± 6 years) scheduled for CS gave their informed consent to the study which was approved by the University Human Research Committee. CPB time was 107 ± 22 mins, membrane (27) and bubble (13) oxygenators were used. Anaesthesia was balanced and pts were extubated 12 to 18 hrs after CPB. Pts were monitored with Swan-Ganz catheters (SGC) for 24 hrs after CPB. At that time Qs/Qт was calculated according to the standard shunt equation. After the SGC had been removed, an estimated shunt was calculated. Measurements of Qs/Qт were performed: before induction of anaesthesia (I), after induction of anaesthesia (II), 5 mins after CPB (III) 2 (IV) and 6 (V) hrs after CPB, 30 mins after extubation (VI), 24 hrs after CPB (VII) and on the 2nd, 3rd, 5th, 8th and 13th postoperative day (PD) (VIII, IX, X, XI, XII, respectively). Analysis of data was performed by two-way analysis of variance, $p < 0.05$ being regard as significant.
Results: The figure shows the values for Qs/Qт expressed as means ± SD. There was a significant increase in Qs/Qт above baseline throughout the whole investigated period except on the 13th PD. Qs/Qт reached maximum at 30 mins after extubation (VI).



Conclusions: The results of our study show a significant change in Qs/Qт during CS and postoperatively. This finding is a consequence of negative influence of CPB itself and the other factors in relation to operation. The recovery of pulmonary function occurred on the 13th PD when Qs/Qт have found it's preoperative level.

OXYGENATOR TYPE AND PULMONARY SHUNT AFTER CORONARY SURGERY

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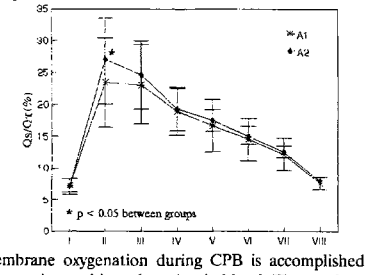
Objectives: Many studies have shown advantages of membrane oxygenators over bubble type oxygenators. The aim of this study was to evaluate the influence of oxygenator type on pulmonary shunt (Qs/Qт) after coronary surgery.
Methods: 40 patients (pts) gave their informed consent to the study which was approved by the University Human Research Committee. Pts were divided into two groups: A1 (n = 27) with a membrane oxygenator and A2 (n = 13) with a bubble oxygenator used during cardiopulmonary bypass (CPB). Pts were monitored with Swan-Ganz catheters (SGC) for 24 hrs after CPB. At that time Qs/Qт was calculated according to the standard shunt equation. After the SGC had been removed, an estimated shunt was calculated. Measurements of Qs/Qт were performed: before induction of anaesthesia (I), 30 mins after extubation (II), 24 hrs after CPB (III) and on the 2nd, 3rd, 5th, 8th and 13th postoperative day (IV, V, VI, VII, VIII, respectively). Analysis of data was performed by one-way analysis of variance, $p < 0.05$ being regarded as significant.
Results: The figure shows the values for Qs/Qт expressed as means ± SD. Qs/Qт was significantly greater at 30 mins after extubation (II) in A2 group. The difference between the two groups was no more significant from 24 hrs after CPB (III) to the end of the investigated period.



Conclusions: Membrane oxygenation during CPB is accomplished by reduction in blood cellular destruction and less alteration in blood. The results of our study show the influence of oxygenator type on value of Qs/Qт only after extubation (12 to 18 hrs after CPB). The difference in Qs/Qт disappeared 24 hrs after CPB and since that time the oxygenator type had no influence on Qs/Qт. It may be of particular importance in patients with severe forms of cardiopulmonary disease who are at risk of higher postoperative morbidity and mortality.

PREVALENCE OF HYPOMAGNESEMIA IN ICU PATIENTS

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OBJECTIVES: Hypomagnesemia has been reported with a variable prevalence (20 to 61%) in ICU patients. Magnesium deficiency can induce a number of clinical symptoms (primarily cardiovascular and neuro-psychiatric) but can also be clinically silent (10-65% are asymptomatic).
METHODS: We measured whole blood ionized magnesium (iMg++) in 74 patients on admission to the ICU, using a NOVA 8 electrolyte analyzer (NOVA Biomedical), containing an iMg++ electrode. Blood was collected in syringes with dry heparin (Radiometer QS 50). Normal range of iMg++ was found between 0.45-0.55 mmol/L (healthy volunteers).
RESULTS: For the entire population, we found a 61% prevalence (45/74) of hypomagnesemia (Figure 1). Among the surgical patients, the prevalence was highest after cardiac surgery (85%) and after thoracic surgery (80%) and was lowest after neurosurgery (8%). Hypomagnesemia was also common in patients after liver transplantation (LVTX) or with hepatic failure (100% for both groups).
CONCLUSION: Our findings confirm that hypomagnesemia is common in acutely ill patients, especially in those after cardiothoracic surgery or those with liver disease. Nevertheless, it is difficult to define the associated factors with sufficient specificity so that measurements of iMg++ are warranted to diagnose hypomagnesemia.

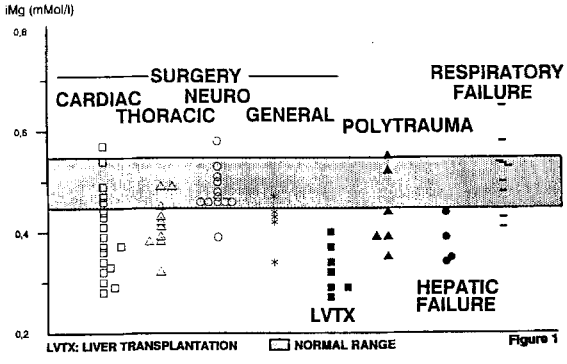

Figure 1

PARAAORTIC COUNTERPULSATION AND CENTRIFUGAL BLOOD PUMP ARE EQUALLY EFFECTIVE IN CARDIOGENIC SHOCK

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Objective: The Centrifugal Blood Pump (CBP) is often used for partial support of patients with severe cardiogenic shock. The hemodynamic effects of a new valveless Para-aortic Counterpulsation Device (PACD) were compared to those of a CBP in acute experimental cardiogenic shock.
Methods: The PACD, a valveless round pumping chamber that has a 100 ml stroke volume, was implanted via a dacron graft on the ascending aorta in nine dogs and was synchronized on the base of the electrocardiogram in order to provide diastolic augmentation. The CBP was implanted on the same animals with the inflow into the left atrium and the outflow into the aortic arch. Hemodynamics were obtained with both devices off, with the PACD on, or the CBP on.
Results: There was no difference in mean aortic pressure 60.0±12.0 mmHg (PACD on) vs 69.0±26.0 mmHg (CBP on), in left ventricular end diastolic pressure 11.9±5.4 mmHg (PACD on) vs 9.9±5.2 mmHg (CBP on) or in cardiac index 84.0±36.0 ml/kg/min (PACD on) vs 85.0±33.0 ml/kg/min (CBP on). However, there was a significant difference in tension time index (TTI) 712±381 mmHg.sec/min with the PACD on vs 1,339±694 mmHg.sec/min with the CBP on ($p=0.01$),in left ventricular systolic pressure 55.0±19.0 mmHg with the PACD on vs 73.0±26.0 mmHg with the CBP on ($p=0.006$), in double product 5,629±2,574 mmHg/min with the PACD on vs 7,440±3,294 mmHg/min with the CBP on ($p=0.006$) and in endocardial viability ratio 3.97±2.0 with the PACD on vs 1.45±0.32 with the CBP on ($p=0.005$).
Conclusions: The PACD is at least as effective as the CBP in restoring the peripheral hemodynamics in cardiogenic shock and furthermore it decreases markedly the myocardial oxygen demand making it a preferable device in cases of reversible damage of the myocardium.

HEPARIN ASSOCIATED THROMBOCYTOPENIA AND THROMBOSIS (HATT): INCIDENCE, DIAGNOSTIC TOOLS AND CLINICAL COURSE

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Heparin influences platelet function and may lead to thrombocytopenia called heparin-associated thrombocytopenia (HAT) regardless of the dose and route of administration. Additional venous and/or arterial thrombosis may lead to life-threatening complications. The incidence of so-called heparin-associated thrombocytopenia and thrombosis (HATT) ranges between 1-5%. HATT is confirmed by a heparin induced platelet activation assay (HIPA).

Results: From 11/93 to 11/94 1146 consecutive patients of our icu were reviewed retrospectively. All patients were treated with heparin. The incidence of HATT was 1% (12). In all cases diagnosis was proven by a positive HIPA. 2/12 patients died. In 3/12 HATT could be confirmed before severe thromboembolic complications occured. 4/12 patients developed a deep vein thrombosis (DVT), 2/12 DVT and pulmonary embolism (PE), 2/12 DVT, PE and arterial thrombosis (AT) and 1/12 a DVT, PE, AT and a sinus thrombosis.

Conclusion: The incidence of HATT in a consecutive series of 1146 pts. is 1%. Presence of thrombocytopenia and thrombosis of the great vessels is associated with a significant mortality (2/12). Computed tomography (CT) and transthoracic/transesophageal echocardiography (TTE/TEE) are important tools in diagnosing and monitoring the extent of central venous and arterial thrombosis.

HEMODYNAMIC PATTERN IN CARDIOGENIC SHOCK: IS IT ALWAYS TYPICAL?

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OBJECTIVE: To determine extreme hemodynamic patterns in cardiogenic shock.

Although cardiogenic shock is characterized by a low cardiac index (CI), high systemic vascular resistance index (SVRI), and high cardiac filling pressures, some patients may develop an atypical pattern.

METHODS: We reviewed the hemodynamic pattern of 73 patients with cardiogenic shock, as defined by an initial CI below 2.5 l/min/m² in the presence of myocardial dysfunction attributed to ischemic heart disease (N=26), heart failure (N=7), valvulopathy (N=2) or recent cardiac surgery (N=38). After exclusion of 10 patients with concurrently suspected/documented infection, this study included 63 patients, of whom 23 (36.5%) survived. Treatment of shock included dopamine (N=43), dobutamine (N=56), norepinephrine (N=18) and epinephrine (N=23).

RESULTS: Lowest values of CI and SvO2 were 1.74±0.50 l/min/m² and 48.0±10.6 %, respectively. Highest values for CI and SvO2 were 2.76±0.84 l/min/m² and 66.1±11.6 %, respectively. At some point during their evolution, 24 patients (38%) reached a CI > 3.0 l/min/m² and 14 (22.2%) a CI > 3.5 l/min/m². 49 (77%) patients reached a SvO2 > 60 % and 14 (22.2%) patients a SvO2 > 75 %.

CONCLUSIONS: The hemodynamic pattern of cardiogenic shock is not always typical. The release of inflammatory mediators and the administration of vasoactive drugs are likely to be implicated.

OUR EXPERIENCE OF ENAP (ENALAPRIL) APPLICATION IN THE TREATMENT OF HYPORENIN ARTERIAL HYPERTENSION

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39 patients with arterial hypertension (AH) and initially law plasma renin activity (PRA) had been studied. In all patient changes of arterial pressure (AP) after single administration of Enap was studied. Hypotensive reaction wiht decreasing of average AP about 20-25 mm Hg after single drug administration observed only in 4 patients. ENAP monotherapy accomplished during one week with 20 mg daily dose. Hypotensive effect observed in 5 patients including ones which were susceptible to single ENAP administration. After that first stage of therapy all patints began to combinate ENAP with Hypothyazid in dose of 25 mg per day. After week of treatment such drugs combination lead to veritable AP lowering in 3 addition patients.

In the remaining resistant to such drug combination patients was add Corinfar in daily dose of 40 mg. This new drug combination permits to lower AP in 23 patients. Subsequent discontinuation of ENAP administration to such patients did not connected with increasing of again.

Therefore the most of the patients with AH and law PRA(78,7%)did not susceptible to ENAP therapy and ENAP and Hypothyazid combination. On the contrary-combination of Corinfar with Hipothyazid was effective in 59% patients with AH and low PRA.

CAN EXTREME VALUES OF SvO2 PREDICT RELIABLY THE OUTCOME IN CARDIOGENIC SHOCK?

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OBJECTIVE: A number of studies have shown that cardiac index is lower in non-survivors than in survivors from cardiogenic shock. In this study we investigated the possible predictive value of extreme values of mixed venous oxygen saturation (SvO2) in cardiogenic shock.

METHODS: In 35 patients with cardiogenic shock due to ischemic heart disease (N=26), heart failure (N=7) and valvulopathy (N=2), hemodynamic data including measures of intravascular pressures, cardiac output and mixed venous gases were collected at regular times intervals, at least 3 times a day. All measurements were obtained in a relative steady state and in the absence of severe anemia or hypoxemia. Treatment of shock included dobutamine (N=30), dopamine (N=24), norepinephrine (N=12) and epinephrine (N=7). 27/35 (77%) patients died.

RESULTS: Lowest CI values averaged 2.18±0.58 and 1.52±0.47 l/min/m² in survivors and non-survivors, respectively (p=0.002). Highest CI values averaged 3.51±0.68 and 2.24±0.79 l/min/m², for survivors and non-survivors, respectively (p=0.0003). Lowest SvO2 values averaged 56.1±10.1 and 42.8±10.5 % for survivors and non-survivors, respectively (p=0.003). Highest SvO2 values averaged 73.6±6.9 and 59.9±12.7 % for survivors and non-survivors, respectively (p=0.007). None of the 8 survivors but 13/27 (48%) non-survivors reached a SvO2 below 45% (p=0.015). All survivors but only 15/27 (56%) non-survivors reached a SvO2 above 64% (p=0.03).

CONCLUSION: These data indicate that both SvO2 and CI measurements are important prognostic indices in cardiogenic shock. Patients who never reach a SvO2 below 45% or who reach a SvO2 of 65% have a better outcome.

DEVELOPMENT OF A NOVEL EXTRACORPOREAL LIVER SUPPORT SYSTEM. HAEMODYNAMIC STUDY IN HEALTHY ANIMALS

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Objective: Based on our previous studies of the function of isolated liver grafts, this experimental protocol aims at developing a novel extracorporeal liver support circuit, with an incorporated pig liver.

Methods:The graft liver was obtained from pigs weighing 15-20 Kg. Under general anesthesia the animals underwent total hepatectomy,following cannulation of the portal vein, the infrarenal aorta and the infrahepatic vena cava and perfusion with 4 lt of heparinised R/L solution at 4°C. The circuit consisted of the graft liver connected to a fluid reservoir and a centrifuge pump. Ten healthy pigs weighing 30-35 Kgr were connected to the circuit as follows: The rt carotid artery was connected to the portal vein of the graft and the rt jugular vein was connected to the fluid reservoir, through the centrifuge pump. The fluid reservoir collected the outflow from the graft's suprahepatic inferior vena cava. The cystic duct of the graft was ligated and the bile duct cannulated for bile collection and measurement. Bridges were adapted to the circuit to bypass the graft liver when necessary. In cases of by pass blood perfusing the graft was oxygenated through a bubble oxygenator. Mean total priming volume of the circuit was 600 ml. Temperature was maintained at 38°C and portal vein pressure at 16 (12-20) mmHg. The flow was 0.5-0.7 ml/gr of graft liver mass per minute. Observation period was 8 hours (T_8).

Results: Results of the hemodynamic and metabolic monitoring of the recipients [MAP (T_0=124mmHg, T_8=118mmHg), HR (T_0=177, T_8=201), RAP (T_0=11mmHg, T_8=19mmHg), PAP (T_0=26mmHg, T_8=31mmHg), PCWP (T_0=14mmHg, T_8=15mmHg), SVR (T_0=1940dyn·sec/cm^3, T_8=2190dyn·sec/cm^3), PVR (T_0=206dyn·sec/cm^3, T_8=354 dyn·sec/cm^3), CO (T_0=4.63lt/min, T_8=3.6lt/min), DO_2 (T_0=662ml/min, T_8=261.6 ml/min), VO_2 (T_0=118ml/min, T_8=111ml/min), O_2ER (T_0=17.8%, T_8=42.5%), pH (T_0= 7.48, T_8=7.39), pO_2 (T_0=292mmHg, T_8=371mmHg), pCO_2 (T_0=28mmHg, T_8=30 mmHg), pVO_2 (T_0=47mmHg, T_8=36mmHg), SvO_2 (T_0=84%, T_8=66%), BE, Na, K, Ca^{++}, lactate, osmolality, AST, ALT, PT, APTT, revealed hemodynamic and metabolic stability of the animal. O_2 consumption, CO_2 production and tissue oxygenation of the graft were also studied.

Conclusion: The described circuit proved to be safe and well tolerated by healthy animals but its value for temporary liver support is currently being estimated, in a surgically induced experimental fulminant hepatic failure model.

FIVE YEAR FOLLOW UP OF HUMORAL IMMUNITY IN PACED PATIENTS.

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Introduction: Prosthetic materials like silikone, dacron, teflon e.t.c. produce auto immune responses and may even trigger clinical syndromes like Scleroderma, Sjogren, SLE e.t.c. In our study we followed the evolution of humorial immunity parametrs for up to five years in a cohort of paced pts with implanted metallic and silicone materials.

Method: 24 paced pts (mean age 55+- 13 yrs) without clinical or laboratory findings of malignancy or immune disorders were included. We measured the immunoglobulins, the complement, the auto antibodies and the proteins involved in inflammatory reactions every 6 months. The initial and final mean values are shown in the table.Statistics included x^2 and t-test.

Results:

Mean Values	Initial	After 5 years	P
IgG	1599+-522	1998+-1032	N S
IgM	125+-52	1998+-92	<0.001
IgA	323+-94	485+-240	N S
C_3	170+46	190+-80	N S
C_4	28+-8	40+-31	N S

We also noticed that although low antibody titles were found in 3 pts initially, there were found in 9 pts after 5 yrs.

Conclusion: Pacemaker materials provoke a mild modification of humoral immunity increasing IgM title and mildly increasing auto antibody title.

ANOTHER CASE OF SYSTEMIC CAPILLARY LEAK SYNDROME

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The systemic capillary leak syndrome is a rare but devastating disorder characterized by hypotension, hemoconcentration, and monoclonal gammapathy. We have managed a patient with this condition.

A 49-year-old woman presented a 3 year history of occasional self-limited episodes of weakness, generalized edema and oliguria. The immunologic testing showed normal levels of complements, C1q inhibitor, and serum chemistry values, between or during a attack. She was not treated. She was admitted to the hospital with symptoms including nausea, vomiting, weakness and oliguria. On examination, the patient presented facial and generalized edema. The systolic blood pressure was 60 mm Hg, pulse 140 beats/minute, hematocrit 0.59, serum protein 46 g/l, and serum albumin 23 g/l. An IgG-kappa paraprotein was demostrated (7.82 g/l) and urine was negative for protein. Crystalloid and colloid don't increased the blood pressure but resulted in anasarca, with a total of 11 litres of intravenous fluids. Therapy with frozen plasma, 1.000 units of C1q inhibitor, corticosteroids, antihistamines and antifibrinolytic agents was unsuccessfull. The administration of dopamine, norepinephryne and epinephryne was inefective. The patient died at the 48 hores.

Only a few cases have been reported, all had IgG paraprotein. The pathophysiology is unknown, but is possible that the paraprotein may be responsible for the increased capillary permeability. Despite efforts to resuscitate the patients during an acute attack, the syndrome is often fatal. The variable course of systemic capillary leak syndrome and the unpredictability and self-limited nature of attacks cloud assessment of therapeutic intervention.

VASKULITIS AND INTENSIVE CARE MEDICINE: SUBSTITUTION OF FACTOR XIII (FXIII) IS ESSENTIAL IN THE THERAPY OF SEVERE HENOCH-SCHÖNLEIN PURPURA (HSP) WITH INTESTINAL HAEMORRHAGE

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Objectives: HSP, a systemic leucocytoclastic vasculitis and anaphylactoid purpura can be accompanied by abdominal pain and life-threatening intestinal bleeding. Recently we could disclose, that these patients develop severe FXIII-deficiency and immense haemorrhagic oedema of the intestinal wall. By the following case report we will demonstrate and discuss the importance of FXIII-deficiency for pathogenesis, therapy and outcome in HSP.

Case report: A 41 year old man developed typical skin manifestations of HSP following an episode of severe (biliary ?) pancreatitis and percutaneous draining of a pancreatic pseudocyst. Two days later he had a paralytic ileus with immense hemorrhagic wall-oedema and massive dilatation of the small bowel. He got fever up to 39.5 °C and developed severe gastrointestinal haemorrhage (blood transfusions necessary). The coagulation data disclosed a severe FXIII-deficiency (activity 34%), whereas Quickvalues, platelet count and ATIII-level were found to be within the normal range. Elastase was markedly elevated. Substitution of FXIII to normal levels leeds to the cessation of bleeding symptoms and abdominal pain, later resulting in a *restitutio ad integrum*.

Conclusions: HSP with intestinal involvement is a life-threatening vasculitis, in which careful and frequent examinations of the coagulation system, especially of FXIII are necessary. Detailed analysis of the coagulation data suggest, that the severe FXIII-deficiency is due to a specific degradation by proteolytic enzymes (like elastase) as well as consumption within the immense haemorrhagic oedema of the intestinal wall. Knowing these facts, even most severe cases of HSP with intestinal involvement can be successfully treated by substitution of FXIII.

Nurging care and results from two years experience in continuous arteriovenous hemofiltration

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The purpose of the present work is to provide some information about the nursing care and results from our experience in continous arteriovenus hemofiltration (CAVH).

CAVH is an extracorporeal technique, especially applicable in the critically ill patients, for disturbances, and for the control of azotemia.

We used this method in 30 critically ill patients 16 men and 14 women ages from 32–74 who had sepsis – ARF 10 congestive heart failure 8 postoperative multiple organ failure 8 and polytrauma 4.

This method was applied to these patients from 24 to 168 hours. 20 % of the patients recovered completely their kidney function, 50 % improved their kidney function and 30 % died.

We concluded therefore that this method was very effective for the critically ill patients to whom it was applied, but it requires excellent and continuous nursing care; Under the above mentioned circumstances the method works effectivelly.

DIALYSIS WITH BIOINCOMPATIBLE AND BIOCOMPATIBLE DIALYZER MEMBRANES IN RATS WITH ACUTE RENAL FAILURE:

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An animal model with rats undergoing a dialysis procedure was designed to test the hypothesis that recovery from ischemic acute renal failure (AIRF) may be affected by the type of membrane used in hemodialysis. Male Sprague Dawley rats were allocated to 2 groups: in group I, (n=48) AIRF was inducted by bilateral renal artery clamping for 60 min. Group II (n=48) rats underwent a sham procedure. In each group, rats were dialyzed twice (4th and 8th day) with either a Cuprophan (Cupro), a Hemophan (Hemo) or a PAN (AN69) minidialyser or stayed nondialyzed (no HD). Renal function was monitored daily by measuring urea and creatinine values and by two single shot inulin clearances on the days following dialysis. Additionally hemolytical activity of complement was determined.

Inulin clearance on day 5 was reduced significantly but there was no difference in the degree of decrement in glomular filtration rate (GFR) between dialyzed and undialyzed rats, nor between the dialyzed animals with different membranes (GFR: no HD: 0.78±0.54; Cupro: 0.84±0.9; Hemo: 0.82±0.28; AN69: 0.77±0.31). The evaluation of renal function by day nine revealed significant recovery for all AIRF-groups compared to day 5 ($p<0.001$), irrespective of wether they underwent dialysis or not, or the type of dialysis membrane. Complement activation could be detected in all dialyzed groups but no statistical differences between the animal groups dialyzed with different membranes were noticed. Our findings refute the hypothesis that in AIRF exposure to complement-activating cellulosic membranes impairs the recovery of renal function in rats.

CHANGES IN SERUM RENIN-ANGIOTENSIN SUBSTANCES AFTER CEREBRAL ANEURYSMAL OPERATION

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Objectives: We evaluated the changes in plasma renin-activity (PRA) and serum concentrations of angiotensin I and II, that were associated with renal tubular function after cerebral aneurysmal surgery in the ICU.
Methods: Twenty patients without DM or renal disease (Hunt & Kosnik, Grade II~IV) were the subjects of this study. Urinary Na, NAG, B_2-microglobulin, PRA, and serum concentrations of angiotensin I and II were evaluated on the 1st, 3rd, 7th and 14th days after the aneurysmal operation.
Results: We observed high values of urinary NAG and B_2-microglobulin on the 1st day and further significant increases until the 7th day. PRA and serum concentrations of angiotensin I and II showed significant increases after the 3rd day.
Conclusions: Significant increases in urinary NAG and B_2-microglobulin suggested an insult to the proximal renal tubules after the aneurysmal operation. The increases in PRA and serum concentrations of angiotensin I and II occured after the 3rd day during the cerebral vasospasms period. We speculated that the release of renin-angiotensin substances during vasospasm induces vasoconstriction of the efferent glomerular arteriole, which might cause renal tublar insult.

EFFECT OF PERIOPERATIVE PARAMETERS ON THE OUTCOME OF KIDNEY TRANSPLANTATION

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Objective: To examine how influence the preoperative parameters of the recipient to the transplanted kidney function in every day practice.
Design: prospective, multifactorial study
Patients: 150 patients who underwent first cadaver kidney transplantation in our unit between January and December in 1994 were involved.
The recipients were divided into 3 Groups: *Group I:* non functioning graft (n=27); *Group II*: delayed graft function (n=59); *Group III*: good graft function (n=64). The grouping criteria were: a/ haemodialysis in the first 5 postoperative days, b/ diuresis in the 1st postoperative day, c/ serum creatinine difference between the 1st postoperative day and the preoperative level.
All of the parameters were involved into the examination which we measure in our every day practice.
Results: The preoperative haematocrit level differed significantly between Group I. (0.36) and Group II. and III. (0.31 and 0.30, $p< 0.05$). Intraoperative significant differences were found between the different groups in systolic blood pressure (Group I. 110 Hgmm, Group II. 140 Hgmm, Group III. 165 Hgmm, $p<0.05$), mean arterial pressure (Group I. 66 Hgmm, vs. Group II. 83 Hgmm $p<0.05$, vs. Group III. 116 Hgmm $p<0.001$), and pulse-amplitude and rate-pressure product too. The second warm ishaemic time in Group III. was significantly shorter than in the other two groups (Group III. 39 min. vs. Group II. 43 min. $p< 0.05$, vs. Group I. 49 min. $p< 0.001$). The rejection rate was higher in the first 5 days in the patients with non-functioning grafts (Group I. 53% and Group II. 24% vs. Group III. 12 %). The other examined parameters have not differed significantly.
Conclusion: According to our results the success of the kidney transplantation is multifactorial. The most important factors of this relationship are: the perioperative fluid-balance, the maintenance of adequate perfusion blood pressure during the operation, good surgical technique and immunological problems.

INCIDENCE AND PROGNOSIS OF RENAL DYSFUNCTION, AFTER ELECTIVE CARDIAC SURGERY.

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Objectives: The study was aimed at analysing the incidence of renal dysfunction following cardiac surgery and its prognosis (acute renal failure, post-operative morbidity and mortality).
Methods: Two hundred and thirty seven patients (aged from 28 to 90) were consecutively operated on for elective cardiac surgery and retrospectively included in the study. Patients with preoperative infections and operated on in emergency were excluded. Each patient had preoperative invasive cardiac investigation with angiography and calculated ejection fraction (EF). Anaesthesia, cardiopulmonary bypass (CPB) and cardiac arrest management were similar in all patients. General body temperature was reduced to 28 - 30 ° C. Renal dysfunction was defined as a 20 % increase from baseline of serum creatinine. Demographic data, ASA, treatments, pre-operative creatinine level, CPB and clamping (AXC) times, intra and postoperative use of inotrope, serum lactate level before surgery, at the end of CPB, at the time of admission in intensive care unit (ICU) and on post operative day one and APACHE score were compared in patients with or without renal dysfunction using ANOVA test for repeated mesures and $\chi 2$ when appropriate. Data are expressed as mean $\pm$ SD. P value less than 0.5 was considered statistically significant .
Results: Thirty two patients (13,5 %) suffered from renal dysfunction. Age, serum lactate level at the end of CPB, at admission in ICU, at POD1 and APACHE level at admission in ICU, intra-operative use of inotropes were statistically different in patients with or without renal dysfunction ($p<0,05$). Mortality rate was statistically different in patients with or without renal dysfunction (12,5 % and 0 %, respectively, p=0,001). Incidence of acute renal failure following renal dysfunction was 6,2 % (2 patients required hemodialysis).
Conclusions: Although our criteria for defining renal dysfunction were very sensitive, the incidence of renal dysfunction following elective cardiac surgery was lower than communly accepted in the litterature (1). However renal dysfunction appeared significantly associated with a poor prognosis.
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