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Abstracts

44. Jahrestagung der Österreichischen Gesellschaft für Pneumologie

4. Jahrestagung der Österreichischen Gesellschaft für Thoraxchirurgie

14.–16. Oktober 2020

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Fälle des Jahres 2020 Cases of the year 2020

F01

SLE-assoziierte interstitielle Lungenerkrankung, COVID-19 oder doch etwas anderes?

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Patientencharakteristik, Anamnese, Symptome: Eine 44-jährige Patientin mit systemischem Lupus erythematodes wird von der rheumatologischen Ambulanz im Frühjahr 2020 zur pneumologischen Begutachtung zugewiesen. Die Vorstellung erfolgt bei Verdacht auf pulmonale Hämorrhagie mit diffusen, bilateralen milchglasartigen Eintrübungen in einem rezenten CT-Thorax. Anamnestisch klagt die Patientin über seit einigen Wochen bestehenden Reizhusten mit intermittierenden Hämoptysen sowie zunehmende Belastungsdyspnoe. Vorbekannt ist ein Zustand nach Pulmonalembolie infolge eines Antiphospholipidsyndroms, weshalb Xarelto® eingenommen wird. Hinsichtlich des SLE ist die Patientin unter Hydroxychloroquin klinisch stabil und weist laut rheumatologischer Einschätzung keine Aktivitätszeichen der Erkrankung auf.

Ein initialer Therapieversuch mit Kortison bei Verdacht auf Lupusinduzierte ILD verläuft nach einer kurzfristigen Besserung der Beschwerden frustan. Die Symptome nehmen in weiterer Folge einen progredienten Verlauf.

Diagnostik und Diagnose: In der weiteren Abklärung zeigt sich lungenfunktionell primär eine restriktive Ventilationsstörung mit verminderter Oxygenierung und CO-Diffusion. Die Patientin wird schließlich einer Bronchoskopie mit bronchoalveolärer Lavage unterzogen, wobei sich das Bronchialsystem makroskopisch unauffällig darstellt. Zytologisch weist die BAL keine Lymphozytose, welche zu einer ILD bei SLE passen würde, sondern eine Neutrophilie auf. Es erfolgte eine erweiterte Erregerdiagnostik u. a. auf Pneumocystis jirovecii, Tuberkulose, respiratorische Viren und in Anbetracht des aktuellen Zeitgeschehens auch auf das SARS-CoV-2. Schlussendlich hat die PCR-Analyse des Bronchialssekrets Bordetella pertussis ergeben.

Die Patientin ist beruflich als Kindergärtnerin tätig, wodurch ein gewisses Expositionsrisiko gegeben ist. Eine Schutzimpfung gegen Pertussis wurde im Kindesalter durchgeführt, aber nicht mehr aufgefrischt. Die pulmonale Hämorrhagie dürfte letztendlich eine Folge der OAK und des protrahierten Reizhustens sein.

Therapie: Nach einer oralen Antibiose mit Azithromycin zeigen sich die alveolären Infiltrate im Verlauf signifikant rückläufig. Subjektiv berichtet die Patientin zuletzt über deutliche Besserung der respiratorischen Beschwerden, welche sich auch in einer gebesserten Lungenfunktion widerspiegelt.

F02

Nichts geht über eine gute Anamnese!

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Patientencharakteristik, Anamnese, Symptome: Im April 2020 präsentierte sich ein, bis dato gesunder, 28-jähriger Mann mit Kopfschmerzen und Fieber bis 38 Grad auf der Notaufnahme. Es bestand kein Schwindel, keine sensomotorischen Defizite, kein Husten, keine Geruchs- oder Geschmackstörungen, keine Atemnot, keine thorakalen oder abdominellen Beschwerden.

Diagnostik und Diagnose: Ein SARS-CoV-2 PCR Test war negativ. Im Thorax-Röntgen etwas verstärkte peribronchovaskuläre Gerüstzeichnung zentral wie bei Bronchitis/Peribronchitis, keine umschriebenen Infiltrate oder Pleuraergüsse. Er wurde mit symptomatischer antipyretischer Therapie nach Hause entlassen. Eine Woche später präsentiert sich der Patient mit zunehmender Atemnotsymptomatik, SpO₂ 70 % unter 15 L Sauerstoff. Übersichtsradiologisch ausgeprägte ARDS-typische bilaterale Infiltrate. Sofortige Aufnahme auf die Intensivstation, Intubation und maschinelle Beatmung. In der Bronchoskopie zeigte sich keine obstruktive Sekretbildung oder Blutung. Bei weiterhin bestehendem schweren ARDS, Notwendigkeit zur Anlage einer venovenösen extrakorporalen Membranoxygenierung (VV-ECMO). Laborchemische Befunde bei ICU-Aufnahme: Leukozyten 16 g/L, Lymphozyten 6 %, CRP 335 mg/L, PCT 8,38 ng/mL, Kreatinin 1,7 mg/dL, eGFR 54 mL/min, Bilirubin gesamt 1,6 mg/dL, Interleukin-6 1069 pg/mL, (1->3)-beta-D-Glukan und Galactomannan im Normbereich. Legionellen- und Pneumokokken-Schnelltest, Blutkulturen und Harnkulturen, Virus-PCR inklusive HIV im EDTA-Blut, PCR aus BAL-Flüssigkeit auf Bakterien, Viren und Aspergillus Puumala und Hantaan Tests, sowie mehrmalige SARS-CoV-2 PCR waren negativ.

Therapie: Es wurde eine empirische antibiotische Therapie mit Piperacillin/Tazobactam und Azithromycin eingeleitet. Fremdanamnestisch hält der Patient seit Jahren Nutztiere (u. a. Lamas, Ziegen, Gänse und Tauben). Aus diesem Grund Erweiterung der Diagnostik um eine Chlamydophila psittaci Blut-PCR und Serologie. Beide Tests lieferten ein positives Ergebnis, sodass die endgültige Diagnose einer Psittakose gestellt werden konnte. Unter der antibiotischen Therapie besserte sich der Zustand des Patienten rasch. Insgesamt verbrachte der Patient 13 Tage auf der Intensivstation, davon 11 Tage intubiert, 9 Tage an der ECMO. Nach weiteren 10 Tagen auf der Normalstation kann der Patient bei bestem Wohlbefinden entlassen werden.

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F03

Dyspnoe als Leitsymptom einer inkarzierten rechtsseitigen Bochdalek-Hernie mit Kolonperforation bei einer erwachsenen Patientin

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Patientencharakteristik, Anamnese, Symptome: Eine 40-jährige Patientin wurde nach plötzlichem Auftreten von Dyspnoe, Tachypnoe und rechtsthorakalen Schmerzen mit Ausstrahlung in den rechten Oberbauch vorstellig. Die Anamnese bezüglich Traumas oder chronischen Vorerkrankungen war unauffällig.

Diagnostik und Diagnose: Die Blutgasanalyse zeigte eine Hypoxie. Laborchemisch fand sich lediglich eine isolierte, milde Leukozytose. Die Thoraxauskultation ergab rechtsseitig verminderte Atemgeräusche. Die Computertomografie des Thorax wies einen rechtsseitigen hinteren Zwerchfeldefekt mit intrathorakaler Hernierung des Kolon ascendens und rechtsseitigen Pneumothorax mit Mediastinalshift nach links aus. Bildgebend bestand mithin der Verdacht auf eine Kolonperforation und eine Bochdalek-Hernie.

Differentialdiagnostik: Obwohl Bochdalek-Hernien bei Erwachsenen selten sind, müssen sie differentialdiagnostisch bei Patienten mit Dyspnoe berücksichtigt werden. Eine intrathorakale Kontamination nach bakterieller Translokation oder Hohlorganperforation kann zur Entwicklung von Pleuraempyemen führen. Die sorgfältige intraoperative Lavage und Drainage der Thoraxhöhle hat deshalb in diesen Fällen große Bedeutung.

Therapie: Es erfolgte eine Notfalllaparotomie, welche die Diagnose bestätigte. Ein 2 cm langer Zwerchfeldefekt mit inkarziertem und perforiertem Kolon ascendens wurde erkannt. Unter Erweiterung der Bruchpforte konnte das Kolon nach intraabdominell reponiert werden. Aufgrund von ischämischen Veränderungen sowie der Kolonperforation wurde eine rechtsseitige Hemikolektomie mit Anlage einer Seit-zu-Seit-Ileotransversostomie erforderlich. Nach ausgedehnter abdominaler und transdiaphragmaler thorakaler Lavage wurde eine Büllau-Drainage platziert, Zwerchfeldefekt und Bauchdecke wurden mittels Naht verschlossen. Am 13. postoperativen Tag wurde aufgrund eines rechtsseitigen Pleuraempyems nach diagnostischer VATS eine anterolaterale Thorakotomie mit anschließender Pleuradekortikation zur Sanierung erforderlich. Die Patientin erholte sich letztlich gut und wurde am 12. postoperativen Tag nach Hause entlassen.

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F04

Organisierende Pneumonie nach COVID 19 Infektion

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Patientencharakteristik, Anamnese, Symptome: Ein 49-jähriger Mann hatte im März 2020 einen respiratorischen Infekt mit Fieber und trockenem Husten. Eine SARS CoV 2 PCR wurde während der akuten Krankheitsphase nicht durchgeführt, da die Kriterien der Falldefinition damals nicht erfüllt wurden. Trotz Abheilen der akuten Symptome blieben dem Patienten persistierende Dyspnoe bei geringer Belastung.

Diagnostik und Diagnose: Bei auffälligem Thorax-Röntgen zeigte die Computertomographie oberlappenbetonte milchglasartige Veränderungen sowie unterlappenbetonte Konsolidierungen und Bronchiolektasien, weswegen der Patient zur weiteren Abklärung an die 2. Medizinische Abteilung, Klinik Ottakring überwiesen wurde. Funktionell zeigten sich eine grenzwertige restriktive Ventilationsstörung ohne Hinweis auf Obstruktion, sowie eine erniedrigte Diffusionskapazität. In der Blutgasanalyse war eine milde Hypoxämie und eine ausgeprägte Hypokapnie zu sehen. Ein nasopharyngealer SARS CoV 2 Abstrich ergab einen negativen Befund, die Untersuchung der Serum-Antikörper fiel jedoch positiv aus, passend zu der Verdachtsdiagnose einer abgelaufenen COVID 19 Infektion. Am 27.04.2020 zeigte sich in der transbronchialen Parenchym-Biopsie aus dem rechten Oberlappen Granulationsgewebe in den Alveolen und Bronchiolen mit Masson Körpern – typisch für eine organisierende Pneumonie [1]. Es konnte in der Lavage kein Keimnachweis erfolgen. In Zusammenschau aller Befunde wurde die Diagnose einer organisierenden Pneumonie nach COVID 19 Infektion gestellt.

Therapie: In der Kontrolle am 04.05.2020 berichtete der Patient über eine spontane Besserung der Beschwerden. Ebenso war es zu einer Verbesserung des Gasaustausches und der Lungenvolumina gekommen, sodass auf eine systemische Kortisontherapie verzichtet wurde. Zusammenfassend handelt es sich um den ersten Fall einer histologisch gesicherten organisierenden Pneumonie nach Covid-19.

Literatur

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F05

Bronchiale Anthrakofibrose bei einem Jugendlichen mit Tuberkulose

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Patientencharakteristik, Anamnese, Symptome: Ein 17-jähriger Jugendlicher somalischer Herkunft ohne Exposition gegenüber Zigaretten- und Brennstoffrauch oder Mineral- und Kohlenstaub präsentierte sich mit Husten, Brustschmerzen, intermittierendem Fieber und Gewichtsverlust (etwa 8 kg).

Diagnostik: Im Labor fanden sich Anämie (Hb 8,9 mg/dl), Thrombozytopenie (122.000/μl), erhöhte Aminotransferasen und LDH, sowie erhöhte Entzündungswerte (CRP 78 mg/l, Ferritin 4918 ng/ml). Thoraxröntgen, CT und MRT zeigten eine Konsolidierung des rechten Mittel- und Unterlappens, prominente Hilus-Lymphknoten sowie knotige, bis zu 16 mm große Infiltrate in Lunge, Leber, Milz, Meningen und rechter Niere. Der TST war negativ, der IGRA positiv. Bronchoskopisch zeigte sich eine massive Obstruktion der Segmentbronchien des rechten Mittel- und Unterlappens durch käsig-impaktiertes Sekret, eine schwarz verfärbte Schleimhaut im Sinne einer Anthrakofibrose sowie endobronchial eingebrochene, verkäsende Lymphknoten. Die BAL bestätigte eine pansensible Tuberkulose.

Differenzialdiagnose: Es fanden sich keine Hinweise für andere infektiologische, immunologische oder rheumatologische Erkrankungen. Eine Knochenmarkspunktion zeigte eine hämophagozytische Lymphohistiozytose, jedoch keine maligne Infiltration.

Therapie: Der Patient erhielt eine Therapie mit Rifampin, Isoniazid, Pyrazinamid, Ethambutol, sowie Prednisolon. Bei steigenden Entzündungswerten wurde die Therapie um

Abb. 1 | F05

Linezolid und Meropenem erweitert. Insgesamt erfolgten drei Versuche einer bronchoskopischen Re-Kanalisation, welche teilweise erfolgreich waren. Weitere Verlaufskontrollen zeigten einen Rückgang der Anthrakofibrose, des Aszites sowie eine Verkleinerung der Tuberkulome, jedoch keinen signifikanten Rückgang der endobronchialen Massen. Der Patient ist aktuell noch in stationärer Behandlung.

F06

Blinder Passagier

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Patientencharakteristik, Anamnese, Symptome: Eine 47-jährige Patientin stellte sich in der Notaufnahme aufgrund von akut aufgetretener Dysarthrie vor. Zudem beschrieb sie chronisch rezidivierende Schmerzen linksthorakal. Anamnestisch war eine rezente internistische Begutachtung bei bekannter arterieller Hypertonie sowie NIDDM 2 unauffällig gewesen. Eine neurologische Begutachtung ergab bis auf eine verwaschene Sprache (a.e. durch eine hypertensive Entgleisung bedingt) keine Auffälligkeiten.

Diagnostik und Diagnose: Mittels Akut CCT konnte eine rezente Blutung oder Ischämie weitgehend ausgeschlossen werden. Eine Carotisangiographie ergab keinen Hinweis auf einen rezenten Verschluss oder eine relevante Stenose der intra- oder extrakraniellen Gefäße. Auffallend im Rahmen dieser Untersuchung war jedoch eine geknickt wirkende Aorta sowie eine Komprimierung der Vena brachiocephalica sinistra durch einen Mediastinalshift nach rechts. Als Grund dafür wurde eine knapp 15 × 9 × 10 cm große Raumforderung des linken Hemithorax angegeben.

Ein CT Thorax bestätigte eine weichteildichte Raumforderung ohne Kontrastmittelaufnahme oder Gefäßzeichnung mit guter Abgrenzbarkeit zur linken Pulmonalarterie. Es erfolgte eine Ultraschall-gezielte Stanzbiopsie, welche histologisch keine Malignität ergab. Es wurde daher primär die chirurgische Resektion geplant.

Differentialdiagnostisch kamen anhand des radiologischen Bildes ein N. bronchi, ein abgekapselter Erguss mit erhöhten Dichtewerten, eine pulmonale Echinokokkose, eine bronchogene Zyste oder ein – letztlich bewiesener – gutartiger Tumor infrage. Serologisch konnte eine Echinokokkose ausgeschlossen werden.

Therapie: Therapeutisch war aufgrund der Tumorausdehnung eine operative Sanierung Mittel der Wahl. Bei intraoperativ nur wenig erhaltenem Restparenchym erfolgte die linksseitige Pneumonektomie. Die Histologie bestätigte die Diagnose eines Neurilemmoms (Schwannoms). Da der immunhistochemische Stammzellmarker CD117 (c-KIT) negativ war, wurde von einer Stammzellfaktor-Rezeptornachfärbung abgesehen. Eine Tumornachsorge ist 6-monatlich für die nächsten 5 Jahre geplant.

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F07

Der entscheidende Durchbruch

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Patientencharakteristik, Anamnese, Symptome: Ein 52-jähriger männlicher Patient stellte sich in unserer Ambulanz mit dem Leitsymptom „Rückenschmerzen links“ seit drei Wochen vor. Am linken thorakolumbalen Übergang findet sich eine ca. 20 × 10 cm messende größenprogrediente paravertebrale Raumforderung, die palpatorisch prallelastisch und druckdolent scheint. Der Patient berichtet von 15 kg Gewichtsverlust in den letzten zwei Monaten. Anamnestisch besteht nur eine abdominelle Aorten-Thrombose.

Diagnostik und Diagnose:

1. Labor:
2. Leu 15.1 G/L, Hb 10.5 g/dL, CRP 473.34 mg/L
3. CoVid-19: neg.
4. CT-Thorax/Abdomen: Im posterioren Unterlappensegment zeigt sich zusätzlich eine umschriebene, zentral hypodense (durchschnittlich 20 HU) Retention. Diese setzt sich über die laterodorsale Thoraxwand und den 11. ICR in eine ausgedehnte subkutane Retention mit randständigen KM-Enhancement und geringen Luftsinschlüssen fort. Die max. Ausdehnung dieser Retention beträgt etwa 12 × 4,7 × 10,5 cm.
5. Blutkultur: kein Wachstum
6. Bakteriologie Pleuraerguss:
7. Fusobacterium nucleatum, Parvimonas micra
8. Ziehl-Neelsen: negativ
9. Histologie Lunge: Lungenwedgeresektat mit einer nekrotisierenden akuten Bronchopneumonie mit Abszessbildung, Organisationszeichen und fibrosierender begleitender Pleuritis bei pulmonaler Aktinomykose (Oberlappen links).

Differenzialdiagnostik: TBC Ausschluss

Therapie:

Abb. 1 | F07

1. Thoraxchirurgie:
Abszess-Inzision, Ausräumung, Rippenteilresektion
Anterolaterale Thorakotomie links, Keilresektion des linken OL's, Lingulektomie, Lobektomie linker UL
2. Pulmologie:
Stationär:
Pen G (10–12 Mio Einheiten aufgeteilt in 3 bis 4 Einzeldosen)
Therapie für 2 Wochen
Anschließend:
Amoxicillin 1 g 3 × tägl. für mind. 3 Mon.
CT-Verlaufs kontrolle nach drei Monaten

Literatur

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F08

Ösophago-pulmonale Fistel bei Non Hodgkin Lymphom der Wirbelsäule

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Patientencharakteristik, Anamnese, Symptome: Wir berichten von einem 70-jährigen Patienten mit neu aufgetretenem produktivem Husten, rezidivierenden Fieberschüben und Nachtschweiß über 4 Wochen. An Vorerkrankungen sind ein art. Hypertonus, ein chron. Nikotinabusus mit 50PY sowie ein Alkoholabusus (5 Standardgetränke pro Tag) bekannt. Es liegt kein erinnerliches Trauma vor; bisher keine Interventionen thorakal durchgeführt.

Diagnostik und Diagnose: Computertomografisch wird der Verdacht einer abszedierenden Pneumonie mit fraglicher Fistelbildung zum Ösophagus geäußert (Abb. 1). In der Gastroskopie erhärtet sich dies bei ca. 26 cm ab Zahnreihe intubierbarer Fistelöffnung, welche bei appliziertem Kontrastmittel eine Anreicherung eines Fistelbaus mit Verbindung in das rechte Bronchialsystem darstellt.

Abb. 1 | F08 CT-Thorax nach endoskopischer Applikation von Kontrastmittel über den Fistelkanal

Therapie: Im Rahmen einer rechtsseitigen Thorakotomie erfolgte eine offene Wedge-Resektion des Oberlappens sowie Mittellappens rechts, wobei sich intraoperativ histologisch der Verdacht einer Lymphominfiltration ergab. Die Fistulierung zur Speiseröhre wurde mittels Vena azygos-Patch gedeckt und übernäht. Eine protektive endoluminale VAC-Anlage konnte bereits am 4. postoperativen Tag entfernt werden. Histologisch bestätigte sich ein aggressives Non-Hodgkin-Lymphom der B-Zellreihe, speziell eines diffusen großzelligen B-Zell-Lymphoms (zentroblastisch-polymorph), Nicht-Keimzentrumstyp nach Hans-Klassifikator. Von onkologischer Seite wurde einer Therapie mittels R-CHOP initiiert bei postoperativ chirurgisch unauffälligem Status.

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F09

Allergie mit Biss

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Patientencharakteristik, Anamnese, Symptome: Ein 70-jähriger Patient wird an unserer Abteilung vorstellig, mit einer neu aufgetretenen akuten allergischen Reaktion. Als Sofortmaßnahme werden Kortison und ein Antihistaminikum parenteral verabreicht. Eine erweiterte anamnestische Allergensuche bleibt negativ. Am Vortag hat der Patient Nieren gegessen und dazu ein Glas Weißwein getrunken. Der Patient wurde bereits anderenorts wegen ähnlicher Symptome abgeklärt, jedoch ohne Ergebnis. Er ist mit einem Allergie-Notfallset ausgestattet. Nach 24 h Observanz wird der Patient entlassen. Eine ambulante Kontrolle wird vereinbart.

Diagnostik und Diagnose: Im Zuge der ambulanten Abklärung, inklusive Komponentendiagnostik, fällt eine Sensibilisierung gegen den Zucker Alpha-Gal auf. Der durchgeführte RAST auf Rindfleisch, Schweinefleisch und Hammelfleisch ergibt ebenfalls einen positiven Sensibilisierungsnachweis. Die Anamneseerhebung bezüglich rezenter Zeckenbisse ist positiv. Endgültige Diagnose: Alpha-Gal Syndrom. Dies ist eine allergische Sofortreaktion auf das Oligosaccharid Galactose-alpha-1,3-Galactose kurz Alpha-Gal [1, 2]. Eine Sensibilisierung erfolgt durch einen Zeckenbiss [3]. Beim nächsten Verzehr von rotem Fleisch (Rind, Schwein, Hammel, Wild, vor allem Innereien) kommt es dann, verdauungsbedingt zeitverzögert, zur allergischen Reaktion.

Therapie: Als Therapie gilt der Verzicht auf rotes Fleisch und Gelatineprodukte sowie das Vermeiden von weiteren Zeckenbissen. Das Allergie-Notfallset soll mitgeführt werden [3].

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F10

Von der Diagnose einer Pneumonie zur Rituximab-Therapie – MPO-ANCA-assoziierte Vaskulitis mit pulmonaler und renaler Beteiligung

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Patientencharakteristik, Anamnese, Symptome: Im Juli 2020 wird eine 62-jährige Patientin vom niedergelassenen Pneumologen an unsere Abteilung überwiesen. Die Aufnahme erfolgt aufgrund einer vor ca. zwei Wochen suspeziierten Pneumonie, welche mit Amoxicillin-Clavulansäure behandelt wurde. Im Aufnahmegespräch berichtet die Patientin über deutliche Abgeschlagenheit und Belastungsdyspnoe (Stiegen steigen) bei bisher altersentsprechender sehr guter Leistungsfähigkeit. In der Anamnese sind eine atypische Pneumonie vor einem Jahr, eine primär biliäre Cholangitis (ED 2019 im Rahmen der Pneumonie) und eine substituierte Hypothyreose auffällig. In den von uns initial erhobenen Laborbefunden zeigen sich moderat erhöhte Entzündungsparameter (CRP 5,79 mg/dl, Leukozyten 15,1 G/L), woraufhin die antibiotische Therapie auf Azithromycin 500 mg umgestellt wird. Eine durchgeführte Computertomographie des Thorax zeigt bipulmonale fleckige Milchglasstrübungen, peribronchovaskuläre Verdichtungen mit teils positivem Pneumobronchogramm und hiläre sowie mediastinale Lymphadenopathie. Zur Abklärung der dementsprechend im Raum stehenden Differenzialdiagnosen einer Sarkoidose, Vaskulitis bzw. eines Lymphoms werden eine Bronchoskopie mit transbronchialer Lymphknotenbiopsie (LK11L, LK11R, LK7 und LK4R) und detaillierte laborchemische Untersuchungen durchgeführt.

Diagnostik und Diagnose: Im Verlauf kommt es zu einer Verschlechterung der Nierenfunktion (Creatinin 1,77 mg/dl) und einer Proteinurie (1,4 g/l), ansteigenden Entzündungsparametern (CRP, Leukozyten, BSG) und einem positiven Ergebnis für MPO-ANCA (27 IU/ml). Die histopathologische Aufarbeitung der Lymphknotenbiopsien zeigt ausgeprägte reaktive Zell- und Kernveränderungen ohne Hinweis für eine Infiltration mit malignen Zellen. Die erhobenen Befunde erhärten den Verdacht auf eine MPA-ANCA-assoziierte Vaskulitis mit pulmonaler und renaler Beteiligung. Die Patientin wird an die Universitätsklinik für Nephrologie transferiert, wo komplikationslos eine Nierenbiopsie durchgeführt wird. Hierbei zeigt sich das histologische Bild einer Pauci-immunen Glomerulonephritis mit Halbmondbildungen und Schlingennekrosen in 50 % der Glomeruli, vereinbar mit der Diagnose einer MPO-ANCA-assoziierte Vaskulitis.

Therapie: Nach entsprechender Aufklärung der Patientin beginnen wir mit der Therapie mit Rituximab 1000 mg (aktuell zwei Gaben erhalten, dritte Gabe geplant) sowie Methylpred-

nisolon 60 mg/Tag (Tapering auf aktuell 30 mg/Tag). Erfreulicherweise reagiert die Patientin umgehend im Sinne einer deutlichen Verbesserung der Lungenfunktion, des Allgemeinzustandes sowie laborchemisch (MPO-ANCA aktuell 6,4 IU/ml, Crea 1,46 mg/dl, Proteinurie 250 mg/l, CRP neg.).

F11

Lungentransplantation bei COVID-19-assoziiertem ARDS in einer PCR-positiven Patientin

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Patientencharakteristik, Anamnese, Symptome: Am 21. März 2020 wurde eine 44-jährige Patientin ohne relevante Vorerkrankungen am Klinikum Klagenfurt positiv auf SARS-CoV-2 getestet und stationär aufgenommen (Tag 0). Da sich ihre respiratorische Situation verschlechterte, wurde sie am Tag 7 intubiert. Bei weiterer Progression wurde am Tag 13 eine veno-venöse (vv) femoro-femorale extracorporale Membranoxygenierung (ECMO) implantiert. Die Verabreichung von Immunglobulinen, Tocilizumab, Lopinavir, Rekonvaleszenten-Plasma-Infusionen sowie wiederholte Bauchlagerungen führten zu keiner Besserung des respiratorischen Zustandes. Um die Möglichkeit einer Lungentransplantation zu evaluieren, wurde die Patientin am Tag 48 an die Medizinische Universität Wien transferiert.

Diagnostik und Diagnose: Im CT zeigten sich beidseitige Konsolidierungen, nekrotische Areale, sowie Thrombosen der kleineren und mittleren Arterien. Die Patientin war in ihrer respiratorischen Funktion vollkommen abhängig von der vv-ECMO (Tidalvolumina bei 50 ml bei 25 Peak, 8 PEEP). PCR-Testungen auf SARS-CoV-2 waren wiederholt positiv, allerdings mit hohen „cycle-thresholds“, sodass vermutet wurde, dass es sich nur um residuale Viruspartikel ohne aktive Infektion handeln könnte. Um eine persistierende COVID-19 Infektion auszuschließen, wurden daher „Vero-Cell“-Kulturen durchgeführt, welche nach einer Woche Inkubation negativ waren. Es war evident, dass bei der Patientin durch konservative Therapien keine Heilung mehr erzielt werden kann, und eine Lungentransplantation wurde als einzige verbliebene Therapieoption gesehen.

Abb. 1 | F11

Therapie: Die Patientin wurde nach insgesamt fünf Wochen „bridging“ an der vv-ECMO doppelungentransplantiert und konnte Ende August das Krankenhaus verlassen.

Dieser Fall stellt die weltweit erste Lungentransplantation in einem Patienten mit COVID-19-assoziiertem ARDS und positiven PCR-Ergebnissen dar. Die Möglichkeit einer Lungentransplantation kann bei COVID-Patienten unter folgenden Umständen in Betracht gezogen werden:

- Einzelorganversagen in jungen Patienten
- Ausschöpfung alternativer Therapieoptionen
- negative PCR oder bei hohen „cycle threshold“-Werten negative Vero Kultur

Der ausführliche Bericht dieses Falles wird in Kürze im Journal „The Lancet Respiratory Medicine“ veröffentlicht.

F12

Anti-IL5/Rituximab Therapie bei therapieresistanter Eosinophiler Granulomatose mit Polyangiitis

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Patientencharakteristik, Anamnese, Symptome: Herr H., geb. am 26.04.2001, präsentierte sich im Alter von 15 Jahren erstmalig mit Rhinorrhoe, Pruritis, einem schuppigen streckseitenbetonten Exanthem, Niesen und verstärktem Tränenfluss. Der Patient entwickelte im weiteren Verlauf Cephalaea, temporale Gesichtsfeldeinschränkungen und eine erschwerte Nasenatmung. Bereits als Kleinkind bestanden intermittierende Episoden mit Husten, Auswurf, Kurzatmigkeit und expiratorischem Giemen.

Diagnostik und Diagnose: Laborchemisch zeigte sich 2018 eine absolute Eosinophilie mit 1,9 G/L. Im Nasennebenhöhlen CT kamen eine weichteildichte Auskleidung der Nasenhaupt- und sämtlichen Nasennebenhöhlen sowie knöcherne Arrosionen des Sinus frontalis und maxillaris beidseits zur Darstellung. Im initialen CT-Thorax zeigten sich fleckige, oberlappenbetonte Milchglasareale, Tree-in-Bud-Zeichen und Bronchialwandverdickungen. Lungenfunktionell zeigte sich eine fixierte obstruktive Ventilationsstörung ohne Reversibilität und eine reduzierte Diffusionsfläche. Zwischen November 2017 und Juni 2019 erfolgten drei funktionelle endoskopische Nasennebenhöhlenoperationen bei rezidivierender expansiver Pansinusitis mit Knochendefekten. Histopathologisch zeigte sich chronisch entzündlich veränderte, polypöse umgebaute Nasenschleimhaut mit vermehrt eosinophilen Granulozyten und stellenweise histiozytären Zellen ohne Hinweis auf eine Vaskulitis. Die Diagnose EGPA wurde gestellt.

Differenzialdiagnostik: Differentialdiagnosen umfassen: Analgetika-induziertes Asthma, eosinophile Pneumonie, allergische bronchopulmonale Aspergillose, Granulomatose mit Polyangiitis und das Hypereosinophile Syndrom.

Therapie: Trotz systemischer OCS Therapie (20–100 mg Prednisolon) kam es zwischen 2017 und 2019 zu rezidivierenden pulmonalen und sinusoidalen Exazerbationen, so dass im Januar 2020 die Einleitung einer Rituximab-Therapie (6 Zyklen je 1000 mg) erfolgte. Hierunter zeigte sich primär eine klinische, lungenfunktionelle und CT-morphologische Besserung der pulmonalen Situation, sodass die OCS-Dosis bis 10 mg reduziert werden konnte. Allerdings kam es trotz zwischenzeitlicher

Erhöhung der OCS-Dosis (50 mg) und Fortsetzung der Rituximab-Therapie zu einer erneuten ausgeprägten und OP-pflichtigen destruktiven eosinophilen Pansinusitis und pulmonalen Exazerbation. Daher erfolgte im Januar 2020 unter OCS Dosis von 50 mg ein Therapieversuch mit Mepolizumab (100 mg s.c. alle 4 Wochen). Dies führte zu einer kompletten Remission der Pansinusitis und Normalisierung der Lungenfunktion (OCS aktuell 7,5 mg).

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F13

Beatmungspflichtige Pneumonie im Zeitalter der COVID-Pandemie: was sonst?

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Patientencharakteristik, Anamnese, Symptome: Im Mai 2020 wird der 47-jährige Herr P. mit massiver Dyspnoe und ausgeprägter Oxygenierungsstörung mit bilateralen intrapulmonalen Milchglasstrübungen und Konsolidierungen an einer auswärtigen Intensivstation aufgenommen. Aufgrund der typischen radiologischen Veränderungen bestand zunächst der Verdacht auf eine COVID-19 Pneumonie. Eine Infektion mit dem SARS-CoV-2 Virus wurde mittels wiederholter PCR Untersuchung ausgeschlossen und der Patient schließlich zur differenzialdiagnostischen Abklärung der thorakalen Veränderungen an unsere pneumologische Intensivstation überstellt.

Diagnostik und Diagnose: An der Intensivstation erfolgte eine diagnostische Bronchoskopie, in welcher sich ein ausgeprägter Lokalfund, mit flächigen, teils konfluierenden, teils

Abb. 1 | F13

fibropurulent und granulomatös wirkenden Schleimhautveränderungen (Abb. 1) zeigt. Anhand von Schleimhautbiopsien wurde die Diagnose eines extranodalen peripheren T-Zell Lymphom mit zytotoxischem Immunphänotyp gesichert.

Therapie: Chemotherapie der Wahl ist das CHOP-Schema. Der Patient war weiterhin tief sediert und intubiert mit einem rasch progredienten Lokalbefund sowie hohem FiO₂-Bedarf und benötigte mittlerweile hohe Dosen an Katecholaminen. In Rücksprache mit der Onkologie wurde die CHT im Sinne einer Salvage-Therapie verabreicht. Leider entwickelte der Patient trotz antimikrobieller Abschirmungstherapie eine invasive Aspergillose sowie eine ausgeprägte Neutro- und Thrombozytopenie und verstarb 4 Tage später.

F14

Der steinige Weg zurück zur Alm

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Patientencharakteristik, Anamnese, Symptome: Wir berichten über einen 43-jährigen Hüttenwirt, der aufgrund von hohem Fieber (39,7 °C) und Kurzatmigkeit am 11.03.2020 stationär aufgenommen wird. Circa 8 Tage zuvor begannen grippale Beschwerden, und der Patient wurde bei V. a. auf Influenza mit Tamiflu® und Unasyn® anbehandelt.

Diagnostik und Diagnose: Trotz negativer Expositionsanamnese wird nun eine COVID-19 Testung durchgeführt, die positiv ausfällt. Bezüglich Vorerkrankungen und Risikofaktoren bestehen eine arterielle Hypertonie und ein BMI von 39 kg/m². Bereits am Aufnahmetag verschlechtert sich der Zustand des Patienten rapide und die Blutgasanalyse zeigt einen pO₂ von 55 mm Hg unter zwei Liter Sauerstoff.

Therapie: So wird er österreichweit als erster COVID-19 Patient intensivpflichtig und eine CPAP-Therapie wird eingeleitet. Im weiteren Verlauf entwickelt sich eine respiratorische

Abb. 1 | F14 Diese Abbildung zeigt in **a** das erste Thorax-CT, das bei Aufnahme des Hüttenwirts kurz vor Intubationspflichtigkeit entstand. Das pulmonale Muster zeigt eine ausgedehnte COVID-19-Viruspneumonie mit einer CT-Score Severity von 20 von 25 möglichen Punkten. Abbildung **b** zeigt die Kontroll-Computertomographie sechs Wochen nach Entlassung. Vereinzelt Milchglasverdichtungen und Retikulationen sind sichtbar (CT-Severity Score: 12). Teilnehmerdurchschnitt: 8)

Insuffizienz mit Indikation zur Intubation. Es wird eine antiinfektive Therapie mit Ampicillin/Sulbactam, Azithromycin und Favipiravir begonnen. Bei sehr langsamer Besserung und langwierigem Weaning kann der Patient erst nach 19 Tagen extubiert werden. Es erfolgt eine Verlegung auf die Normalstation und im Weiteren ein Rehabilitationsaufenthalt.

Im Rahmen unserer COVID-19 Nachsorgestudie (CovILD) wird der Patient sechs und zwölf Wochen nach Entlassung an der pulmonologischen Ambulanz vorgestellt. Es zeigt sich eine stetige Besserung der respiratorischen Symptomatik bis hin zur Symptombfreiheit. Im CT-Severity Score sinkt der Wert bei Intubation von 20/25 Punkten auf vorerst 12 und schließlich 5 Punkte (Abb. 1).

Dieser Fall beschreibt den österreichweit ersten und überraschend jungen, intensivpflichtigen Covid-19 Patienten, bei dem trotz anfänglicher Unklarheit in Anbetracht des neuen Krankheitsbildes und der fulminanten Pneumonie eine bemerkenswerte Genesung gelungen ist.

F15

Wieviel Lunge braucht der Mensch?

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Patientencharakteristik: 73 Jahre alt, guter AZ und EZ, Z. n. Lungenkarzinom linker Oberlappen, chronischer Nikotinabusus, knotige Formation in beiden Schilddrüsenlappen – chronische Autoimmunthyreoiditis vom Typ Hashimoto

Anamnese: Z. n. VATS-Lobektomie linker Oberlappen UICC IA

Diagnostik: Thoraxröntgen, PET-CT, Thorax CT, Stanzbiopsie, interdisziplinärer Tumorboard Beschluss

Diagnose: De-novo-Karzinom rechter Oberlappen am Übergang Segment IV und V, pleurawandnahe, bioptisch verifiziertes Adenokarzinom cT3 bei Z. n. Lobektomie linker Oberlappen, postoperative Thrombose der Vena femoralis inguinal rechts nach veno-venöser ECMO.

Therapie: Obere Bilobektomie (rechter Oberlappen und Mittellappen) an der veno-venösen ECMO – Kanülierung über die rechts Vena jugularis interna und Vena femoralis rechts,

Abb. 1 | F15

über eine anterolaterale Thorakotomie rechts im 6. ICR inklusive adäquate onkologische Lymphadenektomie Position 4 rechts bis 11i

Wissenschaftliche Poster Scientific Posters

P01

Multi-omics profiling predicts allograft function after lung transplantation

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Background: Lung transplantation is the ultimate treatment option for patients with end-stage respiratory diseases but bears the highest mortality rate among all solid organ transplantations due to chronic lung allograft dysfunction (CLAD). The mechanisms leading to CLAD remain elusive due to insufficient understanding of the complex post-transplant adaptation processes. Here, we aimed to better understand the processes preceding CLAD, and investigate their association with future changes in allograft function.

Methods: We performed an exploratory cohort study in 78 patients, including broncho-alveolar lavage samples from lung donors and recipients (after transplantation). We analyzed the alveolar microbiome using 16S rRNA sequencing, the cellular composition using flow-cytometry, and conducted metabolome and lipidome profiling.

Results: We established distinct temporal dynamics for each of the analyzed data sets. Comparing matched donor and recipient samples, we revealed that recipient-specific as well as environmental factors, rather than the donor microbiome, shape the long-term lung microbiome. We further discovered that the abundance of certain bacterial strains correlated with underlying lung diseases even after transplantation. A decline in forced expiratory volume during the first second (FEV1) is a major characteristic of lung allograft dysfunction in transplant recipients. By using a machine learning approach, we could accurately predict future changes in FEV1 from our multi-omics data, whereby microbial profiles showed a particularly high predictive power.

Conclusions: Broncho-alveolar microbiome, cellular composition, metabolome and lipidome show specific temporal dynamics after lung transplantation. The lung microbiome can predict future changes in lung function with high precision.

The authors marked with an asterisk (*) are the corresponding authors.

P02

Current symptom-based risk scores for stable coronary artery disease evaluation are not applicable in COPD patients

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Background: Cardiovascular diseases are arguably the most important comorbidity in patients with chronic obstructive pulmonary disease (COPD). Despite an increased prevalence of coronary artery disease (CAD) in COPD patients, there are no dedicated diagnostic recommendations. We investigated whether COPD patients receive adequate primary evaluation of CAD despite overlapping symptoms.

Methods: 302 patients with COPD, who underwent invasive coronary angiography (ICA), were retrospectively matched (for age, BMI and cardiovascular risk factors) with 302 patients without functional lung diseases. Quality and onset of symptoms prior to ICA were documented and individual patients' pre-test probabilities according to ESC guidelines were calculated. End-points were delay of ICA referral after symptom onset and clinical outcome, defined as subsequent revascularization.

Results: Mean delay between symptom onset and ICA was 19.9 ± 22.0 months in COPD patients compared to 8.3 ± 12.7 months in the control group ($p < 0.0001$). COPD patients had a lower rate of typical chest pain (25.2 % vs. 38.1 %, $p = 0.0009$), and dyspnoea only (18.2 % vs. 26.8 %, $p = 0.015$). Sub-analysis of GOLD grades revealed an incremental delay with increasing COPD severity: GOLD 1: 16.1 ± 17.3 months; GOLD 2: 17.6 ± 22.1 months; GOLD 3: 20.1 ± 21.3 months and GOLD 4: 24.2 ± 23.4 months. Furthermore, the revascularization rate increased with higher pre-test probability for the control group, but not for patients with COPD GOLD 1-4.

Conclusions: Patients with COPD are insufficiently evaluated for CAD due to overlapping symptoms. Current CAD risk scores for stable chest pain appear inappropriate for patients with COPD.

P03

SARS-CoV-2 infections in cancer outpatients – most infected patients are asymptomatic carriers without impact on systemic cancer therapy

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Background: Oncologic patients are regarded the population most at risk of developing a severe course of COVID-19 due to the fact that malignant diseases and chemotherapy often weaken the immune system. In the face of the ongoing SARS-CoV-2 pandemic, how particular patients deal with this infection remains an important question.

Background: In the period between the 15th and 26th of April 2020, a total of 1227 patients were tested in one of seven oncologic outpatient clinics for SARS-CoV-2, regardless of symptoms, employing RT-qPCR using BGI Real-time fluorescent RT-PCR kit for detecting 2019-nCoV2 on Applied Bioscience ABI7500 instruments.

Results: Of 1227 patients, seventy-eight (6.4 %) were tested positive of SARS-CoV-2. Only one of the patients who tested positive developed a severe form of COVID-19 with pneumonia (CURB-65 score of 2), and two patients showed mild symptoms. Fourteen out of 75 asymptomatic but positively tested patients received chemotherapy or chemo-immunotherapy according to their regular therapy algorithm (± 4 weeks of SARS-CoV-2 test), and 48 of 78 (61.5 %) positive tested patients received glucocorticoids as co-medication. None of the asymptomatic

Fig. 1 | P03

infected patients showed unexpected complications due to the SARS-CoV-2 infection during the cancer treatment.

Conclusions: These data clearly contrast the view that patients with an oncologic disease are particularly vulnerable to SARS-CoV-2 and suggest that compromising therapies could be continued or started despite the ongoing pandemic. Moreover, the relatively low appearance of symptoms due to COVID-19 among patients on chemotherapy and other immunosuppressive co-medication like glucocorticoids indicate that suppressing the response capacity of the immune system reduces disease severity.

P04

Rare antibody development in cancer patients

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Background: For the further crisis management of the corona pandemic and the socio-economic impact on society, a strategy that allows selective isolation measures is particularly important. So far, it has been assumed that patients suffering from COVID-19 develop antibodies that provide immunity and are thus protected from a reinfection with SARS-CoV-2. This also forms the basis of the assumption that rapid vaccine development will lead to rapid control of the pandemic. In the present study, we analyzed the antibody development of 77 oncology patients 14 days after positive RT-qPCR testing for SARS CoV2.

Methods: RT-qPCR and anti-SARS-CoV2-antibody methods from BGI (MGIEasy Magnetic Beads Virus DNA/RNA Extraction Kit) and Roche (Elecsys Anti-SARS-CoV-2 immunoassay) were used, respectively, according to the manufacturers' specifications.

Results: Surprisingly, in only 6 of 77 individuals with a confirmed history of COVID-19 antibody development was detected. Despite of multiple testing, these patients did not develop antibodies in subsequent tests.

Fig. 1 | P04

Conclusions: These results undermine the previous hypothesis that SARS-CoV-2 infections are regularly associated with antibody development and cast doubt on the provided immunity to COVID-19. This may have a decisive impact on the future course of action in the pandemic and underline the importance of further data on antibody development against SARS-CoV-2.

P05

Chronic thromboembolic pulmonary hypertension: Improvement of sleep-disordered breathing after balloon pulmonary angioplasty

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Background: Chronic thromboembolic pulmonary hypertension (CTEPH) is characterized by severe pulmonary artery hypertension and presence of sleep-disordered breathing (SDB) with associated hypoxemia which could further contribute to the severity of hypertension adversely affecting the outcome. Limited data are available on the prevalence of SDB in CTEPH and so far, the effect of balloon pulmonary angioplasty (BPA) on SDB has not been evaluated. We hypothesized that subjects with CTEPH have a high prevalence of SDB, both obstructive and central sleep apnea with associated hypoxemia, which could improve with BPA.

Methods: 33 consecutive patients with CTEPH underwent treatment-naïve and post-BPA polygraphy (nasal-pressure-sensor, thermistor, thoracoabdominal-excursion-sensors, pulse oximeter; Alice PDx, Philipps®) and hemodynamic and echocardiographic assessments.

Results: Before BPA, prevalence of SDB (defined as an apnea-hypopnea index (AHI) >5 per hour) was 75%: 8 patients

(24 %) without SDB, 18 (54 %) with predominantly obstructive sleep apnea (OSA; AHI=26), and 7 (21 %) with predominantly central sleep apnea (CSA; AHI=41). OSA was associated with male-gender, obesity and overnight fluid-shifts, whereas CSA with worse right ventricular end-diastolic diameter. Patients with SDB had significantly higher oxygen-desaturation index (ODI) and tendency for worse desaturation than those without SDB. After BPA, mean AHI and ODI decreased by 45 % ($p=0.004$) and 28 % ($p=0.001$). In OSA patients, AHI decreased from 26 to 19 ($p=0.088$) and in CSA patients from 41 to 21 ($p=0.011$). Along with improvement in SDB, nocturnal desaturation decreased (time-below-90 % from 50 % to 43 % of time-in-bed, $p=0.037$).

Conclusions: This is the first study of the effects of BPA on SDB in CTEPH. We found high prevalence of SDB, both OSA and CSA, in consecutive subjects underdoing BPA, and report that BPA significantly improved sleep-disordered breathing and nocturnal desaturations. Future randomized controlled trials are needed to determine if effective treatment of SDB improves central hemodynamics, morbidity and mortality of patients with CTEPH.

P06

Pulmonary rehabilitation following COVID-19 – First short-term results regarding symptoms, quality of life, and psychological burden of disease

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Background: Even though many studies have been published on COVID-19 within the last months, little is known about the results of pulmonary rehabilitation (PR) following a severe infection. Therefore, the current study examines the changes of wellbeing through inpatient PR after COVID-19.

Methods: We surveyed patients at the beginning (T1) and the end (T2) of inpatient PR following hospitalization due to COVID-19. We assessed respiratory symptoms (dyspnea, cough, and phlegm expectoration) and pain with symptom rating scales, fatigue with the Brief Fatigue Inventory (BFI), quality of life with the EuroQol-Questionnaire (EQ-5D-SL), and symptoms of depression and anxiety with the Patient Health Questionnaire (PHQ-D).

Results: From the beginning of May until the end of June 2020, 31 patients were eligible, of which 25 patients could be included in the study and completed all T1 and T2 assessments (Mean age: 58.1; 38.9 % female; 52.8 % after invasive ventilation).

At T1 the participants were heavily burdened and dyspnea on exertion was by far the most common and burdensome impairment. Over the course of the PR (mean treatment duration: 26 days; range: 21–35 days), the data revealed improvements in all mentioned outcomes. Dependent samples t-tests revealed statistical significance in all variables, except for pain ($p=0.058$) and phlegm expectoration ($p=0.258$). Effect sizes ranged from small ($d=0.48$, $p<0.01$ for dyspnea at rest) to large

effects ($d=1.08$, $p<0.001$ for dyspnea on exertion; $d=1.15$, $p<0.001$ for depression; $d=1.08$, $p<0.001$ for quality of life).

Conclusions: First analyses indicate that patients may benefit from inpatient PR after hospitalization due to COVID-19. Symptoms of dyspnea, cough, depression, and anxiety decreased significantly over the course of the PR, whereas quality of life significantly increased. PR could therefore play an important role in dealing with the pandemic. Follow-up assessments three and six months after the PR are currently ongoing.

P07

COVID-19 and sleep apnea – Is there an interrelation?

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Background: Fatigue is among the most common symptoms in COVID-19 patients and about 50 % still suffer from persistent fatigue 2 months later [1]. Some studies discuss a possible link to obstructive sleep apnea syndrome (OSAS) [2], however, no studies have been published in COVID-19 patients after discharge. Therefore, we examined COVID-19 patients for the presence of OSAS within 4 weeks after acute hospital discharge during inpatient pulmonary rehabilitation.

Methods: From May until July 2020 we screened all eligible COVID-19 patients for OSAS using polygraphy. If the screening revealed an Apnea-Hypopnea Index (AHI) of ≥ 15 , further diagnostics using polysomnography were conducted. Furthermore, we assessed the sleepiness using the Epworth Sleepiness Scale (ESS) and the Body-Mass-Index (BMI).

Results: 37 patients were eligible for the study, of which 24 were willing to participate. Mean age was 56.4 (range: 33–83), 24 % were female, and mean BMI was 31.8 (range: 22.2–53.3). Only four patients had an AHI <5 , whereas eleven fulfilled the criteria for an at least moderately severe OSAS (AHI ≥ 15). The AHI was significantly correlated with the BMI ($r=0.44$, $p<0.05$) but not with the ESS ($r=-0.09$, $p=0.71$). A positive airway pressure therapy was indicated in eight patients (33 %); five agreed to the therapy (20 %).

Conclusions: According to our data, rates of OSAS are extraordinarily high in patients after hospitalization due to COVID-19. This could be an explanation for frequently mentioned symptoms of tiredness and attention deficit. Yet, further studies are needed to examine a possible causal association and correlations to other common symptoms, such as cognitive impairment or sleep disturbances.

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P08

Central sleep apnea in pacing-induced cardiomyopathy

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Background: Sleep disordered breathing, in particular central sleep apnea (CSA) is common in heart failure patients, but its role in pacing induced cardiomyopathy has not been studied yet. In this study entitled UPGRADE, we set out to evaluate the effect on sleep architecture and sleep disordered breathing in PICM patients receiving biventricular pacing.

Methods: Presence of CSA was assessed by single-night polysomnography (PSG) in 54 PICM patients within one month after left ventricular lead implantation (with biventricular stimulation still not activated). CSA was diagnosed in half of patients ($n=27$). Patients with moderate or severe CSA were randomized to cardiac resynchronization therapy (CRT) versus right ventricular pacing (RVP) in a double-blinded cross-over design and re-scheduled for a follow up PSG 3–5 months, after repeated assessment of sleep and crossing-over another PSG was conducted 3–5 months later.

Results: CRT led to a significant increase in left ventricular ejection fraction and significant reduction in left ventricular end systolic volumes and N-terminal pro brain natriuretic peptide plasma levels, whereas no significant effect was observed with ongoing RVP. CSA was significantly improved after 3.9 (3.2–4.4) months of CRT: apnea hypopnea index (AHI) decreased from 39.1 (32.1–54.0) events per hour at baseline to 22.2/h (10.9–36.7) by CRT ($p<0.001$). Central apnea index decreased from 27.1/h (17.7–36.1) at baseline to 6.8/h (1.1–14.4) after CRT activation ($p<0.001$). Ongoing RVP yielded only a minor improvement in AHI and central apnea index. Pre-existent CSA did not affect structural response rate and had no impact on mid-term follow up (median 2.8 years).

Conclusions: CSA is highly prevalent in patients with PICM. CRT upgrading significantly improves CSA leading to a similar outcome in PICM patients without pre-existent CSA.

UPGRADE is an investigator-initiated independent clinical trial, supported by the ÖNB Jubiläumsfondsprojekt Nr. 15974. This study was further supported by an unlimited scientific grant from the Boston Scientific Investigator Sponsored Research (ISR) Committee, Boston Scientific, St. Paul, MN, USA.

P09

Nitrogen multiple breath washout, spirometry, and body plethysmography in school-aged children with repaired congenital diaphragmatic hernia – Results from a prospective cross-sectional study

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Background: Patients with repaired congenital diaphragmatic hernia (CDH) often suffer from obstructive airway disease. Nitrogen multiple breath washout (N2-MBW) is a sensitive method to detect ventilation inhomogeneity and peripheral airway pathology with higher sensitivity than conventional spirometry. We set out to obtain detailed information about peripheral airway pathology by N2-MBW in addition to conventional lung function testing.

Methods: We prospectively compared school-aged children following CDH repair and healthy controls using spirometry, body plethysmography and N2-MBW. Group analyses were made using T-test and Mann-Whitney-U Test, as appropriate. Matching criteria included age, gender and level of physical activity.

Results: 13 (median [IQR] age 10 [8–13] years, f:m=5:8) former patients and 11 matched healthy controls (9 [7–12] years, f:m=4:7) were included. Mean lung clearance index (LCI) was highly similar in both groups (7.4 vs. 7.4; $p=0.893$). Slope of conducting airways (Scond) was significantly higher (0.029 vs. 0.017; $p=0.032$) in CDH patients. FEV1 (88 vs. 101 %pred; $p=0.009$), MEF25 (72 vs. 108 %pred; $p=0.009$), MEF50 (78 vs. 109 %pred; $p=0.002$) and FEF25–75 (66 vs. 95 %pred; $p=0.003$) were significantly lower in CDH patients. RV (133 vs. 85 %pred; $p=0.001$), RV/TLC ratio (39 vs. 24 %pred; $p=0.001$) and airway resistance (Reff) (146 vs. 103 %pred; $p=0.003$) were significantly higher in CDH patients, whereas there was no significant difference in TLC (99 vs. 106 %pred; $p=0.230$) and FVC (100 vs. 102 %pred; $p=0.698$). Three CDH patients had LCI and eight Scond values above the upper limit of normal (healthy controls: two and three, respectively). According to conventional lung function testing, 7/13 former patients showed an obstructive, none a restrictive pattern and six had normal lung function. FEV1% correlated significantly positively with MEF25%, MEF50% and FEF25–75 % and negatively with RV/TLC ratio.

Conclusions: We found significant airway obstruction in both central and peripheral airways and hyperinflation in patients with congenital diaphragmatic hernia compared to healthy controls.

P10

Inhalation therapy in COVID-19 patients –
Prerequisites and examples for safe treatmentRüdiger Siekmeier^{*1}, Kurt Rasche², Carsten Ehrhardt³,
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Towards the end of 2019, coronavirus disease 2019 (COVID-19), named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was observed in Wuhan (China) for the first time and subsequently spread rapidly across the globe. The lung is the virus' primary target organ, but many other organs are affected, too. In consequence, therapy focuses on both, pulmonary and systemic symptoms. At present, there is no established pharmacological treatment for COVID-19 available, however, many studies are currently on their way. Treatment is based on local (i. e. inhalation) and systemic therapy, often in ventilated patients. Prerequisites for inhalation therapy are measures to prevent infection of health care personnel, use of adequate systems for drug administration and compounds suitable for pulmonary delivery. We reviewed publications on COVID-19 treatment for strategies for safe inhalation therapy of ventilated/non-ventilated patients and compounds used in clinical studies. Strategies for inhalation administration differ in respect of disease severity and use of personnel protective equipment is essential. In mild-disease patients, asthma/COPD treatment is preferred by pMDIs/DPIs, if necessary. Jet/mesh nebulizers can be used with mouth pieces/nasal cannulas (no face masks to avoid aerosol spread) and one-way filters/valves. In ventilated patients, mesh nebulizers with filters should be used. Physical therapy/suctioning should not be combined with aerosol therapy (avoidance aerosol spread). Numerous compounds/biomolecules are under study for inhalation treatment of COVID-19, e. g. interferons (with/without systemic administration of antivirals, such as ribavirin, lopinavir, ritonavir), sargramostim (GM-CSF), aviptadil (synthetic vasoactive intestinal polypeptide), DAS181 (recombinant sialidase), PUL042 (immunostimulant, TLR 2/6/9 agonist), budesonide, nitrogen oxide and hydrogen. In summary, inhalation therapy is important for treatment of pulmonary symptoms of COVID-19. Strategies for pulmonary drug delivery differ in respect to disease severity (e. g. mild symptom patients vs. ventilated patients). Various pharmacological compounds/biomolecules are under study. However, up to now there is no established inhalation treatment of COVID-19.

P11

Clinical relevance of the new hemodynamic
definition of precapillary pulmonary hypertensionKatarina Zeder^{*1,2}, Piet Rosenstock^{1,2}, Alexander
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Background: The previous hemodynamic definition (previous definition, PD) of precapillary pulmonary hypertension (prePH) was mean pulmonary arterial pressure (mPAP) ≥ 25 mm Hg with pulmonary arterial wedge pressure (PAWP) ≤ 15 mm Hg. Recently prePH was redefined as mPAP > 20 mm Hg with PAWP ≤ 15 mm Hg and pulmonary vascular resistance (PVR) ≥ 3 WU (new definition, ND). We aimed to assess the impact of this change on patient survival.

Methods: Patients with PAWP ≤ 15 mm Hg undergoing right heart catheterization were retrospectively analyzed. Based on the PD and the ND, four groups were formed: PD + ND no-prePH (Group A), PD prePH but ND no-prePH (B), PD no-prePH but ND prePH (C), PD + ND prePH (D). Age-adjusted Cox-regression analyses were used to evaluate the association of these four groups with all-cause mortality.

Results: N=630 patients (f=69%; age=66 yrs [IQR 55–73] were included; median follow-up time=8.0 yrs [IQR 4.1–10.8]; Group A: n=281 [44.6%, 43 deaths]; B: n=30 [4.8%, 10 deaths]; C: n=30 [4.8%, 15 deaths]; D: n=289 [45.9%, 146 deaths]). Group B and C were significantly different in mPAP (28 vs. 22 mm Hg, $p < 0.001$), PAWP (13 vs. 7 mm Hg, $p < 0.001$), and PVR (2.6 vs. 3.5 WU, $p < 0.001$), but not in the frequency of cardiopulmonary comorbidities (90% vs. 73%, $p = 0.095$), and mortality rate ($p = 0.185$; HR 1.7 [95%CI 0.78–3.7]). Group D had significantly worse survival compared to group A ($p < 0.001$; HR 4.3 [95%CI 3.08–6.01]) and group B ($p = 0.007$; HR 2.32 [95%CI 1.26–4.29]), but similar survival to group C ($p = 0.248$; HR 1.37 [95%CI 0.8–2.33]). Group A survival was similar to B ($p = 0.067$; HR 1.86 [95%CI 0.96–3.6]), but significantly improved compared to C ($p < 0.001$; HR 3.15 [95%CI 1.75–5.64]).

Conclusions: Applying the new PAP-criteria for prePH lead to newly diagnosed prePH in 30 additional subjects, whereas the same amount of patients, previously fulfilling prePH criteria, did not meet the current definition due to the newly introduced PVR criteria. Although these two groups had strikingly different hemodynamic characteristics, survival was similar.

P12

Pulmonary hemodynamics during exercise as independent predictors of mortality in systemic sclerosis

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Background: Pulmonary hemodynamics during exercise may help to identify early pulmonary vascular disease in systemic sclerosis (SSc). Whether they are of prognostic relevance in this subset of patients is unknown. We tested the association between pulmonary hemodynamics at rest and peak exercise with all-cause mortality in patients with SSc.

Methods: All SSc patients with resting mPAP <25 mm Hg and at least 1-year follow-up data who underwent symptom-limited exercise right heart catheterization between April 2005 and December 2018, were analyzed. Age-adjusted Cox-regression analyses were performed to assess the association between pulmonary hemodynamics and mortality.

Results: *N*=80 patients (female=63; median age=57 yrs [IQR 47–67]; median follow-up time=10.4 years [IQR 8.5–11.8]) were analyzed. 11 deaths occurred with a median time to death of 5.0 years [IQR 2.6–7.1]. *N*=68 patients with mean pulmonary arterial pressure (mPAP) ≤20 mm Hg and *N*=12 patients with mPAP 21–24 mm Hg were included. Pulmonary vascular resistance (PVR) at peak exercise (*p*=0.006; HR:2.20 [95 %CI 1.26–3.87]), total pulmonary resistance (TPR) at peak exercise (*p*=0.026; HR:1.56 [95 %CI 1.06–2.29]), mPAP/cardiac output (CO)-slope (*p*=0.047; HR:1.14 [(95 %CI 1.002–1.286)]) and transpulmonary gradient (TPG)/CO-slope (*p*=0.034; HR:1.34 [95 %CI 1.02–1.76]) turned out as age-independent predictors of mortality. In contrast, resting pulmonary hemodynamics (mPAP, pulmonary arterial wedge pressure, CO, PVR and TPR) were not associated with age-adjusted mortality.

Conclusions: In this study assessing the prognostic relevance of pulmonary exercise hemodynamics in patients with systemic sclerosis, PVR and TPR at peak exercise as well as mPAP/CO-slope and TPG/CO-slope turned out as age-independent predictors of all-cause mortality.

P13

Clinical survey with hypertonic saline (3–7%) and the eFlow®rapid in CF children below 6 years of age

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Background: Until recently, the CF guidelines for children recommended inhalation of hypertonic saline (HS) for infants only as a supportive secretolytic therapy mainly on an individ-

ual basis. Recent studies show that HS can improve health even in CF babies.

Methods: The surveys provide information about acceptance, reason and frequency of 3–7 % HS application using a jet or vibrating membrane nebuliser (VMN; eFlow®rapid) in children ≤6 years. The online questionnaires address healthcare professionals in paediatric CF centres in the UK and German speaking countries (DACH). In the UK 21 and in DACH 17 paediatric CF centres participated in the survey. From both regions, a total of 54 healthcare professionals responsible for almost 1900 CF children ≤6 years of age responded.

Results: Secretolysis by HS in children ≤6y is rated excellent, very good, or good by 81.1 % in UK and by 100 % in DACH. The tolerability is reported excellent to good by 67.1 % (UK)/100 % (DACH). In both surveys approx. 90 % of caregivers declare to use VMN in CF patients ≤6 y and less than 25 % in infants ≤2 y. Caregivers satisfaction regarding the ease of inhalation with VMN in infants ≤2 y is rated excellent to good by 70.5 % (UK)/59 % (DACH) and in the group 2–6y by 100 % (UK and DACH).

Conclusions: The results of the survey reveal that in children ≤6 years nebulized HS for secretolytic therapy is general practice and well tolerated by this age group. They are consistent with the latest recommendations in the official CF guidelines for children, which confirm the benefits of using HS. In addition, the data also reflect the trend in the UK, where the annual report of the UK CF registry refers that the use of HS in young children is increasing every year.

P14

Expression patterns of heat shock protein 90 in patients with thymic epithelial tumors regarding the World Health Organization classification

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Background: Thymic epithelial tumors (TETs) are rare malignancies with unique association to the paraneoplastic syndrome myasthenia gravis (MG). Heat shock protein 90 (HSP90) harbour great potential as cancer biomarker and HSP90 inhibitors approach clinical cancer therapy.

Methods: To investigate HSP90 tissue expression patterns, we analysed tumor tissues of completely resected TET patients (*n*=101; 78 thymomas and 23 thymic carcinomas (TCs)), regular thymic tissue of six MG patients, and four patients without MG,

true thymic hyperplasia (TTH) from five patients without MG and follicular thymic hyperplasia (FTH) from five patients with MG by using immunohistochemistry.

Results: The expression of HSP90 in nuclei and cytoplasm of tumor cells and non-neoplastic lymphocytes varied with WHO histological subtype (nuclei staining patterns: micro-nodular tumor (MNT): 40 % A: 100 % AB: 92.9 % B1: 88.9 % B2: 84.6 % B3: 71.4 % and TC: 65.2 %; cytoplasmic staining patterns: MNT: 100 % A: 60 % AB: 7 % B1: 11.1 % and B2: 11.5 B3: 100 % TC: 95.7 %). We detected HSP90 expression in centroblasts, but not centrocytes, of germinal centres in 100 % of MG patients with FTH. All lymphoid follicles of myasthenic patients expressed HSP90 protein. Hassall's Corpuscles showed no HSP90 expression in every tissue sample. We did not detect thymic HSP90 expression in four patients with regular thymic morphology or five patients with TTH.

Conclusions: HSP90 expression data propose high potential for HSP90 as an additional immunohistochemical marker for MNT, WHO-B3 thymoma, and TC or as a possible candidate molecule for targeted therapy. Caution is warranted in TET patients with MG overexpressing HSP90.

P15

Later-line treatment with lorlatinib in ALK- and ROS1-rearrangement-positive NSCLC: a retrospective, multicenter analysis

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P15 | Fig. 1 Efficacy results of ALK positive patients

Results	ALK-positive patients					
	Overall	1 prior TKI	2 prior TKI	≥ 3 prior TKI	only one 2 nd Gen TKI	≥ two 2 nd Gen TKI
N (%)	37 (100%)	10 (27.0%)	13 (35.1%)	14 (37.8%)	20 (54.1%)	17 (45.9%)
ORR ¹	43.2% (27.1; 60.5)	40.0% (12.2; 73.8)	53.8% (25.1; 80.8)	35.7% (12.8; 64.9)	50.0% (27.2; 72.8)	35.3% (14.2; 61.7)
DCR ¹	56.8% (39.5; 72.9)	60.0% (26.2; 87.8)	69.2% (38.6; 90.9)	42.9% (17.7; 71.1)	60.0% (36.1; 80.9)	52.9% (27.8; 77.0)
CR	1 (2.7%)	0 (0%)	0 (0%)	1 (7.1%)	0 (0.0%)	1 (5.9%)
PR	15 (40.5%)	4 (40.0%)	7 (53.8%)	4 (28.6%)	10 (50.0%)	5 (29.4%)
SD	5 (13.5%)	2 (20.0%)	2 (15.4%)	1 (7.1%)	3 (10.0%)	3 (17.6%)
PD	16 (43.2%)	4 (40.0%)	4 (30.8%)	8 (57.1%)	8 (40.0%)	8 (47.1%)
Median DoT ²	4.4 (1.3; 7.6)	4.4 (0.5; 8.2)	NR	3.0 (1.8; 4.2)	4.4 (1.1; 7.7)	4.4 (0.2; 8.6)
Median OS ² (since lorla start)	10.2 (3.6; 16.8)	6.4 (3.9; 9.0)	31.2 (NR)	7.1 (0.0; 20.2)	7.9 (0.0; 29.7)	10.2 (4.1; 16.2)
Median OS ² (since advanced diagnosis)	41.8 (34.1; 49.5)	28.3 (11.9; 44.8)	66.5 (NR)	40.6 (30.5-50.8)	39.2 (21.7; 56.7)	43.4 (30.9; 55.9)

Table 1b. Risk analysis of the efficacy data

risk analysis ³	maturity	3-months	6-months	12-months	2-years	5-years
DoT rate	70.3%	62.2%	45.9%	31.7%	NR	NR
OS rate (since lorla start)	67.6%	73.0%	62.2%	45.4%	35.1%	NR
OS rate (since advanced diagnosis)	67.6%	100%	100%	86.5%	70.3%	33.3%

¹ 95% confidence interval was calculated using the clopper-pearson method

² median was calculated with the Kaplan-Meier-estimator

³ the risk analysis was an estimation of the cumulative incidence for the event of interest calculated using the Kaplan-Meier method

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Background: In clinical practice, patients with ALK-rearrangement-positive non-small-cell lung cancer commonly receive sequential treatment with ALK tyrosine kinase inhibitors. The third-generation agent lorlatinib has been shown to inhibit a wide range of ALK resistance mutations and thus offers potential benefit in later lines, although real-world data are lacking. This multicenter study retrospectively investigated later-line, real-world use of lorlatinib in patients with advanced ALK- or ROS1-positive lung cancer.

Methods: Fifty-one patients registered in a compassionate use program in multiple Austrian Lung Cancer Centers who received second- or later-line lorlatinib (range, 2–9) between January 2016 and May 2020, were included in a retrospective real-world data analysis.

Results: Median time on lorlatinib treatment was 4.4 months for ALK-positive and 12.2 months for ROS-positive patients. ALK-positive patients showed a response rate of 43.2 %, while 85.7 % of the ROS1-positive patients were considered responders. Median overall survival from lorlatinib initiation was 10.2 and 20.0 months for the ALK- and ROS1-positive groups, respectively. In the ALK-positive group, lorlatinib proved efficacy after both brigatinib and alectinib. Lorlatinib treatment was well tolerated.

Conclusions: Later-line lorlatinib treatment can induce sustained responses in patients with advanced ALK- and ROS1-positive lung cancer.

P16

Computed tomography determinants of local and systemic inflammation biomarkers in interstitial lung diseases: a retrospective cohort study

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Background: Anti-fibrotic medication is effective in progressive fibrosing interstitial lung diseases (ILD), but a subgroup of fibrotic ILD patients also benefits from immunomodulatory therapies. Additional to high-resolution computed tomography (HRCT), blood and broncho-alveolar lavage (BAL) biomarkers could help to identify such phenotypes.

Methods: HRCT of 127 subsequent single-center ILD-board patients (mean age 65 (standard deviation 14) years, 65 % male), were evaluated for radiological findings considered non-inflammatory (reticulation including honeycombing (RET), traction bronchiectasis (TBR), emphysema (EMP)) or active inflammatory (consolidations (CON), ground glass opacities (GGO), noduli (NDL), mosaic attenuation (MOS)) in 6 distinct lung regions. Each resulting score was further graded as minimal (0–1 regions involved), medium (2–4) and extensive (5–6). Associations between blood and BAL biomarkers and radiological finding scores were evaluated using Spearman correlation coefficients, Kruskal-Wallis tests were used for significance testing between the graded subgroups.

Results: Blood neutrophil, lymphocyte and eosinophil fraction, neutrophil-lymphocyte ratio (NLR) and BAL lymphocyte fraction consistently showed opposite correlations for inflammatory versus non-inflammatory HRCT finding scores. Blood lymphocyte fraction significantly differed by the graded extent of GGO ($p=0.032$) and CON ($p=0.027$), eosinophil count by TBR ($p=0.006$) and NLR by CON ($p=0.009$). C-reactive protein significantly related to GGO ($p=0.023$) and CON ($p=0.004$), while LDH showed multiple significant positive associations with RET ($p=0.01$), TBR ($p<0.001$), GGO ($p=0.049$) and MOS ($p=0.027$). In BAL fluid, lymphocyte fraction had a significant interaction with GGO ($p=0.017$).

Conclusions: Biomarkers from peripheral blood and BAL may have the potential to differentiate predominantly non-inflammatory or fibrotic from active inflammatory radiological ILD patterns.

P17

COVID-19 is not „just another flu“: A real-life comparison of severe COVID-19 and influenza in hospitalized patients in Vienna, Austria

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Background: COVID-19 (CoV) is regularly compared to influenza. Mortality and case-fatality rates vary widely depending on incidence of CoV and the testing policy in affected countries. To date no data comparing severely ill hospitalized patients with CoV and influenza exists.

Methods: Data from patients with CoV was compared to patients infected with influenza A (InfA) and B (InfB) virus during the 2017/18 and 2018/19 seasons. All patients were ³18 years old, had PCR confirmed infection and needed hospital treatment. Demographic data, medical history, length-of-stay (LOS), complications including in-hospital mortality were analyzed.

Results: In total 142 patients with CoV were compared to 266 patients with InfA and 300 with InfB. Differences in median age (CoV 70.5 yrs vs. InfA 70 yrs and InfB 77 yrs, $p<0.001$) and laboratory results were observed. CoV patients had fewer comorbidities, but complications (respiratory insufficiency, pneumonia, acute kidney injury, acute heart failure and death) occurred more frequently.

Median length-of-stay (LOS) was longer in CoV patients (12 days vs. InfA 7 days vs. InfB 7 days, $p<0.001$). There was a 4-fold higher in-hospital mortality in CoV patients (23.2 %) when compared with InfA (5.6 %) or InfB (4.7 %; $p<0.001$).

Conclusions: In hospitalized patients CoV is associated with longer LOS, a higher number of complications and higher in-hospital mortality compared to influenza, even in a population with fewer co-morbidities. This data, a high reproduction number and limited treatment options, alongside excess mortality during the SARS-CoV-2 pandemic, support the containment strategies implemented by most authorities.

P18

Mesothelin-associated molecules and its role in physical stress conditions

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Fig. 1 | P17

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Background: Mesothelin (MSLN) and Megakaryocyte Potentiating Factor (MPF) were described as promising biomarkers and targets for therapy in different malignancies. Conflicting data exist on the importance of marathon (M) and half marathon (HM) running for health. So far, the role of MSLN and MPF remains unknown in physical stress processes.

Methods: We performed enzyme-linked immunosorbent assays for MSLN and MPF in serum samples of M ($n=34$), HM ($n=34$), and volunteers ($n=45$). The following timepoints for taking the blood draw were chosen: one week before (baseline), at the finish line (peak), and one week after (recovery) the marathon competition. Moreover, we analysed the supernatant of granulocytes, monocytes, dendritic cells (DCs), and peripheral blood mononuclear cells (PBMCs) in five volunteers if MSLN or MPF will be secreted by stimuli such as hypoxia, lipopolysaccharide, CD3/CD28, and phorbol myristate acetate. Data are reported as mean $\pm$ standard deviation [ng/ml].

Results: There was a statistically significant serum increase of MSLN and MPF from baseline to peak in M and HM (MSLN(M): 5.54 ± 0.40 vs. 7.17 ± 0.29 ; $p < 0.001$) (MPF(M): 1.68 ± 0.18 vs. 3.23 ± 0.31 ; $p < 0.001$) (MSLN(HM): 6.25 ± 0.30 vs. 7.48 ± 0.34 ; $p = 0.001$) (MPF(HM): 2.49 ± 0.20 vs. 3.51 ± 0.28 ; $p < 0.001$). MSLN and MPF serum levels significantly decreased from peak to recovery in M and HM (MSLN(M): 7.17 ± 0.29 vs. 4.46 ± 0.52 ; $p < 0.001$) (MPF(M): 3.23 ± 0.31 vs. 1.56 ± 0.22 ; $p < 0.001$) (MSLN(HM): 7.48 ± 0.34 vs. 5.23 ± 0.44 ; $p < 0.001$) (MPF(HM): 3.51 ± 0.28 vs. 2.06 ± 0.23 ; $p < 0.001$). Volunteers showed statistically significant higher MSLN serum levels

compared to M and HM at baseline (MSLN(M): 12.9 ± 1.1 vs. 5.54 ± 0.40 ; $p < 0.001$) (MSLN(HM): 12.9 ± 1.1 vs. 6.25 ± 0.30 ; $p < 0.001$). MSLN and MPF had a moderately positive correlation with creatinine but not with any lung function parameters in M and HM. We could not detect MSLN and MPF in any supernatants of all tested cell types.

Conclusions: Physical stress conditions can influence the MSLN and MPF serum levels of healthy patients. On average, untrained people have higher MSLN serum concentrations than marathoners and half-marathoners. Furthermore, granulocytes, monocytes, DCs, and PBMCs do not contribute to the MSLN and MPF serum elevation.

P19

The German Severe Asthma Registry: obesity is associated with asthma parameters

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Obesity is a risk factor for asthma severity. This study aims to evaluate associations of obesity with severe asthma parameters in the German Severe Asthma Registry including 1065 patients (49 ± 17 yrs, 58 % female, BMI 27 ± 6 kg/m², 26 % obese (BMI ≥ 30 kg/m²)), 107 treated with anti-IgE- and 237 with anti-IL5(R) antibodies.

The same proportion of obese patients received biologics as non-obese patients, but obese patients were more frequently on LAMA therapy (60 % vs. 51 % $p=0.01$), had more exacerbations (4.5 ± 4/y vs. 3.6 ± 3/y, $p=0.003$), worse quality of life and more often uncontrolled asthma (88 % vs. 78 %, $p<0.001$), as reflected by worse ACQ (3.2 ± 1.4 vs. 2.8 ± 1.5), ACT (12 ± 5 vs. 15 ± 5) and mAQLQ scores (3.5 ± 1.2 vs. 4.0 ± 1.3; all $p<0.001$).

Obesity was associated with less blood eosinophils (37 % vs. 53 %, $p<0.001$), more neutrophils (6.2 ± 2.8 G/L vs. 5.7 ± 2.8 G/L, $p=0.02$) and lower lung function parameters: FEV1 (1.8 ± 0.7 L vs. 2 ± 0.8 L, $p=0.01$) and FVC (2.8 ± 1 L vs. 3.1 ± 1 L, $p<0.001$). Non-obese patients were more often non-smokers (42 % in non-obese vs. 27 % in obese, $p<0.001$).

Conclusions: In our severe asthma cohort, obesity represents a specific phenotype of severe asthma that is significantly associated with exacerbations, worse quality of life, lower blood eosinophil numbers, as well as lower FEV1, and FVC.

P20

Discordant perception of global health between COPD outpatients and their physicians – Real world data from the CLARA project

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Background: COPD patients suffer from respiratory symptoms and limitations in daily life impacting on their global health status. However, perception of global health status may differ between patients and their physicians.

Methods: We conducted a national, cross-sectional study among pulmonologists and general practitioners in Austria. The St. George's Respiratory Questionnaire for COPD patients

(SGRQ-C) was used. Furthermore, we asked, independent from each other, the patient as well as the treating physician to estimate the global health status of the patient (excellent, good, fair, poor, very poor).

Inclusion criteria were a physician's diagnosis of COPD and age ≥ 40 years. Subjects with a history of lung surgery, lung cancer or COPD exacerbation within the last four weeks were excluded.

Results: 67 pulmonologists and 6 general practitioners participated and enrolled 1,175 COPD patients. Of those 248 patients did not fulfill the GOLD criteria for COPD (FEV1/FVC ≥ 0.7) and 77 were excluded due to missing data. Finally, 850 patients (62.8 % men; mean age 66.2 ± 0.3 (SE) years; mean FEV1%pred. 51.5 ± 0.6 (SE)) were analyzed.

In 48.7 % of study participants, patients and physicians disagreed on the global health status. In 29.7 % it was estimated better by the physician than by the patient (overrated patients), and in 19.0 % it was underrated. Multivariate regression analysis indicated that overrated patients had a statistically significant better lung function (FEV1), less exacerbations and a lower total SGRQ-C score compared to underrated patients.

Conclusions: In stable COPD outpatients, treated by pulmonologists and general practitioners, the global health status, most likely indicating the burden of COPD, tends to be overestimated by physicians in patients with milder airway obstruction and less exacerbations and underestimated in patients with more severe airway obstruction and frequent exacerbations. This discordant perception of global health might severely affect treatment options.

P21

Lowering of mean pulmonary artery pressure is a prognostic marker in pulmonary hypertension

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Background: Treprostinil (TRE), a prostacyclin analog, is effective for the treatment of pulmonary arterial hypertension and non-operable chronic thromboembolic pulmonary hypertension (CTEPH). We hypothesized that a greater change of hemodynamics is of prognostic value. Therefore, we evaluated effects of first-line subcutaneous (sc) TRE in patients with severe pulmonary hypertension (PH) and analyzed the prognostic value of hemodynamic response at 1 year on treatment.

Methods: Data was prospectively collected from patients with pre-capillary PH in WHO functional class III or IV, mean right atrial pressure of 10 mm Hg, and/or cardiac index ≤ 2.2 liters/min/m². Patients received first-line scTRE. Dose adjustments were performed individually according to clinical symptoms and side effects.

Results: Between 1999 and 2019 138 patients were treated with first-line scTRE. All patients were classified as non-low-risk at baseline (6MWD > 440, WHO functional class I or II, right atrial pressure < 8 mm Hg and cardiac index ≥ 2.5 L/min/m²). 18 (13 %) patients underwent double lung transplantation, and 59 (42.8 %) died of any cause. Overall survival rates at 1, 5, 10, and 15 years were 91 %, 57 %, 31 % and 29 %. The strongest predictor of outcome was change in mPAP after one year of scTRE. Change in mPAP -18.4 ± 7.9 mm Hg ($p=0.012$) was associated with the best subsequent survival of 12.7 ± 1.5 years.

Conclusions: Aggressive lowering of mPAP in the first year of treatment correlated with better survival.

P22

Institutional comparison of VATS segmentectomy to VATS lobectomy

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Aim: Aim of the study was to examine the perioperative and long-term outcome of patients after anatomical VATS segmental resection compared to anatomic VATS lobectomy.

Methods: The institutional VATS database was queried. Exclusion criteria for the lobectomy group were more complex procedures than a VATS lobectomy, neoadjuvant therapy, clinically nodal positive patients and patients with tumor diameter > 30 mm.

Results: The study population consisted of 362 patients (segmentectomy=63, lobectomy=299). Age and gender distribution did not differ in the two cohorts. Regarding perioperative results, patients after VATS segmentectomy had a shorter stay at the postoperative recovery room (228 min vs. 250 min, $p=0.005$), shorter chest drain duration (3 d vs 4 d, $p<0.001$), and a lower airleak rate (3.2 % vs 17.1 %, $p=0.005$). The shorter drainage duration did not result in a shorter hospital stay (7 d vs 8 d, $p=0.74$). For primary lung cancer patients (91.6 % in the lobectomy group, 72.2 % in the segmentectomy group), there was no difference in overall or progression free survival after a median follow-up of 55 months. Recurrence rates after segmental resection was 12.5 %, after a lobectomy 19.3 % ($p=0.258$), respectively.

Conclusions: VATS segmental resections in carefully selected patients result in comparable oncologic outcome while improving perioperative results.

P23

Persisting pulmonary impairment following severe SARS-CoV-2 infection, preliminary results from the CovILD study

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Background: In the 2002/2003 SARS1 outbreak, 30 % of survivors exhibited persisting structural pulmonary abnormalities months after infection. Yet to this day, there is no follow-up data in patients after severe COVID-19. In this prospective multicentre observational study, we aim to systematically evaluate the cardio-pulmonary damage in COVID-19 survivors at 6, 12, and 24 weeks after discharge.

Methods: At each visit, clinical examination, laboratory testing, blood gas analysis, lung function, thoracic HR-CT and echocardiography are conducted.

Results: Preliminary data from 82 consecutive patients was evaluated at the first follow-up visit, i. e. 6 weeks after discharge. Mean age was 56.7 years (63.4 % males); 43.9 % of patients had a positive smoking history. 54 patients (65.9 %) exhibited persistent symptoms, with dyspnoea ranking highest (36.6 %), followed by cough (19.5 %). 20 patients (24.4 %) showed persistent lung impairment (defined as FVC < 80 % and/or FEV1 < 80 %), while 31 patients (37.8 %) showed signs of hyperinflation (defined as RV > 120 %). 23 patients (28 %) showed reduced diffusion capacity (DLCO). 48 patients (58.5 %) showed left ventricular diastolic dysfunction. Importantly, serum NT-proBNP, D-dimer, and ferritin levels were found significantly elevated.

Conclusions: A major portion of COVID-19 survivors presented with persisting dyspnoea and lung function abnormalities. Altogether, our results indicate prolonged resolution and remodelling, implementation of our HR-CT scan findings will finally be key to exactly define the cardio-pulmonary damage after COVID-19. We are eager to present our data of 6 and 12 weeks follow-ups at the ÖGP 2020.

P24

Change in asthma management recommendations is associated with reduction of reliever usage in the real-world setting: a longitudinal retrospective claims data analysis in Burgenland

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Background: Asthma is one of the most common chronic respiratory diseases. Recommendations on pharmacological management underwent several changes over recent years. This study evaluates longitudinal drug prescription patterns in patients with asthma in a real-world setting in the Austrian State Burgenland.

Methods: All persons claiming at least one prescription of an anti-obstructive drug (AO) between 2005 and 2018 ($n=77664$, 46 % male, 54 % female) were extracted from an administrative database of the statutory health insurance in the Austrian State Burgenland (BGKK). Annual relative prevalence of patients with controller and reliever drug groups were calculated for patients with asthma.

Fig. 1 | P24

Results: Of the annual average of 197 500 insured patients 6.2 to 9.6 % claimed an AO medication. Distribution of the age groups 0–6, 7–17, 18–56 and >56 years was 4.0, 12.1, 39.4 and 44.6 %, respectively. Based on diagnoses (hospital and sick leave data), age (<56 years) and drug patterns an asthma cohort was selected (48 % of patients with AO). Annual relative prevalence of selected drug groups is presented in Fig. 1. From 2013 to 2014 the reduction in reliever drugs is associated with an increase in controller medication, in particular, combinations of inhaled corticosteroids (ICS) and Formoterol (F). Subgroup analyses show that this pattern is consistent in differently defined asthma cohorts, not present in a COPD cohort and more marked in asthma patients seen by a respiratory specialist. 2013 two large studies on the single inhaler treatment (SIT) concept were presented and in 2014 SIT was introduced in the GINA report.

Conclusions: Change in asthma treatment recommendation was effectively translated into practice in Burgenland.

P25

Pulmonary pressure/flow slopes during exercise as independent predictors of mortality in patients at risk for pulmonary hypertension

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Background: Patients with early pulmonary vascular disease (PVD) typically show an abnormal hemodynamic response to exercise. However, it is unknown whether pulmonary exercise hemodynamics are of prognostic relevance in patients with early PVD, independent from pulmonary resting hemodynamics. The aim of this study was to assess the association

of pulmonary exercise hemodynamics with all-cause mortality in patients with normal or mildly elevated pulmonary arterial pressure (PAP) at rest.

Methods: Patients with unexplained dyspnea and/or suspected PVD undergoing exercise right heart catheter (RHC) at our PH-clinic were retrospectively analysed. Exercise RHC was performed in case of a resting mPAP <25 mm Hg. In a first step, dichotomized resting-, submaximal- and maximal exercise hemodynamic variables were analysed using multivariate Cox regression, adjusted for sex and age, to identify prognostic cut-offs. Best cut-off for each variable was defined as the cut-off score with the smallest *p*-value. In a second step, the relevance of cut-offs, derived from the first model, was assessed using a multivariate model also accounting for age, sex, cardiopulmonary comorbidities, smoking history, and pulmonary resting hemodynamics.

Results: 207 patients were included (69 % female, age: 62 ± 13 yr, mPAP: 18 ± 4 mm Hg). Median observational-time was 4.3 yr (IQR: 2.0–8.5) with *N* = 40 (19 %) mortality events. MPAP/cardiac output (CO)-slope, transpulmonary gradient (TPG)/CO-slope and pulmonary arterial wedge pressure (PAWP)/CO-slope turned out as sex and age independent predictors of mortality. Best cut-offs were found at 7.5 mm Hg/L/min (mPAP/CO-slope), 3.9 mm Hg/L/min (TPG/CO-slope) and 6.0 mm Hg/L/min (PAWP/CO-slope). In the second model, correcting for age, sex, cardiopulmonary comorbidities, smoking history and pulmonary resting hemodynamics, mPAP/CO-slope (HR: 2.84, 95 %CI: 1.22–6.59; *p* = 0.015), TPG/CO-slope (HR: 2.60, 95 %CI: 1.17–5.82; *p* = 0.020) and PAWP/CO-slope (HR: 4.92, 95 %CI: 1.95–12.44; *p* = 0.001) remained significant predictors of all-cause mortality.

Conclusions: In patients with normal or mildly elevated PAP at rest, pulmonary pressure/CO-slopes are predictors of all-cause mortality, independent from age, sex, cardiopulmonary comorbidities and resting pulmonary hemodynamics.

P26

Mindfulness interventions in acute exacerbations of COPD – a feasibility study

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Background: Patients with acute exacerbations of COPD do not only suffer from physical symptoms but also from psychological distress and stress. As pharmacological interventions showed only limited effectiveness in targeting the latter, a need for alternative treatment options emerges. In other chronic conditions, mindfulness interventions are effective in reducing psychological distress and stress. However, research on mindfulness interventions in COPD is still scarce and not focusing on exacerbations. Therefore, the present study reviewed the existing literature and explored the acceptability, feasibility, and implementation of mindfulness interventions focusing on exacerbations in COPD patients.

Methods: Firstly, literature examining mindfulness interventions in COPD patients was reviewed. Secondly, a qualitative and explorative study using semi-structured interviews was conducted. The sample consisted of 10 COPD patients (60 % women; M=74.40 years, SD=8.30) hospitalised after an acute exacerbation. Data were analysed using thematic analysis.

Results: The literature review yielded eight studies, providing preliminary evidence for the feasibility and effectiveness of mindfulness interventions in COPD patients. The qualitative analysis revealed five main findings: (1) Patients express an openness and need for new treatment approaches. (2) Mindfulness is difficult to differentiate from other mind-body concepts. (3) Implementation conditions are crucial for patient's interest. (4) Limitations of the application of interventions must be considered. (5) Not interested patients differ from interested ones.

Conclusions: Hospitalized COPD patients showed a strong interest in new treatment approaches like mindfulness interventions. Focusing on mindfulness interventions during exacerbations seem acceptable and feasible. Future studies investigating those are needed and should consider implementation conditions, patients' needs and physical limitations.

P27

TRICOP – A real-world effectiveness study with a single-inhaler extrafine triple therapy over 52 weeks in Austrian patients with COPD

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Background: Available evidence of the efficacy of single-inhaler triple therapy in patients with COPD derives from RCTs and has not been assessed in real-world settings in Austria. The aim of this NIS was to evaluate tolerability and effectiveness

of extrafine beclomethasone-dipropionate, formoterol-fumate and glycopyrronium (BDP/FF/G, Trimbrow[®] 87/5/9 µg) in patients with COPD.

Methods: A prospective, multicenter NIS was conducted over 52 weeks in pulmonary and general practices in Austria in 2018/19. Eligible patients with COPD had an indication for treatment with BDP/FF/G according to the summary of product characteristics. In addition to tolerability, lung function, exacerbation rate, symptom scores and COPD assessment Test (CAT) were recorded.

Results: 265 patients (male 66 %, mean age 67 years) with moderate to very severe airflow limitation (GOLD Grade 2–4: 96.2 %) and persistent symptoms (GOLD B: 62.3 %, GOLD D: 34 %) according to the 2018 GOLD Report were included. By end of 52 weeks, lung function parameters (FEV1, FEV1 %, and FVC; $p < 0.001$) and symptoms (cough, sputum and shortness of breath; $p < 0.001$) improved significantly compared to baseline.

A clinically-relevant improvement from baseline in CAT score was observed at week 12 and persisted at week 52 in GOLD B (from 22.1 to 15.3 points; $p < 0.001$) and GOLD D (from 25.5 to 16.6 points; $p < 0.001$) patients. A significant reduction of moderate and severe exacerbations over the study period was also observed (57.4 % and 27.3 % respectively; $p < 0.001$). By end of 52 weeks, 93.7 % continued on the treatment. There were 21 adverse reactions reported, of which 16 were non-serious (e.g. oral mycosis) and five were serious, but none of which were deemed drug-related.

Conclusions: Results of this study support the tolerability and effectiveness of BDP/FF/G in patients with COPD in a real-world setting. Patients treated with extrafine BDP/FF/G experienced an improvement in lung function, symptom control and reduction in exacerbations.

P28

Tests for diagnostics of COVID-19 – principles and approvals of commercially available tests

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In December 2019 an unknown viral infection was firstly described in a local fish and wild animal market in Wuhan/China which was identified as a novel coronavirus infection by the Chinese Center for Disease Control and prevention (CCDC) on Jan. 7th 2020 and announced as 2019–new coronavirus disease (2019–nCoV, now COVID-19) by the World Health Organization (WHO) on Feb. 11th 2020. Rapidly spreading across the globe up to begin of August 2020 at least 18 million of infections and 650000 deaths were reported worldwide. Therefore, there was an urgent need of laboratory tests. In our analysis we looked for commercially available COVID-19 tests. At July 31th 2020 at least 280 commercially available tests were described (<https://www.360dx.com/coronavirus-test-tracker-launched-covid-19-tests>). Of these, 193 are based on PCR methods (mostly PCR, qPCR) (with Federal Drug Agency (FDA; very most) or Center of Disease Control (CDC; few) Emergency Use Authorization

(EUA)/with CE-mark/with EUA and CE-mark: 161(12 pending)/60(28) serving as gold standard for virus diagnostics after sampling of nasal/throat swabs in acute infection or other molecular methods (isothermal amplification (4/0/0), CRISPR (2/0/0), sequencing (2/0/0) and others (1/0/0). 3 more tests (1/1/1) are based on immunological antigen detection of virus peptides after sampling of nasal/throat swabs in acute infection which are typically POCT tests based e.g. on immunofluorescence-based lateral flow technology or chromatographic digital immunoassay providing results in a few minutes. 71 tests (50(16 pending, 1 revoked)/34(14) allow measurement of immunoglobulines IgM, IgA and IgG alone/in combination in blood samples and provide information on the immune status after convalescence. Analytical principles of these are different and some (e.g. lateral flow assays) serve for rapid diagnostics. In summary, number and quality of tests rapidly increased. Recent development is based on regulatory guidelines (e.g. <https://www.gov.uk/government/publications/how-tests-and-testing-kits-for-coronavirus-covid-19-work>) and includes also combined tests for discrimination against other diseases (e.g. influenza).

P29

Serum tumor marker dynamics as predictive biomarkers in NSCLC chemo-immunotherapy and mono-immunotherapy maintenance – a retrospective cohort study

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Objectives: To evaluate serum tumor markers (STM) as biomarkers for treatment, monitoring and prognosis in advanced non-small cell lung cancer (NSCLC) treated with chemoimmunotherapy.

Methods: Patients having received platinum-based doublet chemotherapy (CHT) and PD-1/PD-L1-directed immune checkpoint inhibitor (ICI) combination therapy were retrospectively followed. Carcinoembryonic antigen (CEA), carbohydrate antigen 19-9 (CA19-9), cytokeratin-19 fragments (CYFRA 21-1) and neuron specific enolase (NSE) were routinely measured at NSCLC diagnosis. The marker with the highest relative elevation was defined “leading STM”, its change was assessed between CHT-ICI initiation as well as first mono-ICI maintenance therapy and the respective subsequent restaging. Corresponding computed tomography (CT) evaluations were analyzed according to response evaluation criteria in solid tumors (RECIST). For both CHT-ICI and ICI-maintenance phase, STM and RECIST response were evaluated regarding progression-free (PFS) and overall survival (OS) in Kaplan-Meier analyses.

Results: Among 80 CHT-ICI patients (41 % women, mean age 63 years), median PFS was 5 months (M; 4,9) and median OS was 15 M (10, /). PFS was significantly ($p=0.042$) longer, when STM concomitantly decreased (9 M (5,12; $n=41$)) vs. 5 M (3,6; $n=16$). In the 54 (67.5 %) patients who received mono-ICI maintenance, STM decrease was associated with significantly ($p<0.001$) longer PFS (16 M (7, /; $n=16$) vs. 3.5 M (2,6; $n=22$)). Median OS was not reached in most subgroups in both treatment phases. Patients with radiologically stable or progressive disease and concomitant STM decrease vs. increase had similar PFS in the CHT-ICI setting (4 M (3,7; $n=16$) vs. 4.5 (2,6; $n=14$)), but longer PFS in the mono-ICI maintenance setting (13 M (7,16; $n=10$) vs. 3 M (2,4; $n=17$)).

Conclusions: Leading STM dynamics provide prognostic information additional to radiological response evaluation in CHT-ICI patients, especially in the ICI maintenance setting.

P30

Disturbed innate lymphoid cell function in a mouse model of systemic sclerosis

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Background: Systemic Sclerosis is a chronic autoimmune disease characterized by inflammation and tissue remodelling. Increases in the expression and of the AP-1 transcription factor Fra-2 has been shown in the skin of these patients. In mice ectopic overexpression of Fra-2 leads to a systemic sclerosis phenotype, strongly affecting the skin and lung. Fra-2 transgenic mice show pronounced pulmonary inflammation, vascular remodelling and lung fibrosis. Although, the role of several immune cells such as macrophages, B and T lymphocytes has been investigated, the contribution of innate lymphoid cells (ILC) to disease pathogenesis remains elusive. The focus of this study was to determine the development and function of ILC and their role in Scleroderma.

Methods: Multi-colour flow cytometry was used to evaluate the inflammatory cell landscape in Fra-2 transgenic mice in a time dependent manner. Primary cells were isolated and functional assays e.g. apoptosis (caspase activation) and proliferation (ki67 staining and cell counts) were performed in vitro.

Results: Pronounced changes in the inflammatory profile of the lung were observed in a time dependent manner, with increased numbers of T cells and eosinophils and reduced ILC. Similar changes were also reflected in the blood, spleen and liver. Isolated ILC exhibited decreased proliferation and functional activity. Importantly, reduced numbers and function of ILC was already observed before the first signs of lung fibrosis, as assessed by collagen deposition and lung function measurements.

Conclusions: This early dysregulation suggests that ILC play an important role in the development of lung fibrosis in Scleroderma and restoration of ILC could prevent the progression of the disease.

P31

Pirfenidone exacerbates inflammatory influx to the lung in a mouse model of systemic sclerosis

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Background: Systemic sclerosis (SSc) is an autoimmune disorder leading to fibrosis of skin and other internal organs. One SSc hallmark is severe vasculopathy with impaired vascular permeability and tone as an early disease manifestation. Pulmonary complications are the main cause of mortality in patients, but treatment options are still limited. Pirfenidone is approved for the treatment of idiopathic pulmonary fibrosis (IPF), however its effectiveness in SSc-PF is still unknown. Here, we investigated the effectiveness of pirfenidone in a preclinical SSc-PF model, the Fra-2 transgenic (TG) mouse.

Methods: Fra-2 TG and wild-type (WT) control mice received either standard or pirfenidone supplemented diet. Pulmonary function testing, fibrosis quantification, inflammatory cell profiling of bronchoalveolar lavage (BAL) and lung tissue as well as transcriptome analysis of lung homogenates was performed. Using in vitro electric cell impedance sensing measurements pirfenidone effects on endothelial cell permeability were analysed.

Results: Compared to WT mice, TG mice had decreased lung function and elevated levels of inflammatory cells in BAL and lung. Pirfenidone exacerbated this phenotype further by increasing collagen deposition and worsening lung function. These functional and structural changes were associated with significantly higher lung tissue and BAL inflammation, characterized by predominant eosinophilic infiltration in pirfenidone-treated TG mice. Of note, pirfenidone did not alter lung function, collagen deposition or inflammation in WT mice. Transcriptomic profiling indicated the activation of inflammatory cell recruitment and extravasation pathways with significant downregulation of the endothelial cell barrier protein VE-Cadherin. Further, pirfenidone led to decreased resistance of pulmonary microvascular endothelial cell monolayers in vitro.

Conclusions: Pirfenidone was associated with significant deterioration of lung function and elevated inflammatory infiltrates in the lungs of SSc mice. Our study shows that this effect might be due to disturbances of endothelial cell integrity upon pirfenidone treatment especially in diseases with a predisposed vasculature such as SSc.

P32

Patient sex and response to PD-1/PD-L1 inhibitor therapy in advanced NSCLC – a retrospective bi-centric cohort study

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Background: In the recent years immune checkpoint inhibitors (ICI) used to treat advanced non-small-cell lung cancer have significantly gained ground. Due to the controversial data regarding differences in response to ICI between men and women, we aimed to evaluate gender-related differences concerning progression-free (PFS) and overall survival (OS).

Methods: Employing a retrospective approach, we collected and analyzed data of all patients with advanced non-small-cell lung cancer who received ICI monotherapy with atezolizumab, nivolumab or pembrolizumab at the Kepler university hospital Linz between May 2015 and December 2019. Kaplan-Meier analyses were used to evaluate PFS and OS. Uni- and multivariate Cox-regression analyses were calculated to show the impact of influencing variables.

Results: Of 228 patients, 166 persons died (72.8%). Regarding to the 136 male patients, 99 died (72.8%). For female patients it was 69 out of 92 (72.8%). Kaplan-Meier analyses showed no significant difference for PFS (median length 3,5 months, $p=0.273$) or OS (median length 10 months, $p=0.592$) between men and women. With regards to gender related predictors of outcome like PD-L1 expression or ECOG-Score, we observed considerable differences: PD-L1 expression could be shown a significant predictor for PFS and ECOG status predicted OS in men. However, we could not verify any significant predictors for female patients.

Conclusions: In our retrospective research covering 228 participants, we could not verify the higher chance of survival among male patients, frequently mentioned in previous studies. The finding that we could not verify any significant predictors for female patients shows the necessity for further research in that field especially in women.

P33

Changes in pulmonary artery endothelial cell composition in pulmonary hypertension

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Background: Endothelial cells (EC) represent a key cell type in the homeostatic regulation of vascular and lung function, including vasoreactivity, coagulation, immune processes and barrier function. Disturbances in EC function have been associated with development and progression of pulmonary hypertension, both in its idiopathic form or associated with interstitial lung disease. However, it is not clear whether these functional changes are associated with altered EC composition.

Methods: We performed single cell RNA sequencing on pulmonary arteries isolated from donors and pulmonary hypertension patients. Bioinformatics analysis was conducted to gain unbiased insight into EC heterogeneity at the single cell level. Multiplex immunofluorescence staining was combined with confocal imaging of lung tissue samples to assess the spatial heterogeneity of pulmonary artery EC.

Results: Our data revealed that EC in adult human pulmonary arteries are composed of three major populations. Each population was characterized by enrichment in a specific set of biological processes determining their distinct functional roles.

Multiplex imaging analysis confirmed in situ relative frequencies of EC populations and revealed their characteristic spatial distribution throughout the pulmonary artery tree. Arteries in pulmonary hypertension patients displayed altered composition of EC population characterized by the diminished presence of one cell cluster.

Conclusions: In this study, we have revealed EC heterogeneity in the human pulmonary arteries at a single cell resolution and uncovered evidence for their distinct functional specification. Cellular therapy aimed at restoration of the affected cluster or expression of their key genes could serve as a potential therapeutic option in treatment of pulmonary hypertension.

P34

Clinical relevance of exercise hemodynamics and right ventricular function in COPD patients

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Background: Pulmonary hypertension (PH) is a frequent complication of COPD and is associated with poor survival. However, pulmonary and right ventricular hemodynamics and their association with physical capacity in COPD patients with out-of-proportion dyspnea is unknown. In this study we hypothesized that COPD patients show abnormal hemodynamics during exercise, associated with impaired exercise capacity.

Methods: Out of outpatients with unexplained dyspnea, COPD patients with mPAP < 25 mm Hg and age and sex matched controls without COPD and mPAP < 25 mm Hg, who underwent right heart catheterization at rest and during symptom-limited ergometer exercise, were compared.

Results: We analyzed 26 COPD patients (66 ± 11 yr, FEV1: 56 ± 25 %) and 26 controls (66 ± 10 yr, FEV1: 96 ± 22 %). In COPD, resting mPAP and PVR were slightly elevated (median: 21 (IQR:18–23) vs. 17 (14–20) mm Hg, $p=0.022$ and 2.5 (1.9–3.0) vs. 1.9 (1.5–2.4) WU, $p=0.020$). At peak exercise, mPAP and PVR were markedly elevated (47 (40–52) vs. 38 (32–44) mm Hg, $p=0.015$ and 3.1 (2.2–3.7) vs. 1.7 (1.1–2.9) WU, $p=0.028$), whereas pulmonary vascular compliance (PVC) and right ventricular output reserve (0.9 (0.5–1.2) vs. 1.3 (0.7–1.8) mm Hg, $p=0.020$ and 1.9 (1.6–2.6) vs. 3.0 (2.0–4.4) ml/mm Hg, $p=0.045$) were significantly reduced. MPAP/CO-slope (6.9 (5.5–10.9) vs. 3.7 (2.4–7.4) mm Hg/L/min, $p=0.007$) and transpulmonary gradient (TPG)/CO-slope (3.5 (1.6–4.5) vs. 1.6 (0.9–3.5) mm Hg/L/min, $p=0.048$) were significantly steeper in COPD. Compared to controls, COPD patients had worse exercise performance (peak oxygen uptake (VO₂) (65 (55–82) vs. 95 (87–102) %predicted, $p<0.001$). Moreover, peak VO₂ was significantly correlated with peak exercise mPAP ($p=0.001$, $r=-0.540$), PVR ($p=0.001$, $r=-0.568$), PVC ($p=0.008$, $r=0.495$), pulmonary arterial stiffness index ($p<0.001$, $r=-0.591$), RV output reserve ($p=0.008$, $r=0.456$), mPAP/CO-slope ($p=0.006$, $r=-0.491$) and TPG/CO-slope ($p=0.013$, $r=-0.429$).

Conclusions: In COPD, pulmonary and right ventricular hemodynamics are markedly changed as compared to patients without COPD. These findings are strongly associated with exer-

cise capacity and may represent an important exercise-limiting factor. Validation in a larger cohort is warranted.

P35

No indication of insulin resistance in idiopathic PAH with preserved physical activity

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Background: There is a growing interest in metabolic profiling of pulmonary arterial hypertension (PAH) due to current findings suggesting significant metabolic changes causing pulmonary arterial remodeling and linking PAH to insulin resistance. Such findings may have major impact on future diagnostic and therapeutic strategies for PAH. However, most of the studies have enrolled patients with severe disease whose reduced physical activity may have a profound effect on insulin sensitivity. We aimed to directly measure insulin sensitivity in IPAH patients by applying the gold standard method Botnia-clamp.

Methods: We assessed insulin sensitivity in five non-diabetic, normal weight patients with severe idiopathic PAH and preserved physical activity in comparison to their age-, sex-, and body composition matched non-diabetic healthy controls. For assessing insulin sensitivity, the hyperinsulinemic-euglycemic (Botnia) clamp was performed in a simultaneous pairwise matched-control manner.

Results: In this study we detected no indication of insulin resistance in patients characterized by manifest IPAH but no major limitations in their daily physical activity. Both IPAH and control groups displayed normal efficacy of glycemic control. The Botnia clamp measurements showed no differences in insulin response or insulin sensitivity in any of the IPAH patients when compared to their healthy controls and also the comparison of the groups showed no significant differences. In IPAH, the whole-body glucose disposal capacity in response to insulin infusion showed the same characteristics as in healthy controls.

Conclusions: This study does not support insulin resistance to be a primary cause of pulmonary vascular remodeling in IPAH.

P36

Beneficial effects of multidisciplinary rehabilitation in post-acute COVID-19

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Background: The Corona Virus Disease 2019 (COVID-19) pandemic increases the demand for post-acute care in patients after a severe disease course. Various longterm sequelae are expected and physical and rehabilitation medicine (PRM) is challenged to support the recovery both physically and mentally. The aim of this study was to explore dysfunctions and outcome of COVID-19 survivors after early post-acute rehabilitation.

Methods: This study analysed the rehabilitative outcomes of a subgroup of patients included in a prospective observational multicenter study to investigate long-term sequelae in patients hospitalized for SARS-Cov-2 infection.

Results: A total of 23 subjects discharged after severe to critical COVID-19 infection underwent an individualized, multiprofessional treatment plan. Despite a high proportion of patients requiring mechanical ventilation with consequent symptoms of post intensive care syndrome, indices of performance status and pulmonary parameters improved significantly.

Conclusions: Covid-19 survivors show varying degrees of physical and psychological dysfunctions in the early period of recovery after hospital discharge. In this phase, patients strikingly benefit from multidisciplinary inpatient rehabilitation, but the course of residual impairments remains unclear.

P37

Assessing self-medication for obstructive airway disease during Covid-19 using Google trends

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Background: Coinciding with the outbreak of Covid-19 and its associated lockdown, we experienced a dramatic decrease in chronic obstructive pulmonary disease (COPD)-related hospitalizations at the Department of Internal Medicine at the University Hospital of Innsbruck. We therefore thought of using Google's search engine data analysis tool Google Trends to investigate whether patients suffering from COPD and/or

asthma may have consulted the internet for self-medication advice.

Methods: On July 01 2020, we queried Google Trends for the terms "coronavirus asthma", "-COPD", "-hypertension", "-diabetes" and "-cancer", all representing pre-existing conditions constituting a major risk for Covid-19. When further exploring the health-seeking behavior of patients affected by asthma and/or COPD during the Covid-19 outbreak, we focused on those therapeutic approaches with the highest RSV world-wide and thus comparable.

Results: We observed highest RSV for "coronavirus asthma" followed by "coronavirus diabetes" and "coronavirus cancer", "coronavirus hypertension" ranked fourth together with "coronavirus COPD". Paralleling the world-wide Covid-19 outbreak, highest RSV was seen for the topics "Salbutamol", "Montelukast", "Ipratropium bromide", "Beclometasone", and "Fluticasone propionate", encompassing mainly relievers, followed by inhaled corticosteroids (ICS).

Conclusions: Despite other risk factors like hypertension having been largely debated in the media, our analysis revealed highest search volumes for asthma. Considering the GINA guidelines in which the authors explicitly state that asthma treatment should no longer be based solely on short-acting bronchodilators, our data clearly indicates a fail in reaching asthma patients with respective fundamental changes in therapy. Even more alarming is the high search volume for Montelukast, since the FDA released a boxed warning for Montelukast in March 2020 because of serious neuropsychiatric side-effects. Our findings emphasize the urgent need of spreading guidelines and respective updates in a timely manner more intensively in order to reach the general public—especially in a world with an ongoing, potentially life-threatening pandemic.

P38

Is there a difference in local disease control between a VATS and thoracotomy approach?

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Background: Differences in oncologic outcome between VATS and open thoracotomy have not yet been thoroughly investigated for NSCLC. Most studies suggest a similar outcome, but nodal upstaging as a quality parameter is frequently reported to be higher in thoracotomy patients. If more positive lymph nodes are missed by VATS, pN0 in these patients should result in a higher failure rate of local disease control. In this study we analyze the difference of VATS to open thoracotomy regarding above mentioned parameters.

Methods: The institutional database was queried. Exclusion criteria were pathologic nodal positive status, metastatic disease, tumour size >4 cm, adjuvant/neoadjuvant therapy. 422 patients were included. The VATS cohort included 350 patients, the thoracotomy cohort 72 patients.

Results: A VATS approach in patients with pathologic N0 disease did not show a significantly higher rate for local or lymph node recurrence compared to thoracotomy (12.9 % vs. 19.4 %; $p=0.142$). There was no difference in disease-free and overall survival comparing the two groups. Comparing the location of recurrence, thoracotomy patients showed a significantly higher rate of metastatic disease (3.04 % vs. 11.54 %; $p=0.014$),

most likely due to a longer follow-up time. Other clinical factors did not differ between groups.

Conclusions: VATS lobectomy does not result in a higher rate of local disease recurrence, suggesting adequate lymph node dissection with this approach. Other factors than the surgical technique might be responsible for nodal upstaging, therefore nodal upstaging should no longer be used as a quality marker for lymph node dissection.

P39

SARS-CoV-2-specific antibody seroprevalence in a general population – The Viennese LEAD COVID-19 Study

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Background: The only reasonable method for testing the actual rate of SARS-CoV-2 infections in a given population is by antibody testing from a representative population-based sample.

Methods: Participants of the LEAD Study, a population-based cohort study, representative for the Viennese population, and their household members were invited. The study took place from mid-April to mid-May 2020. Anti-SARS-CoV-2 immunoassay and neutralization test were performed. A ques-

tionnaire related to COVID-19 specific symptoms was filled out by all participants.

Results: 12,419 subjects participated (5,984 LEAD participants, 6,440 household members). The projected number of cases according to age and sex for Vienna is 21,504 cases (1.13 %). The cumulative number of positive tested cases in Vienna until May 20th was 3,020. Hence, the projected number is 5.5 to 9.1 times larger than the observed cases. The relative risk of seropositivity by age was highest for children aged 6–9 years [RR 1.21 (CI 0.37–4.01)] and lowest for subjects 65 years and older [RR 0.47 (CI 0.21–1.03)]. Half of the infected subjects developed no or mild symptoms. In a multivariate analysis (Fig. 1) taste and smell disturbances were most strongly related to SARS-CoV-2-specific antibody positivity. The infection probability within households with one confirmed SARS-CoV-2-specific antibody-positive person was 31 %, about 30 times higher than the general ambulatory infection risk.

Conclusions: Prevalence rates in Vienna are low (1.13 %) with the highest seroprevalence in young children and lowest in older (≥65 years) inhabitants. Taste and smell disturbances are very prevalent in COVID-19 infected persons and can guide clinicians in diagnosis- and decision making of COVID-19.

P40

Distribution and prognostic significance of gluconeogenic and glycolytic phenotypes in non-small cell lung cancer

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Background: Inhibition of glycolysis has been considered as a therapeutic approach in aggressive cancers including lung cancer. Abbreviated gluconeogenesis, mediated by phosphoenolpyruvate carboxykinase (PEPCK), was recently discovered to partially circumvent the need for glycolysis in lung cancer cells. However, the interplay of glycolysis and gluconeogenesis in lung cancer is still poorly understood.

Methods: We analyzed the expression of GLUT1, the prime glucose transporter, and of PCK1 and PCK2, the cytoplasmic and mitochondrial isoforms of PEPCK, in 450 samples of non-small cell lung cancer (NSCLC) and in 54 NSCLC metastases using tissue microarrays and whole tumor sections. Spatial distribution was assessed by automated image analysis. Addition-

Fig. 1 | P39 Relationship between symptoms and presence of SARS-CoV-2 specific antibodies in multivariate analysis

Fig. 1 | P40 Glycolysis and gluconeogenesis markers in NSCLC and differences according to histology and tumor size. **a** Examples of strong or moderate (1st row) versus weak/negative IHC staining (2nd row) for PCK1, PCK2, LDHB and GLUT1 in tumors and normal lung tissue (3rd row). Scale bar = 50 microm. **b** Comparison of IHC scores in adenocarcinoma (AD) and squamous cell carcinoma (SC). *** $P < 0.001$. **c** Frequency of glycolytic (GLUT1 positive, PCK1/2 negative), gluconeogenic (GLUT1 negative, PCK1 or PCK2 positive) and mixed phenotypes (GLUT1 positive and PCK1 or PCK2 positive). Samples without immunopositivity for either PCK1, PCK2 or GLUT1 were defined as „unspecified“. LUAD, lung adenocarcinoma; LUSC, lung squamous cell carcinoma. **d** Waterfall plot visualizing combined PCK1/2 IHC scores and GLUT1 scores in a total of 317 NSCLC patients.

ally, glycolytic and gluconeogenic gene expression was inferred from The Cancer Genome Atlas (TCGA) datasets.

Results: PCK2 was preferentially expressed in the lung adenocarcinoma subtype, while GLUT1 expression was higher in squamous cell carcinoma. GLUT1 and PCK2 were inversely correlated, GLUT1 showing preferential expression in larger tumors while PCK2 was highest in smaller tumors. However, a mixed phenotype showing the presence of both, glycolytic and gluconeogenic cancer cells was frequent. In lung adenocarcinoma, PCK2 expression was associated with significantly improved overall survival compared to glycolytic or mixed tumors, while the opposite was found for GLUT1. PCK1/2 expression was enhanced in metastases compared to primary tumors. The metabolic tumor microenvironment and the 3-dimensional context play an important role in modulating both pathways, since PCK2 expression preferentially occurred at the tumor margin and hypoxia differentially regulated glycolysis and gluconeogenesis in NSCLC cells in vitro.

Conclusions: Glycolysis and gluconeogenesis are activated in NSCLC in a tumor size and oxygenation dependent manner and show a differential correlation with outcome. The frequent co-activation of gluconeogenesis and glycolysis in NSCLC should be considered in potential future therapeutic strategies targeting cancer cell metabolism.

P41

Prevalence of positive skin prick test and associated risk factors within a general population – data from the Austrian LEAD study

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Background: Skin prick test (SPT) is a minimal invasive diagnostic test, identifying Type-I-sensitization, which is associated with symptoms as wheezing, atopic dermatitis and rhinitis. Prevalence data vary between countries from 37.7 %–68.6 %. Data about the prevalence in Austria are scarce. Moreover, associated factors for positive SPT have only been investigated in specific age- (e.g. children or adults only) and subgroups (e.g. asthmatics). Therefore, our aim was to investigate the prevalence of positive SPT in a general Austrian population, to define associated factors and compare the prevalence and associated factors between childhood and adulthood.

Methods: Data was obtained from the LEAD Study, an observational, population-based cohort. We included 11.283 participants with a valid SPT and analyzed two age groups separately: childhood (6–18 yrs; $N = 1439$) and adulthood (19–82 yrs, $N = 9844$). Multivariate regression model was used to identify factors associated with positive SPT including socioeconomic status, allergic and/or respiratory diseases, lung function, body composition, lifestyle habits, smoking exposure, pet exposure, and family history.

Results: In our study the overall prevalence of a positive SPT is 37.6 % and is higher in male compared to female in all age pins (Fig. 1). House dust mite and grasses mix are the most prevalent allergens. Factors positively associated with positive SPT in childhood are doctor’s diagnosed allergy or asthma and diagnosed parental allergy; in adulthood are doctor’s diagnosed allergy or asthma, diagnosed parental allergy, and high socioeconomic status. Smoking (current, former and secondhand) is

Fig. 1 | P41 Prevalence of positive SPT by age and gender

negatively associated with positive SPT in adulthood, but not in childhood.

Conclusions: Our study in an Austrian general population identified that 1. positive SPT is highly prevalent, 2. is more prevalent in male, 3. the main allergens observed are grasses mix and house dust mite, and 4. there is a difference in factors associated with SPT in childhood vs adulthood.

P42

Neutrophil recruitment in the acute inflammatory phase of interstitial lung disease is determined by RGS5

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Background: Acute exacerbation of interstitial lung disease (ILD) is associated with a poor prognosis and high mortality. The regulator of G protein signaling5 (RGS5) is present in the lung as well as in neutrophils. However, the potential of RGS5 to limit neutrophilic hyperinflammation and thus disease progression in acute exacerbation has not been explored so far.

Methods: To investigate the functional relevance of RGS5 in vivo, we examined the acute inflammatory bleomycin response phase of pulmonary fibrosis utilizing RGS5 knock out (RGS5^{-/-}) and wild type (WT) mice at age 12–16 weeks (equivalent to adult age in humans). The lipopolysaccharide (LPS)-induced acute lung injury model was used as a second model. The in-vivo studies were extended with analysis of the chemokine levels in the lung, the migratory behavior of the neutrophils obtained from WT and RGS5^{-/-} animals and the downstream pathways in-vitro.

Results: In the acute phase of pulmonary fibrosis, RGS5^{-/-} mice had preserved lung function as compared with WT mice which showed significant combined ventilatory disorders. Analysis of specific immune cell subpopulations in bronchoalveolar lavage fluid (BALF) and lung tissue showed a significant attenuation in the total cell number in the BALF of RGS5^{-/-} animals, predominantly made up of neutrophils and lowered myeloperoxidase (MPO) enzymatic activity in lung tissue. A similar picture was seen in the LPS lung injury model. Our in-vitro

assays showed significantly reduced migration of RGS5^{-/-} neutrophils towards chemokines with preserved intra-cellular calcium signaling. Importantly, the attenuated neutrophil migration was associated with activated RhoA, suggesting RhoA as a predominant negative regulator of neutrophil transmigration.

Conclusions: Our findings demonstrate the efficacy of silenced RGS5 for suppressing neutrophilic hyperinflammation in two different animal models. The specific effects of RGS5 loss might provide an option for a novel therapeutic intervention in inflammatory lung diseases with recurrent exacerbations, without compromising infection defense mechanisms.

P43

Endothelial dysfunction following enhanced TMEM16A activity in human pulmonary arteries

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Background: Endothelial dysfunction is one of the hallmarks of different vascular diseases, including pulmonary arterial hypertension (PAH). Ion channelome changes have long been connected to vascular remodelling in PAH, yet only recently the focus shifted towards Ca²⁺-activated Cl⁻ channels (CaCC). The most prominent member of the CaCC TMEM16A has been shown to contribute to the pathogenesis of idiopathic PAH (IPAH) in pulmonary arterial smooth muscle cells, however its role in the homeostasis of healthy human pulmonary arterial endothelial cells (PAECs) and in the development of endothelial dysfunction remains underrepresented.

Methods: Using healthy donor ($n=3$) and IPAH ($n=3$) lungs, we analysed the expression of TMEM16A in primary human PAECs. IPAH was mimicked with selective adenoviral overexpression encoding TMEM16A tagged with mCherry. TMEM16A activity was investigated by patch clamp. Live cell Ca²⁺ imaging was applied to detect changes in Ca²⁺ homeostasis. PAEC proliferation, apoptosis, tube-formation, wound healing assay, NO production and measurements of PAECs metabolic state addressed functional consequences of increased TMEM16A activity. The role of endothelial TMEM16A in the tone of pulmonary arteries ex vivo was investigated by wire myography.

Results: Here we report enhanced TMEM16A activity in IPAH PAECs. Upon TMEM16A overexpression in healthy primary human PAECs in vitro and in human pulmonary arteries

ex vivo, we demonstrate the functional consequences of the augmented TMEM16A activity: alterations of Ca²⁺ dynamics and eNOS activity as well as decreased NO production, PAECs proliferation, wound healing, tube-formation and acetylcholine-mediated relaxation of human pulmonary arteries. We propose, that ERK1/2 pathway is specifically affected by elevated TMEM16A activity, leading to these pathological changes.

Conclusions: With this work we introduce increased TMEM16A activity in the outer cell membrane of human PAECs important for the development of endothelial dysfunction in IPAH.

P44

Metabolic syndrome and visceral adipose tissue (VAT) are associated with obstructive and restrictive lung function impairment

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Background: Metabolic syndrome (MetS), in particular increased central obesity is associated with cardiovascular events but also lung function (LF) impairment. The aim was to investigate whether LF impairment is associated with increased levels of visceral adipose tissue (VAT).

Fig. 1 | P44 Odds ratios of the metabolic syndrome and VAT associated with impaired lung function pattern

	abnormal LF (FEV ₁ pre BD < LLN)	obstructive LF (FEV ₁ pre BD < LLN + FEV ₁ /FVC post BD < LLN)	restrictive LF (FEV ₁ pre BD < LLN + FEV ₁ /FVC post BD ≥ LLN + FVC post < LLN)
adults 25-82 years - n=9.157	n=670 (7.3%)	n=279 (3.0%)	n=160 (1.7%)
	OR [95% CI]	OR [95% CI]	OR [95% CI]
waist circumference (male: >94cm, female: >80cm)	n.s.	n.s.	n.s.
triglycerides (≥150mg/dl or medication)	n.s.	0.7 [0.5-1.0]*	n.s.
HDL (male: <40mg/dl, female: <50mg/dl or medication)	1.2 [1.0-1.5]*	1.5 [1.1-2.2]*	n.s.
fasting plasma glucose (≥100mg/dl)	n.s.	n.s.	1.7 [1.1-2.8]*
blood pressure (systolic ≥130 or diastolic ≥85mmHg or medication)	n.s.	n.s.	n.s.
VAT mass (>1 z-score)	1.6 [1.4-1.9]**	1.5 [1.3-1.8]**	2.4 [1.8-3.0]**

** p<0.001, *p<0.05, OR = odds ratio.

Methods: Data was obtained from the Austrian LEAD Study, an observational, population-based cohort study. Adults aged 25-82 years with valid LF and metabolic data, including waist circumference (WC) for central obesity, and DXA Scan for VAT (n=9.157) were included in this analysis. LF was assessed by spirometry pre- and post-bronchodilation (BD). Abnormal LF was defined as FEV₁ pre BD < LLN (GLI) and further divided into obstructive (FEV₁ pre < LLN + FEV₁/FVC post < LLN) and restrictive (FEV₁ pre < LLN + FEV₁/FVC post ≥ LLN + FVC post < LLN) pattern. Regression models were performed analysing the association between MetS components (IDF 2006) and abnormal, obstructive, and restrictive LF pattern (corrected for age, sex, smoking status).

Results: Fig. 1 shows odds ratios of MetS components and VAT associated with impaired LF pattern. Increased VAT was associated with both, obstructive (OR 1.5 [1.3-1.8]) and restrictive (OR 2.4 [1.8-3.0]) LF pattern, while increased WC was not.

Conclusions: VAT showed a consistent association with LF impairment independent of the type of impairment, in contrast to the different components of the MetS.

P45

Role of medical masks and face shields for prevention of COVID-19 infection

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In December 2019 an unknown viral infection was firstly described in a local fish/animal market in Wuhan/China. It was identified as a novel coronavirus infection by the Chinese Center for Disease Control and prevention (CCDC) on Jan. 7th and announced as 2019-new coronavirus disease (2019-nCoV, now COVID-19) by the World Health Organization (WHO) on Feb. 11th 2020. The disease rapidly spreads across the globe (begin of August 2020 at least 18 million of infections and 650000 deaths reported worldwide) and until now no specific treatment has been described. Therefore, measures for disease prevention (e.g. vaccines, rapid testing, control of viral transmission by masks/face shields, gloves, digital monitoring/social

Fig. 1 | P46

Species (yeasts in blue, moulds in green)	Patients colonised/tested (%)	Age at 1st detection during observation period, min-max, median (number of pat <18a)	Interval in years of repeated isolation between 1st and last isolation, min-max, median	Number of pat (% of colonised) with chronic colonisation
<i>Candida albicans</i>	127/148 (85.8%)	0.1-54.5, 15.5 (77, 60.6%)	0.1-10.8, 6.5	108 (85%)
<i>Aspergillus fumigatus</i>	119/148 (80.4%)	0.4-54.5, 16.6 (71, 59.7%)	0.1-10.8, 6.4	67 (56.3%)
<i>Candida parapsilosis</i>	47/148 (31.8%)	1.1-60.7, 15.4 (27, 57.4%)	0.2-9.9, 3.3	14 (29.8%)
<i>Candida dubliniensis</i>	36/148 (24.3%)	2.4-56.7, 20.3 (15, 41.7%)	0.1-9.5, 5.7	22 (61.1%)
<i>Aspergillus niger</i>	35/148 (23.6%)	1.2-60.2, 18.6 (16, 45.7%)	0.2-8.8, 2.4	1 (2.9%)
<i>Candida glabrata</i>	26/148 (17.6%)	2.8-35.4, 20.9 (11, 42.3%)	0.1-9.8, 2.5	12 (46.2%)
<i>Exophiala dermatitidis</i>	25/148 (16.9%)	2.7-37, 18.7 (10, 40%)	0.4-9.9, 5.2	13 (52%)
<i>Aspergillus flavus</i>	23/148 (15.5%)	3.9-39.8, 16.9 (12, 52.2%)	0.1-5.3, 1.3	1 (4.3%)
<i>Candida guilliermondii</i>	23/148 (15.5%)	0.4-57.9, 14.4 (13, 56.5%)	0.1-7.9, 0.6	0 (0%)
<i>Candida lusitanae</i>	21/148 (14.2%)	1.5-38.8, 14.9 (12, 57.1%)	0.1-5, 1.5	1 (4.8%)
<i>Scedosporium spp.</i>	20/148 (13.5%)	10.3-59.8, 24.7 (6, 30%)	0.2-9.4, 3.4	9 (40.9%)
<i>Penicillium sp.</i>	18/148 (12.2%)	4.1-33.9, 17.8 (9, 50%)	0.3-2.4, 0.7	0 (0%)
<i>Aspergillus terreus</i>	15/148 (10.1%)	5.3-31.6, 15.3 (9, 60%)	0.1-9.3, 1.4	4 (26.7%)
<i>Saccharomyces cerevisiae</i>	14/148 (9.6%)	7.9-41.5, 22.4 (5, 35.7%)	0.9-6.1, 1.3	2 (14.3%)
<i>Rasamsonia argillacea</i>	10/148 (6.8%)	6.5-49.8, 20 (5, 50%)	0.2-7.7, 1.6	4 (40%)
<i>Rhodotorula mucilaginosa</i>	9/148 (6.1%)	5.3-42.4, 25.3 (4, 44.4%)	3.5, 3.5	0 (0%)
<i>Candida kefyr</i>	8/148 (5.4%)	9.9-31.7, 22.7 (1, 14.3%)	2.3, 2.3	0 (0%)
<i>Candida pelliculosa</i>	8/148 (5.4%)	1.8-32.9, 15.1 (4, 57.1%)	0, 0	0 (0%)
<i>Candida krusei</i>	7/148 (4.7%)	7.6-54, 17.5 (4, 57.1%)	0.1, 0.1	0 (0%)
<i>Candida intermedia</i>	6/148 (4.1%)	6.3-42.1, 13.8 (4, 66.7%)	0.2-1.3, 0.6	0 (0%)
<i>Geotrichum candidum</i>	6/148 (4.1%)	1-29.1, 27.3 (1, 16.7%)	0.5-1, 0.7	0 (0%)
<i>Candida tropicalis</i>	5/148 (3.4%)	0.8-29.3, 10.3 (3, 60%)	3.3, 3.3	0 (0%)

contact tracing (apps)) are of great importance. We analysed a rapidly increasing number of publications investigating virus transmission by aerosols and the role of masks/shields for prevention. In brief, infectious aerosols are produced by coughing, sneezing, speaking and even normal breathing of infected individuals demonstrating the role of the lung as an “aerosol generator”. In aerosol the virus is stable for 3 hours and coughing/sneezing in contrast to normal breathing can transport aerosol for a distance of about 6 meters. Half lifetimes of viable virus are 1 h (aerosol, copper-surface), 3 h (cardboard) and 7 h (plastic-surface) underlining the need of masks/shields and adequate disinfection. A major number of professional masks/face-shields were developed, e.g. N95 mask, surgical mask, face-fitting mask, MIT face shield differing strongly in respect to their properties for filtering and infection prevention; however, comparative head-to-head studies are missing. In summary, masks/face shields play an important role for prevention of COVID-19 infection. However, there are differences in respect to type of the masks/face shields and their indication for use, e.g. general population, health care workers and the use should be combined with other methods of disease prevention.

P46

Airway colonisation with fungi in cystic fibrosis patients

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Background: Cystic fibrosis (CF) leads to airway colonisation with pathogens. The significance of colonisation with fungi is not entirely clear, and epidemiological data regarding colonisation with fungi are somewhat contradictory. *Candida albicans* and *Aspergillus fumigatus* have been most frequently reported, with colonisation rates between 38–78 % and 4–42 %, respectively.

Methods: We analysed results of sputum cultures from paediatric and adult patients of our centre taken between 2009 and 2019. Modified culture methods had been used for fungal cultures. To determine chronic colonisation we applied modified Leeds criteria.

Results: 8,941 sputum specimens from 148 patients were analysed. Of 39,868 isolated pathogens, 8,919 (22.4 %) were fungi cultivated from 5,070/8,941 specimens (56.7 %). 144/148 (97.3 %) patients were at least colonised once. Colonisation rates with fungi did not change significantly between 2009 (76/91; 83.5 %) and 2019 (94/108; 87.0 %). Some species seem to be associated with chronic colonisation while others do not (Fig. 1).

Conclusions: Almost all patients showed colonisation with one or more fungi. The proportions of patients already colonised in childhood and over many years were very high. Some species were detected at much higher rates than previously reported. These differences are more likely due to culture methods and the long observation period than to differences in cohorts. Adequate culturing methods are crucial to study the impact of fungal-colonisation in CF patients.

P47

Investigating prognosis in malignant pleural mesothelioma: The Vienna Mesothelioma Inflammation Score (VMIS) including pretreatment neutrophil-to-lymphocyte ratio, fibrinogen, and CRP is independently associated with overall survival

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Background: Malignant pleural mesothelioma (MPM) is a highly aggressive tumor with dismal outcome and thus, investigating reproducible pretreatment parameters to assess benefit from treatment modalities and to estimate survival is of utmost importance. This study aims to identify potential serum prognostic biomarkers in a large retrospective cohort of a high-volume institution.

Methods: We performed a retrospective analysis of the clinical records, serum parameters at diagnosis, and long-term outcome of patients with pathologically diagnosed MPM between 1994 and 2019. Previously published prognostic serum biomarkers were tested and validated and, in consequence, the prognostic value of an inflammatory serum marker score (VMIS—Vienna Mesothelioma Inflammation Score) was investigated.

Results: In total, 195 patients (147 male, 75.4%) were included. Median age was 67 years (IQR 58–74). Median overall survival (OS) for all cases was 14 months (95% CI; 11.43–17.17). Survival was 56% at 1 year, 17% at 3 years, and 10% at 5 years. Median OS and disease-free survival (DFS) of patients undergoing multimodality treatment including surgery was 23 months (95% CI; 19.64–26.70) and 16 months (95% CI; 12.72–18.68), respectively. The optimal cut-off values for pretreatment neutrophil-to-lymphocyte ratio (NLR), serum fibrinogen and CRP were 4.05, 537.5 mg/dl and 0.865 mg/dl, respectively. Univariate analysis revealed that age ($P=0.007$), ECOG status ($P=0.032$), tumor stage ($P=0.003$), histologic subtype ($P=0.003$), type of treatment ($P<0.001$), NLR ($P<0.001$), fibrinogen ($P<0.001$) and CRP ($P<0.001$) were significantly associated with OS. Accordingly, the VMIS (consisting of pretreatment NLR, fibrinogen and CRP) was highly associated with OS (score 0 vs. 1, HR 1.55, $P=0.040$; score 0 vs 2, HR 2.97, $P<0.001$). In multivariate analysis, VMIS ($P=0.003$), histologic subtype ($P=0.002$), and the type of treatment ($P=0.001$) were independently associated with OS.

Conclusions: VMIS was found to be an independent prognostic score in MPM helping to stratify patients into different treatment groups.

P48

Ocular tuberculosis in children – a case series and clinical experience of one decade

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Background: Ocular tuberculosis (OTB) is a rare manifestation of infection with *Mycobacterium tuberculosis* which can occur isolated or in the setting of systemic infection (1). Data on the epidemiology and clinical course of OTB in children is scarce.

Methods: We performed a retrospective analysis of all inpatients aged <18 years, who were admitted to our department between January 2010 and December 2019 for suspected or confirmed tuberculosis (TB) infection, for the presence of OTB.

Results: We were able to identify four paediatric cases with OTB (cohort: 527 inpatients, 0.76%) (Fig. 2). Three patients suffered from posterior (Fig. 1) and one from anterior uveitis associated with TB. Two patients were diagnosed with pulmonary

Fig. 1 | P48 Ultra wide-field fundus photography of the right eye shows two (one at the temporal inferior and one at the nasal superior vessel arcades) yellowish choroidal granulomas with ill-defined borders and substantial elevation. There seems to be a serous retinal detachment around the granulomas (case #4)

No	age (y)	sex	country of origin	Known TB exposure	HIV	TB disease	Ocular disease	Duration of ATT	Visual acuity (after therapy)
#1	4	f	Austria	no	neg.	disseminated (brain, eye, lungs)	Chorioretinitis OS	4 months	OU 0,8 (lost to follow-up)
#2	9	m	Austria	no	neg.	localized (eyes, lungs)	Serpiginous-like choroiditis OU	6 months	OD 0,4, OS 0,5
#3	10	m	Syria	yes	neg.	localized (eyes, lungs)	Anterior uveitis OU	6 months	OU 1,0
#4	16	f	Afghanistan	yes	neg.	disseminated (brain, eye, lungs, bones)	Chorioretinal tuberculoma OD	12 months	OU 1,0 (lost to follow-up)

Table 1 Abbrev. No – number, y – years, TB – tuberculosis, ATT – anti-tuberculosis therapy, f – female, m – male, OD – right eye, OS – left eye, OU – both eyes.

Fig. 2 | P48

TB after being referred by the ophthalmologist, the remaining showed ocular involvement in the setting of disseminated TB. All patients were treated with systemic corticosteroids and anti-tuberculosis therapy (ATT). Patients received topical steroids additionally, one of whom (case #2) also received steroids intravitreally once for persisting macular oedema. Visual acuity remained normal in two patients.

Conclusions: Despite a higher incidence of extrapulmonary TB in the paediatric age group in general (2), OTB was uncommon in our cohort. When disseminated disease is suspected or ocular symptoms are noted in paediatric TB patients, a detailed ophthalmological examination is imperative.

Freie Vorträge Oral presentations

V01

Lung transplantation for acute respiratory distress syndrome patients: a single center experience

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Background: Acute respiratory distress syndrome (ARDS) is a rapidly progressive lung disease with a high mortality rate. Although lung transplantation (LTx) remains the only lifesaving option for certain end-stage pulmonary diseases, ARDS as indication for LTx is discussed controversially and only limited data are available. For example, in the Eurotransplant region, only 17 patients transplanted for ARDS are documented. Since we have followed a liberal approach of accepting ARDS patients for LTx, we reviewed retrospectively the outcome of this particular patient cohort in our center.

Methods: From 08/98 to 03/19 a total of 10 patients transplanted for ARDS were identified. Demographic and clinical data of these patients were collected and analysed.

Fig. 1 | V01 Survival curve from 1998–2019 ($n = 10$)

Results: Eight/10 patients were listed and transplanted while on extracorporeal membrane oxygenation (ECMO). The remaining 2 patients could be initially successfully weaned from ECMO but remained respirator dependent. The median mechanical ventilation time and median length of ECMO was 33.5 (3.5–62.3) and 29.5 (28–38) days before LTx. Primary graft dysfunction (PGD) grades at 72 hrs were 40 % ($n = 4$), two patients were classified as PGD ungradable (due to prophylactically prolonged ECMO). Length of ICU and hospital stay was 38 (24.5–52) and 57 (43.5–94) days. The 30-day mortality was 10 % and 1-year survival rate was calculated as 55.5 % (Fig. 1). One patient developed chronic lung allograft dysfunction (CLAD) and received re-transplantation 12 years after the primary procedure. The median follow up time was 82 (49.9–1065) days.

Conclusions: Lung transplantation is feasible in carefully selected ARDS patients. Given the lack of alternative treatment options it provides acceptable long-term results.

V02

Investigating prognosis in malignant pleural mesothelioma: The Vienna Mesothelioma Inflammation Score (VMIS) including pretreatment neutrophil-to-lymphocyte ratio, fibrinogen, and CRP is independently associated with overall survival

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Background: Malignant pleural mesothelioma (MPM) is a highly aggressive tumor with dismal outcome and thus, investigating reproducible pretreatment parameters to assess benefit from treatment modalities and to estimate survival is of utmost importance. This study aims to identify potential serum prognostic biomarkers in a large retrospective cohort of a high-volume institution.

Methods: We performed a retrospective analysis of the clinical records, serum parameters at diagnosis, and long-term outcome of patients with pathologically diagnosed MPM between 1994 and 2019. Previously published prognostic serum biomarkers were tested and validated and, in consequence, the prognostic value of an inflammatory serum marker score (VMIS—Vienna Mesothelioma Inflammation Score) was investigated.

Results: In total, 195 patients (147 male, 75.4 %) were included. Median age was 67 years (IQR 58–74). Median overall survival (OS) for all cases was 14 months (95 % CI; 11.43–17.17). Survival was 56 % at 1 year, 17 % at 3 years, and 10 % at 5 years. Median OS and disease free survival (DFS) of patients undergoing multimodality treatment including surgery was 23 months (95 % CI; 19.64–26.70) and 16 months (95 % CI; 12.72–18.68), respectively. The optimal cut-off values for pretreatment neutrophil-to-lymphocyte ratio (NLR), serum fibrinogen and CRP were 4.05, 537.5 mg/dl and 0.865 mg/dl, respectively. Univariate analysis revealed that age ($P = 0.007$), ECOG status ($P = 0.032$), tumor stage ($P = 0.003$), histologic subtype ($P = 0.003$), type of treatment ($P < 0.001$), NLR ($P < 0.001$), fibrinogen ($P < 0.001$) and CRP ($P < 0.001$) were significantly associated with OS. Accordingly, the VMIS (consisting of pretreatment NLR, fibrinogen and CRP) was highly associated with OS (score 0 vs. 1, HR 1.55,

$P=0.040$; score 0 vs 2, HR 2.97, $P<0.001$). In multivariate analysis, VMIS ($P=0.003$), histologic subtype ($P=0.002$), and the type of treatment ($P=0.001$) were independently associated with OS.

Conclusions: VMIS was found to be an independent prognostic score in MPM helping to stratify patients into different treatment groups.

V03

Surgical management and risk analysis of primary malignant pulmonary and chest wall sarcomas – retrospective results from a high-volume center

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Background: Primary malignant pulmonary (PS) and chest wall sarcomas (CWS) are very rare aggressive malignancies and a very heterogeneous group of cancers. The treatment of choice is radical resection in a multimodal setting. The aim of this study was to report our institutional experience in patients with PS and CWS who underwent radical surgery and to evaluate prognostic factors.

Methods: Patients with primary malignant PS or CWS who underwent radical resection at our center between 2003 and 2018 were retrospectively reviewed.

Results: 35 patients with a median age of 46 years were identified. The most common histology was Ewing-sarcoma ($n=8$, 23 %). 19 (54 %) patients underwent neoadjuvant therapy (49 % CHT, 2.9 % RT, 2.9 % immunotherapy). Median tumor size at diagnosis was 10.6 cm (range, 1 to 35 cm). Extended resection was necessary in 54 % ($n=19$), intraoperative use of ECMO in 1 patient. Postoperative complications were observed in 7 patients (20 %). Adjuvant therapy was administered in 17 (49 %) patients (5.7 % CHT, 8.6 % RT, 26 % CHRT). 90-day mortality was 2.9 %. There was no significant difference in overall survival (OS) or disease free survival (DFS) between PS and CWS ($p=0.240$ and $p=0.348$) or in type of histology (Ewing sarcoma vs others, $p=0.708$ and $p=0.122$). 5-year OS and DFS were 68 % and 51 %, median OS was not reached. Median DFS was 79.33 months. Patients requiring extended resection (>1 involved anatomical structures) had a trend for impaired OS (HR 0.171, $p=0.060$) and significantly worse DFS (HR 0.19, $p=0.003$).

Conclusions: Radical resection of primary malignant PS and CWS offers good long-term outcome with low complication rate despite extended resections. However, extent of disease and subsequent necessity for extended resection is an unfavorable factor for long-term survival.

V04

Evaluation of the ESTS EuroLung scores in patients undergoing VATS lobectomy

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Background: The ESTS EuroLung scores were established to predict postoperative morbidity and mortality in patients undergoing anatomic lung resections. Since its introduction, the EuroLung scores have been updated once and an easy-to-use and free-of-charge smart phone app has been created. So far, the scores have not been validated in other patient cohorts. Herein we aimed to elaborate the accuracy of the various EuroLung scores in our VATS cohort.

Methods: The EuroLung scores were calculated for a consecutive cohort of 729 patients scheduled for VATS lobectomy. Postoperative complications, as defined and used by the EuroLung scores, were then analyzed in this prospectively maintained database.

Results: Overall, the observed complication rate was 10.7 % in the VATS lobectomy database. The EuroLung1 predicted a mean risk of morbidity of 21.7 % with a weak eta correlation (η) (EuroLung1: $\eta=0.192$; 2016 parsimonious EuroLung1: $\eta=0.167$; 2019 parsimonious EuroLung1: $\eta=0.174$). A better coherence was observed with the parsimonious EuroLung1 (2016; 11.8 %) and the current parsimonious EuroLung1 (2019; 11.5 %). Binary logistic regression analysis of the included parameters showed that extended resections and ppoFEV1% were associated with increased complications in the EuroLung1 scores. 30-day mortality was 0.8 % (predicted mortality according to EuroLung2: 1.4 %, parsimonious EuroLung2: 1.11 %) and was associated with ppoFEV1% for both scores and coronary artery disease for the EuroLung2 score only. The EuroLung2 showed a larger area under the ROC curve than the parsimonious EuroLung2 (0.59 vs. 0.57). Again, only a very weak eta correlation between predicted and observed mortality was found for the EuroLung2 ($\eta=0.002$) and the parsimonious EuroLung2 (2016) ($\eta<0.001$).

Conclusions: Even though predicted and observed morbidity/mortality rates were comparable in our cohort the scores were not useful to predict the individual risk in this VATS cohort. Therefore, the scores should not be used to permit or refuse surgical therapy.

V05

Initial experience with Intercostal catheter for postoperative pain management in VATS

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Background: Postoperative pain management after video-assisted thoracoscopic surgery (VATS) is still a heavily debated topic, which may affect patients' pain, need of opioids, and postoperative length of stay (LOS). This study aims to analyse the effects of an additional intercostal catheter (ICC) in comparison to a single shot intraoperative intercostal nerve block (SSINB) alone.

Methods: All patients receiving an anatomic VATS resection from 06/2019–03/2020 were analysed. ICC placement at our department was initiated in September 2019. Patients with misplacement of the ICC were analysed in the SSINB group. Exclusion criteria for analysis was a prolonged LOS because of postoperative complications not related to pain-management protocol (one hiatal hernia with oesophageal perforation, one hematologic comorbidity requiring further workup). The ICC cohort included 28 patients, the SSINB cohort 39 patients.

Results: Pain scores on the first postoperative day, after chest drain removal and highest pain score measured did not differ between the two groups ($p=0.472/0.487/0.242$). In four patients (12.1 %), ICC showed a primary non-function. The overall amount of opioids (Piritramide, 3.750 mg vs. 12.500 mg; $p=0.001$) as well as the duration of opioid usage (0.50 days vs. 1.36 days; $p=0.001$) was significantly less in the ICC cohort. The ICC cohort showed a significantly shorter postoperative LOS of 5.18 (mean, range 4–7) days in comparison to 6.95 (mean, range 4–16) days ($p=0.001$). Chest drain duration was significantly shorter in the ICC cohort (2.54 days vs. 3.79 days; $p=0.013$). There was no difference in comorbidities (coronary artery disease, diabetes mellitus, COPD; $p=0.841/0.724/0.152$), age, gender or postoperative complications ($p=0.672/0.806/0.740$).

Conclusions: Pain management with ICC reduces the amount of opioids and number of days with opioids patients' require to achieve sufficient analgesia while at the same time reduces the postoperative LOS and chest drain duration. In conclusion, ICC is an effective tool in postoperative pain management.

V06

Analysis of pain management after anatomic VATS resection in Austrian thoracic surgery departments

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Background: Postoperative pain and its management influences patients' rehabilitation, postoperative complications and quality of life. Despite its impact there are no uniform guidelines. Different centers seem to use various strategies for pain management. In this study we aim to analyze pain management regimens after VATS lobectomy used in Austrian thoracic surgery units with a special interest in opioid usage and strategies to avoid opioids.

Methods: A questionnaire was designed to assess the current use of regional anesthesia, post-operative pain medication and characteristics of individual pain management regimens. The questionnaire was sent to all thoracic surgery units in Austria, with nine out of twelve departments returning them.

Results: Pain management varied between all centers. All departments use regional anesthesia perioperatively. Four out of 9 centers use epidural analgesia or an intercostal catheter for postoperative regional anesthesia in at least 50 % of patients. Two departments follow an opioid restrictive regimen, 5 depending on Visual Analogue Scale (VAS) and two administer opioids on a fixed schedule. Three out of 9 departments use NSAIDs on a fixed schedule. The most used medication is Metamizole (8 out of 9 centers; 6 on a fixed schedule, two depending on VAS) followed by Piritramid (6 out of 9 centers; none as a fixed prescription). All centers reported that their regimen is standardized (with 8 centers basing it on an in-house standard) and all assessed their patients pain scores on a regular basis.

Conclusions: There is no standardized postoperative pain management regimen after anatomic VATS resections. There seems to be a trend towards prolonged postoperative regional anesthesia to reduce opioid consumption in some centers. A further prospective study is in preparation to evaluate the feasibility of opioid-free postoperative pain management and its impact on quality of life.

V07

Perioperative mortality and morbidity following pneumonectomy for severe inflammatory disease of the lung

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Background: Some cases of severe pulmonary inflammation are not amenable to conservative treatment. If pneumonectomy is required in highly septic and instable patients the inherent risk of the procedure increases further. In a retrospective study we analysed these patients comparing them to elective pneumonectomy in patients with malignant disease.

Methods: During the last 15 years 163 patients (age: 60.2 +/- 11.3 years; males: 124, females 39) underwent pneumonectomy. 41 of these cases had underlying severe inflammatory disease (central necrotizing abscess or pulmonary gangrene with accompanying empyema) whereas 122 had resection for malignant tumours.

Results: The inflammatory group was significantly younger (56.4 +/-13.4 vs. 61.5 +/-9.8 years; $p=0.01$) and had a significantly lower BMI (22.8 +/- 6 vs. 25.6 +/- 4.6; $p=0.003$) than the malignant group. There were no differences concerning cigarette or alcohol consumption or COPD, coronary artery disease or peripheral arterial occlusive disease. Both the rate of severe perioperative complications (30.3 % vs. 41.4 %) and of perioperative death (3.28 % vs. 34.1 %) were significantly higher in patients with inflammatory disease ($p=0.000$). In spite of the high perioperative mortality rate of pneumonectomy in inflammatory disease, 5-years survival rate (38.5 % vs. 26.8 %) showed no statistically significant difference between the two groups.

Conclusions: Though sometimes required as a life-saving procedure in severe inflammation of the lung, pneumonectomy in such conditions carries a high perioperative morbidity and mortality. If the first 6 months after pneumonectomy are survived however, the prognosis of this subgroup is fair.

V08

Problem at the pneumonectomy stump. Salvage by myoplastic closure

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Background: For primary closure when material is lacking and for the treatment of bronchial stump dehiscence following pneumonectomy a variety of methods such as pericardial or omental flap as well as myoplastic techniques have been advocated. We present our experience with myoplasty for closure of the main bronchus stump.

Methods: Retrospective analysis of 163 pneumonectomies within the last 15 years (age: 60.2 +/- 11.3 years; males: 124, females 39). In 9 patients (5.5 %) problems at the bronchial stump were present (6 on the right and 3 on the left side), thereof 3 primary impossibilities of direct closure and 6 secondary dehiscences.

Results: In one case dehiscence occurred one day after pneumonectomy, in the remaining 4 patients dehiscence became evident after a mean of 17.2 days (6–30 days). The 3 impossibilities of direct closure of the stump derived from necrosis and fistula following bifurcational stenting in lung cancer, from lack of viable bronchial tissue during completion pneumonectomy following left-sided sleeve resection and from bronchial necrosis in aspergillosis. Closure of the stump was done by pedicled pectoralis major flap in 6, by pedicled diaphragmatic flap in 2 and by pedicled sternoleidomastoideus flap in one patient. If deemed necessary, second-look procedures and/or thoracostomy and VAC were additionally used. One patient did not survive his septic condition and died within 30 days (11.1 %). The overall 5 years survival rate was 50 %.

Conclusions: Pedicled myoplastic flaps provide reliable closure even in detrimental cases of dehiscence of the main bronchus stump.

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