was injected into a vein in the hand or foot. Clearance of the isotope was monitored for 12 min with external scintillation detector. Two compartmental analysis was applied. The fast flow and slow flow compartments represents mainly gray matter and white matter, respectively. Since cerebral blood flow in children varies significantly in proportion to age, it is not valid to compare absolute values of rCBF between children of different age groups. Each rCBF value was expressed as the percentage of the rCBF values of normal children in corresponding age groups, as measured in our institution.

The fast-flow average was similar to that of normal children, but the slow-flow average was slightly lower. There was a negative correlation between slow flow and pre-operative ventricular size ($r=-0.718$, $P<0/02$), but there was no correlation between fast flow and pre-operative ventricular size. There was no correlation between rCBF and post-operative ventricular size. Postoperative IQ(DQ) showed a positive correlation with slow flow ($r=0.813$, $p<0.01$, *Fig. A*), but not with fast flow (*Fig. B*).

It is suggested that in children with hydrocephalus impairment of the white-matter communicating fibers results in a secondary higher intellectual activity.

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Key words: Hydrocephalus, rCBF, IQ(DQ)

Cerebral Perfusion Pressure and Nett Cerebral Mean Transit Time in Childhood Hydrocephalus

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Transit time is defined as the time such that the volume of tracer entering or leaving an organ or tissue is equal to the volume of tracer in that organ or tissue at the equilibrium. This method of measuring cerebral transit time involves introduction of a tracer (sodium pertechnetate) via an antecubital vein. A gamma camera fitted with an ultra high sensitivity collimator is on line to a mini computer. The tracer is flushed rapidly and data are acquired for approximately one minute. The transit time at the aortic arch is calculated from the aortic curve and this is used to correct for variations in central transit time and rate of injection. The results are displayed as a colour coded map (*Figure*). The nett cerebral mean transit time in 102 normal adult subjects for a whole hemisphere is 5.1 seconds (range 2–8 seconds). The transit time results were compared with the mean intracranial pressure and cerebral perfusion pressures from an overnight ICP study carried out at the same time. CT scans provided an index of ventricular dilatation. The mean transit time value (CBV/CBF) is the

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reciprocal of circulatory reserve or the degree of reduction in cerebral perfusion pressure. Transit time values correlated significantly ($p<0.05$) with the actual minus expected cerebral perfusion values.

Two children with arrested hydrocephalus had transit times within the normal range, while their cerebral perfusion pressures remained above 50 mmHg at all times during the day or night recordings. Three children with progressive hydrocephalus had up to 15% of their sleep when the cerebral perfusion pressure was less than 50 mmHg. When ventricular hypodensities were seen on CT scan transit time values were prolonged. Two children with cranio-cerebral disproportion had a severe reduction in cerebral perfusion pressure without significantly abnormal transit times. (J Pediatr Neurosci 5: 69–77, 1989)

Key words: Transit time, Cerebral perfusion pressure, Hydrocephalus

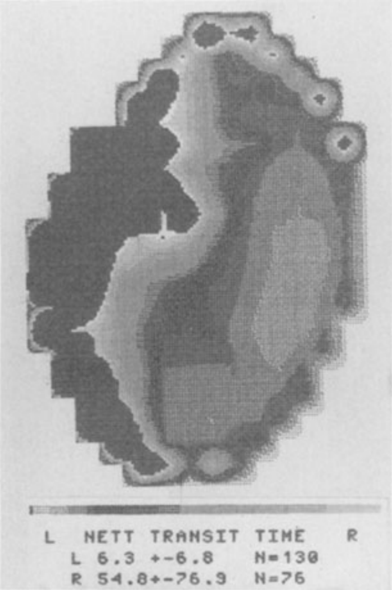

Figure. A colour coded map of the corrected mean nett cerebral transit time in a 14 year old boy with a progressive hemiventriculomegaly showing little flow in the right hemisphere with transit time and values prolonged and indicating a loss of autoregulation within the cerebral circulation of that hemisphere. His ICP recordings showed a reduced cerebral perfusion pressure (below 15 mmHg) in 29% of the awake period and 43% of sleep.