● 1396 THE EFFECTS OF PATENT DUCTUS ARTERIOSUS (PDA) ON PULSATILE FLOW IN THE ANTERIOR CEREBRAL ARTERIES(ACA). Jeffrey M.Perlman, Alan Hill, Joseph J.Volpe. Wash. Univ. Schl. of Med., St.Louis Children's Hosp., Dept. Ped. and Neurol., St. Louis.

The noninvasive measurement of pulsatile flow in the ACA is possible with a transcutaneous Doppler technique in infants with an open anterior fontanel. A pulsatility index (PI), calculated from the systolic and diastolic amplitudes of flow, represents resistance to flow (range 0.0-1.0). The Doppler technique has also been used to diagnose PDA. We have used these techniques to study the relationship between PDA and cerebral blood flow in the ACA.

PDA was confirmed by radiological and echocardiographic studies. In an ongoing study, 5 infants (birthweight <1500 g) had increase in PI at the time of development of PDA and decrease in PI to normal after closure of the PDA. PI values (mean ± SD) prior to, during and following closure of the PDA were 0.69 ± 0.03, 0.89 ± 0.04 and 0.69 ± 0.01 respectively (N=0.66 ± 0.06).

Serial values of PI in a representative case are shown. Arrow represents therapy for closure of PDA.

DAY	1	2	3	4	4	5↓	6	7	8
PI	0.63	0.71	0.71	1.0	0.96	0.96	0.71	0.73	0.70
PDA	-	-	-	+	+	+	-	-	-

The above data demonstrate decreased pulsatile flow in the ACA at the time of development of PDA and abrupt return to normal following closure of the PDA. These observations re: rapid fluctuations in cerebral blood flow may have implications for the genesis of ischemic cerebral injury and/or the development of intraventricular hemorrhage in the premature infant.

1397 EFFECT OF TOTAL PARENTERAL NUTRITION ON PLASMA AMINO ACIDS IN INFANTS WITH NECROTIZING ENTEROCOLITIS. Adney M. Pichanick. (Spon. by Ben H. Brouhard). University of Texas Medical Branch, Department of Pediatrics, Galveston.

Plasma amino acids were measured in 64 infants receiving TPN for NEC. Ages varied from 2-60 days and mean weight was 1621 gm (range 760-2550). The TPN mixture contained Travasol 8.5% with electrolytes, dextrose, vitamins and minerals, administered for 21 days and providing protein at 2.4 gm/kg/day. Plasma or blood transfusions were given at 10 mg/kg once a week. Measurements were also made on 40 healthy control infants feeding normally. Results: There was remarkable agreement in amino acid levels in healthy, preterm, full term, and NEC infants before TPN treatment. TPN produced marked increases at 6 days in Ala, Gly, Arg, His, Met with gradual return to normal by 21 days. Similar but less striking changes were seen with Phe, Val, Pro, Ser, Leu, Ileu, Lys, Thr, and Orn. Levels of Cys and Tau remained stable, while Tyr gradually decreased. Measurements 4 days after stopping TPN showed returns to normal.

Amino acid levels in neonates do not appear significantly affected by age or weight. Levels are affected by TPN, in accordance with the amino acid pattern of the infusate, but return to normal afterwards. The ideal TPN mixture would have the same amino acid profile as breast milk.

1398 PULMONARY HEMORRHAGE IN THE NEWBORN. Adney M. Pichanick, William L. Hilbert. (Spon. by Ben H. Brouhard). University of Texas Medical Branch, Department of Pediatrics, Galveston.

Forty two cases of pulmonary hemorrhage occurred in the neonatal intensive care unit during the last 6 years. The male: female ratio is 2.5:1. Birth weight was 720-3060 gm with 81% of cases below 1500 gm and 24% SGA. Gestational age was 26-29 weeks with 90% below 34 weeks. Complications of pregnancy and/or delivery occurred in 68%. Neonatal complications included hyaline membrane disease (71%), intracranial hemorrhage (69%), and bacterial infection in 12%. Three cases occurred immediately following exchange transfusions. Onset of pulmonary hemorrhage occurred at a mean of 69 hours of life (range 10-212), and time to expiration was 11-288 hours, mean time of death being 87 hours old. All infants were given oxygen in the first 12 hours of life, but no correlation was found between hemorrhage and Apgar score, blood type, hypothermia, asphyxia, acidosis, hypoglycemia, shock, or any particular therapy. There were just 2 survivors, and the frequency of pulmonary hemorrhage was 10.1% of all neonatal deaths. The overall incidence was 1.95 per 1,000 live births.

Conclusion: The infant most at risk will be a male born prematurely <34 weeks weighing <1500 gm, with respiratory distress and intracranial hemorrhage likely. Pulmonary hemorrhage is most likely on the third day with death on the fourth day, although intensive care results in occasional survivors.

1399 USE OF CATHETER OXYGEN PROBES IN THE MANAGEMENT OF CRITICALLY SICK NEONATES DURING TRANSPORT. Manohar Rathi*, Vasundhara Tamaskar, Rama S. Singh, Geetha Cattamanchi and Michael Tidd (Sponsor: D. Vidyasagar) Perinatal Medicine, Christ Hospital, Oak Lawn, IL and Searle Medical Products, Skokie, IL

Umbilical artery catheterization has become an increasingly common method for obtaining arterial samples for in-vitro blood gas analysis, infusion and for direct monitoring of blood pressure in neonates requiring intensive care. With the introduction of miniature Clark oxygen electrodes in umbilical artery catheters, the continuous measurement of PaO_2 became possible. Recent follow up studies have indicated that higher survival rates and lower incidences of cerebral damage and retrolental fibroplasia are obtained when continuous PaO_2 monitoring is available. This is of special interest during transportation via ambulance from one institution to another and is a readily available simple method of monitoring when needed to ensure that the PaO_2 remains within acceptable limits. The disturbance involved in moving an infant may result in major changes in PaO_2 at a time when it is usually impractical to study them except by means of arterial oxygen probes. Results from neonates monitored during transport over a year have shown this portable method to be safe, efficacious and an economical means of continuous PaO_2 monitoring.

1400 LOW PEAK INSPIRATORY PRESSURES (PIP) FOR VENTILATION OF INFANTS WITH HYALINE MEMBRANE DISEASE (HMD). Ian M. Ratner, Jacinto A. Hernandez and Frank J. Accurso. (Spon. by Ernest K. Cotton). The Children's Hospital, Department of Perinatology, University of Colorado Health Sciences Center, Denver.

In an effort to decrease barotrauma, air leaks, and subsequent chronic lung disease we investigated ventilation of infants with HMD on lower PIP. MAP was held constant since it is a prime determinant of oxygenation and ventilation. We studied ten stable, unparalyzed infants with HMD on time cycled, pressure limited ventilators (Baby Bird). They were between 820-3060 gms, 24-82 hours old and on an FIO_2 of .30-.80. MAP, PIP, inspiratory time (ti) and ventilator rate (f) were determined for each infant (Baseline (B)). PIP was then lowered by 30% and f increased by decreasing the expiratory time to maintain MAP constant (Study (S)). End expiratory pressure, FIO_2 and ti were not changed. Each infant was studied in the following sequence: B-S-B-S-B for 20 minutes at each setting. The results, as mean values, are shown in the following table:

	PIP cmH2O	f /min	PaO2 mmHg	PaCO2 mmHg	pH	MAP cmH2O
B	24±3	36±7	72±15	38±4	7.34±.05	11±2
S	17±3	47±10	72±11	40±5	7.32±.04	11±2

There was no significant difference in B or S blood gases (ABG).

We conclude that stable, unparalyzed infants with HMD may be mechanically ventilated at lower PIP with no change in ABG's if MAP is held constant.

1401 A THEORETICAL MODEL OF THE CARDIOVASCULAR SYSTEM IN PRE-TERM INFANTS. Rawson, J.E., Freidman, C.A., Parks, B.R., Douglas, B.F. (Spon. by Blair E. Batson.) Dept. of Pediatrics, Uni of Miss. Med. Center, Jackson MS

A mathematical model has been constructed which demonstrates the effects of gestational age and postnatal age on mean blood pressure in preterm infants. The model also demonstrates the effect of loss of renal mass on blood pressure (as might occur from catheter-induced emboli). Construction of the model is based on Ohm's law: Pressure = Flow X Resistance. Mean arterial pressure is calculated from cardiac output X systemic resistance. The gradually rising mean arterial pressure with increasing gestational age and postnatal age are shown as a function of flow/resistance changes. Analysis of the arterial pressure-urinary output relationship describes the kidney's ability to excrete fluid. If the output of fluid is subtracted from the intake, the rate of change of extracellular fluid volume (EFV) with respect to time (dEFV/dt) is obtained. Integration of dEFV/dt yields a value for EFV which can be used to calculate blood volume. The relationship of blood volume to mean systemic pressure can be used to calculate mean systemic pressure. Subtracting the right atrial pressure from the mean systemic pressure yields the pressure gradient for venous return. The pressure gradient for venous return divided by the resistance to venous return yields the venous return. The cardiac output equals the venous return in the steady state. The data used to construct the blocks are from published reports and new observations. The model is programed in Fossel on a PDP-11 Computer.