1495 CEREBROSPINAL FLUID (CSF) ELECTROLYTES CHANGES IN NEWBORNS WITH PERIVENTRICULAR INTRAVENTRICULAR HEMMORRHAGE (PV-IVH). Mario R. Reale, David A.Clark, Vrinda Telang, Martin S. Katzenstein and Harry S. Dweck.New York Medical College, Westchester Co. Med. Ctr., Valhalla, New York.

To investigate electrolytes and glucose homeostasis in asphyxia and PV-IVH, Na, K, Cl and glucose were measured in CSF and blood of 14 newborns who had simultaneous lumbar and venipunctures at a mean age of 26 hours. Glucose was determined by glucose-oxidase method, Na and K by ion selective electrode and Cl by coulometric-amperometric method. Cranial ultrasounds were done within 48-72 hours after birth.

Babies with PV-IVH had significantly lower CSF Na and Cl than those with no PV-IVH (see table). There were no significant differences in CSF glucose and serum Na, Cl, and glucose between babies with and without PV-IVH. We conclude that PV-IVH significantly lowers Na and Cl in CSF while asphyxia does not.

	CSF				SERUM			
	Na	K	Cl	Glu	Na	K	Cl	Glu
NO IVH	X 134.0*	3.13	118.7**	60.3	136.8	4.7	107.6	90.0
(+ S.D.)	(7.5)	(0.2)	(7.1)	(16.6)	(7.7)	(0.6)	(6.1)	(29.2)
IVH	X 122.0*	3.1	110.0**	46.6	138.0	4.5	108.6	103.3
(+S.D.)	(8.3)	(0.2)	(8.6)	6.64	(4.5)	(0.6)	(6.2)	(12.9)

*p 0.01
** p 0.02

†1496 CEREBRAL BLOOD FLOW AND CEREBRAL OXYGEN METABOLIC RATE DURING HYPERVENTILATION IN THE NEWBORN DOG. John H. Reuter (Spon. by Reginald C. Tsang), University of Cincinnati, College of Medicine, Dept. of Pediatrics and Children's Hospital Medical Center, Cincinnati, Ohio

Cerebral blood flow (CBF) and cerebral metabolic rate of oxygen ($CMRO_2$) were measured during normocarbia and both moderate and severe hypocarbia in 8 newborn mongrel dogs 1 to 7 days of age. The animals were paralyzed with pancuronium and ventilated with 70% N_2O and 30% O_2. The respirator was adjusted to achieve a $paCO_2$ of 15 torr, all subsequent changes to 25 and 40 torr were made by bleeding CO_2 into the system. The sequence of $paCO_2$ levels were randomized. CBF was measured by microsphere technique and $CMRO_2$ calculated as arterial - sagittal sinus O_2 content difference times hemispheric blood flow. All measurements were made after 30 minutes at each $paCO_2$.

	40 torr	25 torr	15 torr
CBF (ml/100g/min ± S.D.)	42.7 ±13.5	19.5 ±4.7	13.8±4.1
$(A-V)O_2$ (Vol % ± S.D.)	3.7 ± 1.3	7.0 ±2.0	9.6 ±2.6
$CMRO_2$ (ml/100g/min ± S.D.)*	1.46± .59	1.29± .42	1.18± .15

*(ANOV p >.2)

It is concluded that despite large decreases in CBF with hyperventilation, $CMRO_2$ is not significantly changed after 30 min of hypocarbia.

1497 COMPARISON OF SCREENING OF HIGH RISK INFANTS BY AUDITORY BRAINSTEM RESPONSES (ABRs) AND BY PNEUMOGRAMS: Yvette Roberson, Kristine McCulloch, Lee R. Hamilton, Dharmapuri Vidyasagar. University of Illinois Hospital, Departments of Pediatrics and Otolaryngology, Chicago, Illinois.

ABRs assess function of the brainstem auditory pathway. Interwave distances reflect brainstem conduction time and wave V latency is an index of maturation. Pneumograms are recordings of respiratory activity which allow quantitation of breathing pauses during sleep. Pneumogram abnormalities reflect dysfunction or immaturity of brainstem respiratory control mechanisms. We compared screening results for 15 high risk infants (GA 30.7 ± 4 wks), BW 1300 ± 600 gm) who had pneumograms and reproducible ABRs and were not receiving theophylline at the time of either screen. All had identifiable waves I and V and 12 (80%) also had wave III. Sleep portions of 12 hr pneumograms were scored for density of short (>6 sec) apneas (A6/D), % time spent in periodic breathing (% PB) and number episodes PB/100 min (#PB/100). Relationship of ABR and pneumogram measurements was analyzed by linear regression. Postconceptual age at the time of screening was 38.5 ± 5.9 wks for ABRs and 38.4 ± 5.7 wks for pneumograms. Wave V latency showed significant correlation with all pneumogram measurements: for A6/D, r=0.73, p=0.002; for % PB, r=0.67, p=0.007; for #PB/100, r=0.61, p=0.015. Interwave distances (I-III, I-V) showed no significant correlation with pneumograms. Thus assessment of the brainstem auditory pathway by ABR wave V latency correlates well with assessment of brainstem respiratory control mechanisms by pneumograms. These findings strengthen the validity of both the ABR and the pneumogram as tests of brainstem maturation and function.

1498 ATYPICAL CYCLIC MOTILITY (CM) IN FETUSES OF DIABETIC MOTHERS (FDMs). S. Robertson, L. Dierker (Spon: J. Kennell), Depts. of Pediatrics and Reprod. Biol., Case Western Reserve Univ., Cleveland, OH 44106.

Cyclic variation in embryonic and fetal movement at 0.1-1.0 cycle/min (cpm) occurs normally in many vertebrates, including the human, and may play a role in neuromuscular development. To determine the effect of alterations in the prenatal environment on the development of CM in the human, 23 FDMs (21 class B-D, 1 A, 1 R) were studied longitudinally 2-7 times (4±1, mean ± SD) from 23-40 wks of gestation. Fetal movement was detected by two strain gauges on the mother's abdomen and digitized in 5 sec intervals during a 14-47 min (26±7) period free of artifacts. Spectral analysis revealed strong CM at .08 - 1.22 cpm (.37±.20) in all fetuses (83/95 individual records), suggesting cyclic activation is a robust property of the immature motor system in the human as in other vertebrates. However, CM was temporarily absent (i.e.,for 1 record) in 12/23 FDMs, vs. 3/29 normal fetuses in a previous study (<.01). Most parameters of CM were stable across age, but its frequency began low and nearly doubled ($p<.01$) from .24±.07 to .47±.28 cpm between 26 and 37 wks, a pattern not seen in normal fetuses. During the same period, CM in the band between .18 and 1.02 cpm increased then decreased ($p<.02$), in contrast to a steady increase in normal fetuses. It remains to be seen if the isolated absence and altered development of CM reflect concurrent metabolic disturbance (although the differences were unrelated to newborn macrosomia or repeated 3rd trimester bouts of maternal hyperglycemia), or are instead sequelae of early neuroembryologic changes in FDMs.

●1499 ROLE OF O_2-HEMOGLOBIN AFFINITY ON THE RESPONSE TO HYPOXIA OF CEREBRAL BLOOD FLOW IN THE FETAL SHEEP. Adam A. Rosenberg, Andrew Harris, M. Douglas Jones, Jr. Johns Hopkins University, Department of Pediatrics, Baltimore.

The increase in cerebral blood flow (CBF) with hypoxia is greater in fetal than adult sheep. Baseline CBF and oxygen delivery (OD=CBF x arterial O_2 content) are also higher in the fetal sheep despite a rate of cerebral O_2 consumption ($CMRO_2$) equal to that in the adult. Previous work showed that this relative overperfusion of the fetal brain is in part due to the left shifted position of the O_2-hemoglobin dissociation curve (ODC) in the fetus. 6 unanesthetized fetal sheep were studied to determine if the greater response of CBF to hypoxia in the fetus is also dependent upon the position of the ODC. Measurements of blood gases, CBF (microsphere technique), $CMRO_2$, OD, and the reciprocal of the arteriovenous (brachiocephalic a. - sagittal sinus) difference in O_2 content ($1/CaO_2$-CvO_2) were made at 3 levels of CaO_2 pre and postexchange transfusion (ET) with adult blood. $1/CaO_2$-CvO_2=$CBF/CMRO_2$ measures changes in CBF if $CMRO_2$ remains stable and is less subject to error than microsphere CBF measurements. P_{50} increased from 16.6 ± 0.5 - 31.7 ± 1.9 Torr (±SEM) and OD decreased 13.12 ± 1.56 - 6.63 ± 0.34 $ml \cdot 100g^{-1} \cdot min^{-1}$ with ET ($p < .05$). During hypoxia, $CMRO_2$ was unchanged both pre and post ET. The response of $1/CaO_2$-CvO_2 to hypoxia was steeper pre ET ($p < .05$). These data support the role of the position of the ODC in the regulation of CBF during hypoxia and are consistent with a tissue O_2 dependent mechanism of CBF control.

†1500 REGULATION OF CEREBRAL BLOOD FLOW VELOCITY (CBFV) IN LOW BIRTH WEIGHT (LBW) INFANTS WITH HYALINE MEMBRANE DISEASE (HMD). Ted S. Rosenkrantz & Daniel Diana, Univ. of Conn. Health Ctr., Dept. of Pediatrics, Farmington, CT. (Sponsored by John R. Raye).

In adults arterial oxygen content (CaO_2) and pCO_2 are the major regulators of cerebral blood flow (CBF) while CBF is constant in the face of changes in mean arterial blood pressure (MABP). In this study Doppler ultrasonography was used to examine the effects of these factors on CBFV in non-asphyxiated LBW infants with HMD requiring mechanical ventilation. Infants were studied on days 1-7, 14 and 21. CBFV was measured in the anterior cerebral artery for determination of the Area Under the Velocity Curve (AUTC)/min. Blood flow velocity was measured in the carotid artery and Diastolic/Systolic ratio (D/S) determined. Hematocrit (HCT), blood gases, MABP and LA/AO ratio (echocardiogram) were measured. CaO_2 was calculated from the hemoglobin dissociation curve. No infant had evidence of ductal shunting on the basis of a normal LA/AO ratio, absence of a murmur, normal pulses and a normal D/S ratio (+.32±.09) (m±sd). Data analysis (n=61) revealed a significant inverse relationship between CaO_2 and AUTC/min (r=.46) ($p<.01$). A strong linear correlation was found between pCO_2 and AUTC (r=.40) ($p<.01$). Despite a rise in MABP associated with postnatal age (r=.57), AUTC/min was constant over the observed range of MABP (29-67 mmHg). We conclude that autoregulation of CBF is present in non-asphyxiated LBW infants with HMD and that their CBF is not pressure-passive as previously suggested.