1378 Apnoea and bradycardia in pre-term babies.

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Bradycardia occurring in association with prolonged apnoea is well documented. However, on many occasions the bradycardia occurs early, before there is any detectable change in arterial saturation. It is also known that obstructive apnoea frequently occurs. We therefore set out to investigate whether bradycardia occurred more commonly in association with obstructive apnoea. Seven pre-term babies with recurrent apnoea were studied on nine occasions in a total body plethysmograph for periods of up to 60 minutes. Tidal flow and volume were measured by a pneumotachograph and intrathoracic pressure with an oesophageal balloon. The presence or absence of the cardiac artefact on the flow trace was used to identify whether the airway was open or closed. A total of 172 apnoeic epidodes were analysed, of which 50% were closed, 27.9% open and 22.1% showed a mixed picture. Bradycardia, defined as heart rate of less than 100 per minute, occurred in 33.9% of closed apnoea, 17.8% of open apnoea and 20% with the mixed picture. Bradycardia occurring with a closed airway tended to be more severe. Respiratory efforts against a closed airway produced a striking bradycardia within two seconds, explaining the excess of bradycardia in this group. Our conclusion is that bradycardia occurring in apnoea is often secondary to mechanical changes occurring within the lung, rather than a response to hypoxia.

1379 RATES AND ASSOCIATED RISK FACTORS FOR D10W-INDUCED HYPERGLYCEMIA (HG) IN NEONATES.

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We have identified rates and associated risk factors for D10W-induced HG among 636 newborns exposed to IV D10W in 2 neonatal ICU's monitored by an intensive Pediatric Drug Surveillance (PeDS) Program. D10W-induced HG (range 110-774 mg %) was observed in 23 exposed infants (3.6%). There was a highly significant trend (X^2=52.5) toward an increasing risk of HG with decreasing admission weight:

Adm Wt in gm (n):	<300(26)	300-999(32)	1000-1999(201)	2000+(377)
% with HG:	30.8	15.6	4.5	0.3

Infants ≥ 1000 gm who were under stress (ie., asphyxia, sepsis, RDS and/or pneumonia) were 7 times more likely to have HG than non-stressed infants of similar weight (2.7% vs 0.4% respectively); however, stress did not appear to increase the risk of HG among infants < 1000 gm. Similarly, among infants ≥ 1000 gm, increases in the average daily dextrose dose/kg of all dextrose-containing infusions increased the risk of HG, but this effect was not observed among the smaller (< 1000 gm) infants. Since HG may alter fluid balance and cerebral blood flow, it may also affect the risk of CNS bleeding or infarct. Admission weight and stress are risk factors for HG which cannot be altered; to reduce the risk of HG in very low birth weight infants or in larger infants who are under stress, physicians should carefully consider the total amount of dextrose administered (independent of fluids and electrolytes) and carefully monitor the neonate's blood glucose.

1380 RETINOPATHY OF PREMATURITY: FLUORESCEIN ANGIOGRAPHIC AND HISTOPATHOLOGIC STUDIES ON INFANTS RECEIVING HIGH AND LOW DOSES OF VITAMIN E.

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Fluorescein angiograms were done on infants who developed retinopathy of prematurity (ROP) while enrolled on a double-blind protocol to determine the effect of dl-α-tocopherol (vitamin E) on the premature retina. This study included one-hundred infants who weighed ≤1500 grams at birth and who developed respiratory distress. They were given orally either 5 mg/kg/day (control) or 100 mg/kg/day (experimental) of vitamin E throughout their hospital stay at Texas Children's Hospital. The angiograms demonstrated that the pathology which developed in the peripheral retina of infants receiving high doses of vitamin E was not different from, but only less severe than, that which developed in infants receiving low doses of vitamin E.

Both light and electron microscopic analyses were done on the eyes of two infants who died while on the study:

Vitamin E Level	Gestational Age	Birth Weight	Oxygen Administered	Clinical ROP	Age at Death
5 mg/kg/day	26 wks	625 g	continuous	III	10 wks
100 mg/kg/day	27 wks	1030 g	continuous	I	19 wks

The infant on low doses of vitamin E demonstrated the vanguard shunt with rearguard retinopathy and intravitreal hemorrhage. The infant on high doses of vitamin E showed no such changes and the nerve fiber layer was free of abnormal neovascularization.

1381 HYPOXIA DISRUPTS THE NEWBORN LAMB'S RESPONSE TO HEMORRHAGE.

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We evaluated the effect of hypoxia on the response of unanesthetized lambs (age 2-10 days) to hemorrhage of 50% of their measured blood volume over 30 min. All 15 lambs breathed 5% CO_2 beginning 15 min. before hemorrhage and continuing for 90 min. after. The 5 lambs in Group I breathed 21% O_2 throughout, the 5 in Group II breathed 9% O_2 for the 15 min. prior to hemorrhage and then 21% O_2, and the 5 in Group III breathed 9% O_2 throughout the experiment. Organ blood flow was determined by radioactive microsphere technique and HR, BP, Hct, PO_2, PCO_2 and pH were measured 20 min. before, immediately before, at 2/3 of, at the end of, and at 90 min. after the hemorrhage. Group I had 4 survivors, Group II had 1, and Group III had none. The mortality in Group III was significantly greater than that in Group I ($p<0.05$ Fischer exact). During the hemorrhage, BP and Hct fell similarly in all groups. In Group I, brain blood flow rose progressively throughout the experiment. In Group III, it rose with onset of hypoxia and then fell progressively thereafter. In Group II, it ran an intermediate course rising with the onset of hypoxia and then falling to baseline where it remained until shortly before death. Multiple regression analysis revealed a positive regression of brain blood flow on BP in Group III. We conclude that hypoxia during hemorrhage increases mortality and disrupts cerebral autoregulation.

● 1382 PULMONARY VASCULAR PATHOLOGY IN FATAL NEONATAL MECONIUM ASPIRATION.

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Although it is suggested that vasoconstriction is responsible for the pulmonary hypertension and persistent fetal circulation (PFC) associated with meconium aspiration (MA), this has not been proven. We therefore studied the pulmonary vascular bed (PVB) of 10 consecutive term newborns (NB) in whom MA was diagnosed in life and confirmed at autopsy. The pulmonary arteries were injected with barium-gelatin before inflation fixation. Morphometric analysis of three structural features of the PVB: 1) Extension of muscle (EM) into small arteries, 2) Percentage medial wall thickness (%WT), and 3) Arterial concentration (AC) was performed. The findings were compared to those of normal fetal and neonatal lungs. The case histories were also reviewed. In 9/10 NB, PFC was evident clinically-in 8/10 right-to-left shunting at atrial level was confirmed by contrast echocardiography and in 7/10 shunting at ductal level was detected by a decrement in PaO2 ≥ 20 torr from right radial artery to descending aorta.

All 9 NB with PFC had EM and increased %WT of the intraacinar arteries with severe encroachment upon the arterial lumen. The NB without PFC had normal arteries. AC was normal in all.

The high correlation between fatal MA and PFC was unexpected. The structurally abnormal PVB found in all NB with MA and PFC could not have been caused by vasoconstriction alone and was similar to that seen in PFC without MA. This suggests a common cause of in utero maldevelopment of the PVB and perinatal MA.

1383 COMPARISON OF SIMULTANEOUSLY MEASURED RADIAL ARTERY (RA), UMBILICAL ARTERY (UA), AND DINAMAP PRESSURE IN SICK NEWBORNS.

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Sixteen infants in whom umbilical artery catheters were placed also had radial or ulnar artery catheters placed. Calibrated transducers generated a continuous hard-copy recording of systolic and diastolic pressures from these catheters. Simultaneously these infants had blood pressure measured by a "device for indirect noninvasive automatic mean arterial pressure" (DINAMAP)*. This was recorded on the same hard copy. The majority of infants were studied within 72 hours of birth. Average study time was 18 hours. Differences in systolic and diastolic pressure between RA and UA and DINAMAP were calculated as follows:

AVERAGE DIFFERENCES IN BP MEASUREMENT

	DINAMAP vs Radial		Radial vs Umbilical	
	Mean ± (range of SEM) (mm Hg)			
	Systolic	Diastolic	Systolic	Diastolic
>2000gm (8)	5±(0.3-1.8)	4±(0.3-1.5) (6)	5±(0.2-0.6)	4±(0.1-0.4)
<2000gm (8)	8±(0.4-1.1)	7±(0.3-1.6) (8)	5±(0.1-0.4)	2±(0.1-0.4)
all infants	6±(0.3-1.8)	6±(0.2-1.6) (14)	5±(0.1-0.6)	3±(0.1-0.4)

Differences between these modes of measurement in individual infants did not change significantly from the first half of the study to the second half. Factors such as placement of the DINAMAP cuff on the lower extremity ipsilateral to the cannulated umbilical vessel appear to bring the measurements even closer. UA and RA pressures are similar in sick newborns. Likewise, DINAMAP reflects radial pressures, but these measurements are done automatically and continuously with this device.