1288 DIMINISHED METABOLIC RESPONSE OF PREMATURE INFANTS TO A THERMAL STRESS WHILE PERIODIC BREATHING DURING SLEEP Robert A. Darnall and Ronald L. Ariagno, (Spon. by J. Kattwinkel) Depts. of Pediatrics, Univ. of Virginia Med. Ctr., Charlottesville, and Stanford Univ. Sch. of Med., Stanford.

Periodic breathing (PB) occurs frequently in premature infants and may represent immaturity of central chemoreceptors. We postulate that other regulated functions such as temperature might be altered during episodes of PB. Six premature infants were studied under radiant warmers for 6-8 hours while simultaneous measurements of oxygen consumption (VO_2), skin (Tabd) and core (Trec) temperature, EEG, EOG, EMG, and respiration were made. After periods of stabilization (Tabd=36.5 ± 0.5 and Trec=37.0 ± 0.2°C.), Tabd was allowed to fall slowly for short periods 4-10 times during the study period. For each of the 907 minutes of total sleep time (TST), breathing pattern (PB or non-PB), state, and VO_2 were assessed. PB occurred in all but one subject and accounted for 11-60% of the TST. PB was distributed equally between REM and NREM sleep. The values for VO_2 were then compared during sleep for warm and cool periods by breathing pattern.

	VO_2 (cc/kg./min)	
	PB	NON-PB
Warm	8.74 ± 0.81	9.20 ± 1.15
Cool	8.89 ± 1.27	9.86 ± 1.17
% change	1.77 ± 10.97	7.21 ± 3.23† p<.005

These data support our hypothesis and suggest that PB during sleep is associated with a decreased metabolic response to thermal stress.

● 1289 CAPTOPRIL ADMINISTRATION TO THE PREGNANT GUINEA PIG INHIBITS FETAL ANGIOTENSIN CONVERTING ENZYME ACTIVITY Dennis Davidson, S. Alex Stalcup, Robert B. Mellins, Columbia University, College of Physicians & Surgeons, Babies Hospital, Department of Pediatrics, New York.

The renin-angiotensin and kallikrein-kinin systems play an important role in fetal and neonatal blood pressure control and the circulatory adjustments at birth. Captopril (SQ14,225), a new antihypertensive agent, inhibits angiotensin converting enzyme (ACE). This affects circulating levels of both ACE substrates, angiotensin I and bradykinin (BK). We thought it important to determine whether maternal administration of captopril inhibits fetal ACE activity.

The placenta is the principal site of ACE activity in the fetus (Davidson et al., Circ. Res., in press). We assessed ACE activity on the fetal side of the placenta in situ by perfusing the umbilical artery with Krebs-Hanseleit containing BK 100ng/ml; normal temperature and flow were maintained. ACE activity was defined as the percent of BK (measured by radioimmunoassay) cleared by the placenta after a single passage through the umbilical circulation. The near-term pregnant guinea pig was given 1 mg/kg captopril IV, followed by an infusion of 300 ug/kg/hr for 1 hour. After captopril, fetal ACE activity (20%, SE=6.8, n=7) was significantly less ($p<.001$) than control activity (77%, SE=2.6, n=12). We conclude that maternal administration of captopril inhibits fetal ACE activity and suggest that the use of captopril in pregnant hypertensive patients could adversely affect blood pressure control in fetal life and during the circulatory adjustments at birth.

1290 TRANSIENT HYPERAMMONEMIA OF PREMATURITY (THP): RESPONSE TO HEMODIALYSIS (HD). Steven M. Donn, Richard D. Swartz, Jess G. Thoene; Depts. of Pediatrics and Internal Medicine, Univ. of Michigan Affiliated Hospitals, Ann Arbor, Michigan

A 2.5 kg male infant delivered at 35 weeks gestation developed generalized seizure activity, then coma at 24 hours of age. Plasma ammonia at 36 hours of age was 2575 µg/dl. The concentration of citrulline in the blood was 109 µM, that of arginine was 145 µM; argininosuccinate was absent, and urinary orotic acid excretion was 46 µg/mg creatinine. Volatile fatty acids in plasma were normal as was the plasma glycine concentration (530 µM). A diagnosis of transient hyperammonemia of prematurity was made and therapy begun. Despite four three-volume exchange transfusions and a constant arginine infusion of 4 mM/kg/day in a single 24 hour period, which increased the plasma arginine and ornithine to greater than 2000 µM, the plasma ammonia concentration remained greater than 1000 µg/dl. The infant underwent three hours of hemodialysis performed via an "umbilical shunt" at 62 hours of age. This lowered ammonia from 2184 to 275 µg/dl and was associated with complete reversal of neurological depression. Ammonia clearance by HD was calculated to be 40 ml/min at a blood flow of 60 ml/min. Ammonia levels continued to fall without further therapy and remained within the normal range (<100 µg/dl) for the duration of hospitalization even after commencement of formula feedings. We conclude that HD is an effective therapy for THP and should be considered in centers equipped for this procedure.

1291 LIMB BLOOD FLOW FOLLOWING UMBILICAL ARTERY CATHETERIZATION (UAC). Usha Doshi, Daniel Flanigan, Dharmapuri Vidyasagar. University of Illinois, Department of Pediatrics, Chicago, Illinois.

Thrombosis of major blood vessels following UAC is a known complication, sometimes resulting in fatal outcome. We used Doppler ultrasound technique to detect blood flow & to measure blood pressure (BP) in limbs. Pressure index (PI); the ratio of ankle BP to brachial BP was calculated. A value of >1.0 was considered normal. We studied 10 normal $\bar{s}$ UAC and 20 sick newborns $\bar{c}$ UAC. In normal newborns, $\bar{x}$ B.Wt. was 2.8±0.15 kg & $\bar{x}$ GA was 37±0.9 wks. PI in Rt leg was 1.06±0.006 and Lt leg was 1.05±0.006. In newborns $\bar{c}$ UAC, $\bar{x}$ B.Wt. was 2.6±0.19 kg & $\bar{x}$ GA was 36.8±0.9 wks. In 15/20 newborns $\bar{s}$ thrombosis PI was 0.88±0.04 in Rt leg, 0.92±0.06 in Lt leg. In 5/20 sick newborns were detected to have art. thrombosis and were serially followed. PI in these was 0.094±0.08 in Rt leg and 0.56±0.2 in Lt leg. This was significantly ($p<0.001$) lower than both normal newborns $\bar{s}$ UAC and in newborns $\bar{c}$ UAC but no thrombosis. These data show that PI $\bar{c}$ and $\bar{s}$ UAC is not different. However once thrombosis sets in, PI drops significantly. 2/5 newborns $\bar{c}$ thrombosis were surgically treated, 1 was treated $\bar{c}$ urokinase followed by heparin, 1 c only heparin and 1 recovered spontaneously. All survived. Followup studies showed return of blood flow and PI to normal in 4/5 newborns by 10-28 days. In 1 that did not have thrombectomy or thrombolytic therapy, PI returned to normal after 8 wks. This study indicates that serial followup by Doppler ultrasound provides a noninvasive method of dection of thrombosis of major arteries following UAC. Early intervention by medical or surgical therapy leads to better prognosis.

1292 THERMAL EFFECT ON A POTTER BABY SCALE Lex W. Doyle, John C. Sinclair, McMaster Univ. Dept. of Peds. Hamilton, Ontario, Canada.

The objective of this study is to describe a significant source of error in the measurement of insensible weight loss (IWL), due to thermal effects on a Potter Scale. The scale was balanced and stable at room temperature. It was then placed in a pre-heated incubator, servo-controlled to maintain air temperature of 36°C. After 5 minutes, the scale began to register a large negative weight change. The maximum rate of this weight change was -15 g/hr at 15 minutes, and it was -7.5, -3.2, -0.9, -0.3 and -0.1 g/hr at 30, 60, 120, 180 and 240 minutes respectively. It was 5 hours before the scale was again stable. A total weight change of -10g was recorded. 49%, 73%, 91% and 94% of this weight change occurred by 30, 60, 120 and 150 minutes respectively. The temperature recorded from a site inside the scale rose 12.8°C. Hence, overall, there was a -0.78g weight change recorded for every °C rise in scale temperature. On cooling, the scale regained the registered weight loss.

In vivo measurements of IWL in newborn babies confirm that erroneously large weight losses are recorded while the scale temperature is rising. The described bias due to heating will cause significant overestimations of IWL. The error will be magnified for smaller babies because they usually require higher incubator (and therefore scale) temperatures. In situations where IWL is measured with a Potter scale in an unstable thermal environment, temperature effects on the scale itself should be allowed for.

1293 INTRAVENTRICULAR HEMORRHAGE AND THE PRETERM SGA NEWBORN Francine D. Dykes, Anthony Lazzara, Peter A. Ahmann (sponsored by A.W. Brann, Jr.) Emory University School of Medicine, Atlanta.

151 consecutive newborn infants < 35 weeks gestation requiring intensive care for more than 24 hours were studied regarding occurrence of subependymal and/or intraventricular hemorrhage (SEH/IVH) with CT scans, ventricular tap or autopsy in 1977 and 1978. SEH/IVH occurred more frequently in the SGA group (36/71) than in the AGA group (28/80). 22/42 SGA infants and 26/61 AGA infants with hyaline membrane disease (HMD) had SEH/IVH. Factors significantly related ($p < 0.02$) to SEH/IVH in AGA infants were alveolar rupture, bicarbonate administration after 1st 24 hours, mechanical ventilation, $PCO_2 > 50$, peak inflation pressure >25 cm H_2O and I:E ratio > 1:1. The only factor significantly related to SEH/IVH in SGA infants was the occurrence of alveolar rupture. 14/20 AGA infants and 16/20 SGA infants with alveolar rupture had SEH/IVH. SGA infants appear to be at higher risk of SEH/IVH than AGA infants. The occurrence of SEH/IVH in the preterm SGA infant may be on a different basis than in the AGA infant and related to prenatal nutritional status rather than postnatal iatrogenic events. Prenatal or intrapartum events superimposed upon decreased supportive tissue in the germinal matrix of the SGA infant may play an important role in the evolution of SEH/IVH in the preterm SGA infant. This is corroborrated by the fact that SEH/IVH occurred more frequently (14/29) in SGA infants without HMD than in AGA infants without HMD (2/19). In summary, prenatal nutritional factors are probably of predominant import in the evolution of SEH/IVH in the preterm SGA infant.