EFFECT OF NARCOTIC WITHDRAWAL ON NEONATAL SLEEP PATTERNS. T.R.C. Sisson, M. Wickler, Peeng Tsai, and I.P. Rao. Temple Univ. School of Medicine, Philadelphia. (intr. by V.C. Vaughan)

It is known that morphine and related compounds suppress REM sleep in the adult. This study was undertaken to determine if infants of heroin and methadone-addicted mothers would exhibit altered sleep patterns in withdrawal. EOG, EMG, and respiration were recorded by multichannel polygraph on 10 infants (4 methadone, 6 heroin) for 2½-4 hr. periods prior to, during, and after chlorpromazine therapy (2.0 mg/kg/d). It was found that heroin and methadone obliterated REM sleep and that periods of quiet sleep were rare before treatment. After a minimum of 48 hrs. therapy, brief but identifiable periods of REM appeared, increasing in frequency as successful withdrawal occurred. However REM occupied a maximum of 5% of sleep time.

Since this state is normally present in the newborn and is thought to be that period of sleep in which neuronal protein synthesis is most active, and since heroin and methadone suppress REM, it was concluded that suitable treatment of withdrawal is essential, not simply to relieve symptoms, but also to promote more normal and necessary sleep patterns during this critical time of brain development. This may, indeed, be especially valuable for those infants already demonstrating intrauterine growth retardation with maternal addiction.

DAMAGE BY VISIBLE LIGHT TO THE BILIRUBIN-DNA COMPLEX.

William T. Speck, (Intr. by Richard E. Behrman). Col. of Physicians and Surgeons, Columbia University, Babies Hosp., Department of Pediatrics, New York, N.Y. 10032

The effects of new environmental agents on child health is a subject of considerable interest. Of special concern are the long-term effects of such agents and more specifically their carcinogenicity, mutagenicity, and teratogenicity which is a function of their ability to modify cellular DNA. The purpose of this study is to determine the effects of bilirubin and/or its photodecomposition products on the ultrastructural arrangement of the DNA molecule. Mammalian and bacterial DNA solutions were illuminated under a phototherapy unit (Vita-Lite), 2W/cm² in the 410-500 nm wavelength band for 6 hours in the presence or absence of bilirubin. Bilirubin was found to form a complex with the DNA molecule and in the presence of light there results: (1) a decrease in the sedimentation coefficient of the DNA, (2) an increase in the thermal denaturation temperature and (3) no significant change in the buoyant density. These findings suggest that the bilirubin-DNA complex results from the intercalation of the bilirubin between the DNA strands. Upon irradiation the bilirubin is activated and this is accompanied by a cleavage of phosphodiester bonds which maintain the DNA structure. Studies on the mutagenicity of bilirubin and its photodegradation products are proceeding. These observations emphasize the importance of long-term follow-up in children with hyperbilirubinemia treated with phototherapy.

EFFECT OF BICARBONATE INFUSION IN NEWBORN DOGS. Jean J. Steichen and Leonard I. Kleinman, Univ. of Cincinnati College of Medicine, Department of Pediatrics, Cincinnati, Ohio.

The influence of a rapid infusion of hypertonic NaHCO₃ on blood gases and osmolality was studied in 7 newborn dogs 11-26 days of age. After tracheotomy and respiratory paralysis with gallamine the animals were artificially ventilated at a level which produced a respiratory acidosis. After blood gases were stabilized for 15 minutes, 2 mEq of HCO₃⁻ per kg, diluted with an equal volume of 5% glucose (osmolality of solution=930) were infused over 3 minutes. Ventilation was maintained fixed at pre-infusion levels. Mean values ± SEM prior to HCO₃⁻ infusion for blood pH, pCO₂, BE and osmolality were 7.24 ± 0.02, 59.7 ± 3.9, 1.16 ± 1.24, 295.5 ± 6.5 respectively. The changes (Δ) in these parameters following infusion at various times are tabulated below.

Time (min)	1	5	15	45	90	150	240
ΔpH	-.02	-.03	-.02	0	+.02	0	+.03
ΔpCO ₂	+12.3*	+15.6*	+15.5*	+11.8*	+10.8*	+8.2	+3.5
ΔBE	+4.3*	+4.2*	+4.3*	+4.3*	+4.3*	+4.0*	+3.0*
ΔOSM	+16.6*	+9.0*	+13.4*	+9.8*	+5.4	-0.3	-5.3

(*significantly different from 0 p<.01)

There was no change in arterial blood pressure and heart rate. These results suggest that rapid infusion of bicarbonate in an infant who cannot alter ventilation to increase CO₂ excretion, does not correct pH but does increase pCO₂ and osmolality.

THE CONTINUUM OF MORBIDITY AND MORTALITY IN THE LOW BIRTH WEIGHT (LBW) INFANT. A. Teberg, J. Hodgman, and E. Dowd. Dept. of Pediatrics, LAC-USC Medical Center, Los Angeles.

Infants with BW <1500gm discharged from LAC-USC nursery during a 15 month period (Oct.72-Dec.73) were followed to assess the continuing morbidity and mortality of the LBW infant. Of 101 infants, 5 were lost to followup, 7 were cared for by private physicians and 89 were followed by a clinic team of pediatric nurse practitioners, pediatricians, and social workers. Four infants died for a mortality of 4.5%. Significant medical morbidity requiring 48 hospitalizations occurred in 19 infants. Failure to thrive and child abuse were found in 9 infants. Outcome morbidity and mortality were related to severity of neonatal respirator disease. 21 of 89 (23.6%) infants required respirator therapy in the nursery. 2 of 4 deaths were in infants treated with respirators during the newborn period. Significant morbidity requiring 1 or more hospitalization occurred in 10 or 45% of respirator infants compared with 9 or 13.3% of non-respirator infants. Failure to thrive and child abuse were found in 1 (or 4.6%) respirator infant compared with 8 (11.7%) non-respirator infants. The LBW newborn continues to be at high risk for morbidity and mortality after discharge. Infants requiring ventilatory assistance had a higher incidence of morbidity and mortality. Mortality seemed less related to nursery course than to post-natal events.

EFFECTS OF HYPOTHERMIA AND REWARMING ON NEONATAL CIRCULATION. P.L. Toubas, R.P. Hof, M.A. Heymann, A.M. Rudolph. Univ. of Calif., San Francisco, Dept. of Peds., Cardiovascular Res. Inst. San Francisco.

Little is known about the influence of core temperature on the neonatal circulation though there are many studies concerning metabolism and temperature. 6 unanesthetized lambs age 1-3 days breathing room air were cooled from 40° to 30°C and then rewarmed. Heart rate (HR), central venous (CVP), femoral arterial (FAP) and left ventricular enddiastolic (LVED) pressures were recorded. Cardiac output (CO) and it's distribution was calculated with the microsphere method. During cooling HR dropped from 230 to 140/min. CO dropped 5%. LVED measured in 3 animals rose from 1 to 20 mm Hg and CVP increased from 4.5 to 8.5 mm Hg. pH fell from 7.38 to 7.18, PO₂ increased from 79 to 90 and PCO₂ from 41 to 57 Torr. Shivering and respiratory distress were prominent. Blood flow to brown fat increased by 600% and to muscle by 43%. Flow to the heart was maintained, but in all other organs it fell by up to 40%. During rewarming CO and HR exceeded control values, FAP, CVP and LVED did not quite reach them. The breathing pattern normalized. The heart, working at a decreased rate with decreased CO in the presence of an increased peripheral demand mainly of muscle and brown fat, seemed not to be able to meet these demands. Respiratory distress developed as LVED and CVP increased. Redistribution of blood volume between systemic and cardiopulmonary circulation may be a major responsible mechanism. Supported by HL 06285

SERUM CALCIUM IN INTRAUTERINE GROWTH RETARDATION (IUGR): Reginald C. Tsang, Mardi Gigger, David Brown, and Harry Atherton (Introduced by Irwin Light), Univ. of Cincinnati College of Med., Dept. of Ped., Cincinnati, Ohio.

Infants with intrauterine growth retardation (IUGR) often exhibit signs of neuromuscular irritability, even without associated hypoglycemia. Little is known about serum Ca in such infants. In this study 47 IUGR infants and 70 infants with birth weights appropriate for gestational age (AGA) were studied serially in the first 3 days of life. Serum Ca in AGA infants was correlated with gestational age; serum Ca in IUGR infants was within the 95% confidence limits for AGA infants of comparable gestation. Forty IUGR infants were matched with 40 AGA infants for birth weight and birth asphyxia (1 minute Apgar Score ≤ 6, or necessity for resuscitation): neonatal serum Ca was not significantly different between the 2 groups. Among IUGR infants postnatal serum Ca was not correlated with birth weight, but correlated significantly with Apgar Scores (r=0.471, p<0.01) and initial acidosis (r=0.34, p<0.05). The lowest serum Ca in IUGR infants with birth asphyxia was 7.52±SE 0.23 mg% compared to 8.41±0.21 in IUGR infants without birth asphyxia. Lower serum Ca was associated with higher serum P at 24 hours of age (r=-0.332, p<0.05). Serum Ca was not related to neuromuscular symptomatology. Thus neonatal serum Ca is affected by gestational age and not by birth weight; intrauterine growth retardation is not associated with lower serum Ca, except in the presence of birth asphyxia.