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ADVERSE CONSEQUENCES OF POSTNATAL HEAD GROWTH RETARDATION. Herbert G. Vaughan, Jr., Cecelia Daum and Diane Kurtzberg (Spon. by Lawrence M. Gartner), Albert Einstein College of Medicine, Departments of Neuroscience and Pediatrics, Bronx, New York.

Reduction in the rate of head growth in premature infants during the neonatal period may have serious consequences for subsequent neurobehavioral development. In a series of 125 LBW infants studied from birth to 15 months of age, head growth was arrested or slowed for 2 to 12 weeks after birth in 27 infants. Severe respiratory insufficiency requiring mechanical ventilation combined with inadequate or marginal caloric intake was common in these infants during the period of impaired growth. Although 20 of the 27 infants achieved normal head circumference by 7 months of age, 18 infants showed neurobehavioral deficits. Six of the seven infants with persistently small heads were defective. Neurophysiologic studies during the neonatal period demonstrated abnormalities characteristic of neuronal immaturity. These findings suggest that neuronal maturation may be impaired during a critical period of cortical synaptogenesis. Compensatory acceleration of head growth following the initial period of impaired growth does not appear in many instances to reverse the adverse neurobehavioral impact of transient postnatal retardation of brain maturation.

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THE PRE-TERM SMALL FOR GESTATION (SGA) INFANT: A TWO YEAR FOLLOW UP STUDY. B.R. Vohr, W. Oh, A.G. Rosenfield, R.M. Cowett. Brown Univ. Program in Medicine, Women & Infants Hosp., Dept. of Ped., Providence, R.I.

Previous investigators have reported unfavorable neurological and developmental outcome of SGA infants (birth weight (b.w.) <1500 gms) born at term or at <30 wks of gestation. Since obstetrical considerations for the delivery of an SGA fetus often arise between 30-38 wks, the outcome of these survivors becomes a relevant issue. In 1975-76, 28 of 47 such infants survived and 21 were followed sequentially during the first 2 yrs. Their b.w. was 1220 ± 195 g (M $\pm$ SD) and the gestation 33.4 ± 2 wks. Each SGA infant was paired with a b.w.-matched appropriate for gestation (AGA) infant whose b.w. was 1195 ± 190 g and gestation 29 ± 2 wks. They have comparable sex distributions, perinatal risk scores, maternal education, occupational status and caloric intake during the first 3 months. The weight, length, and head circumference of the SGA infants attained the 10th percentile by 6-8 months and were similar to the AGA group. Quarterly neurological examinations showed similar findings during the first year in the 2 groups. At 2 yrs, 2 SGA (diplegia) and 1 AGA infant (hemiplegia) were abnormal. The quarterly Bayley scores of the SGA infants were lower during the first year but at 18-24 months, the 2 groups had similar motor and cognitive developmental quotients. The data indicate a favorable outcome in both AGA and SGA preterm infants weighing <1500 gms; the favorable result in SGA infants may form an additional basis for the delivery of such a fetus at 30-38 wks if other obstetrical factors so indicated.

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THE RELATION OF CHOLESTEROL ESTER & CHOLESTEROL SYNTHESIS TO THE INITIATION OF MYELINATION.

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Cholesterol esters are relatively abundant during early brain development and essentially disappear after myelination. However little is known about the role of cholesterol esters and the regulation of their synthesis. In this study regulation of cholesterol ester and cholesterol synthesis by desmosterol was studied in C-6 glial cells, a model of the glial cell found just prior to myelination. Cholesterol ester synthesis (from [14 C]oleate) was stimulated as much as 12-fold after just 5 hours' exposure to desmosterol. Cholesterol synthesis (from [14 C]acetate) was inhibited in a simultaneous and quantitatively similar manner. Observation of similar effects on the syntheses of cholesterol ester and cholesterol from $^3\text{H}_2\text{O}$ indicated that alterations in pool sizes of intermediates did not contribute to the observed responses. Experiments utilizing prelabeled intracellular cholesterol suggested that desmosterol produced its effect by stimulating esterification of primarily endogenous cholesterol. Thus, regulation of cholesterol ester synthesis is active and tightly linked to regulation of cholesterol synthesis in this model of the premyelinating glial cell. The data suggest that prior to myelination desmosterol stimulates cholesterol ester synthesis and inhibits cholesterol synthesis. When the demand for glial cholesterol becomes great, i.e. with rapid myelination, desmosterol is converted to cholesterol, cholesterol ester synthesis is inhibited, and cholesterol synthesis is disinhibited.

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A CONTROLLED STUDY: THE DEVELOPMENT OF INFANTS BORN TO HEROIN-DEPENDENT AND METHADONE-MAINTAINED WOMEN. Geraldine S. Wilson, Janette Goddard, Rita T. Lee

(Intr. by Mardina M. Desmond). Baylor Col. of Med., Dept. of Pediatrics, Houston, Texas.

As part of a longitudinal study, the development of 25 infants born to untreated heroin-addicted women and 23 infants born to methadone-maintained women was studied from birth through 1 year of age. 31 infants of women matched for time of onset of prenatal care, race, age, and marital and socioeconomic status served as controls. Heroin infants were more hypertonic ($p < .005$) than methadone infants or controls, while methadone infants had poorer fine ($p < .05$) and gross motor coordination ($p < .01$) than other groups. Gesell adaptive scores were lower for heroin and methadone infants at 3, 6, and 12 months ($p < .05$), and Gesell language and personal-social scores were lower for drug infants ($p < .05$) through 6 months. The mean Bayley Mental Development Index at 9 months was 96.91 ($SD \pm 18.69$) for heroin infants, 97.25 ($SD \pm 15.74$) for methadone infants, and 107.03 ($SD \pm 14.16$) for controls ($p < .05$). The mean Bayley Psychomotor Development Index at 9 months was 91.87 ($SD \pm 20.39$) for heroin infants, 85.85 ($SD \pm 12.83$) for methadone infants, and 97.93 ($SD \pm 10.9$) for controls ($p < .05$). 1 heroin infant is hydrocephalic and severely impaired, and another has the features of the fetal alcohol syndrome. Both heroin and methadone mothers used multiple other drugs throughout pregnancy. 45% of drug infants were in foster or adoptive care by 1 year; 93% had left the newborn nursery with their biologic mothers.

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JITTERINESS IN THE TERM NEWBORN: CLINICAL SIGNIFICANCE Barry S. Zuckerman, Edgar Oppenheimer, Joseph Donnelly, Nancy Day, Boston U. Sch. Med., Boston City Hospital, Dept. Ped., Boston

Jitteriness or tremor is a frequent finding in newborns that has been poorly studied. Perinatal data was collected and neuro-pediatric examinations were carried out on 511 term newborn infants greater than 38 weeks gestation born at BCH. 160 infants (32%) were found to be clinically jittery; of these 126 (79%) were intermittently jittery (I), with tremor present only when the infant was stimulated, and 34 (21%) were continuously jittery (C), with tremor present at rest. To assess the pathogenesis and clinical significance of jitteriness, nonjittery infants (N) were compared to Groups I and C. An infant in either jittery group was more likely to have a complication of pregnancy ($p < .04$) and more likely to be irritable ($p < .01$). Infants in the C Group were also more likely to be hypertonic ($p < .03$) and have more than one other positive finding on neurologic examination ($p < .001$). No differences were found in regard to frequency of labor or delivery risk factors, (eg: type of anesthesia, forceps, C/Section, pitocin, need for O₂), Apgar Scores, incidence of neonatal medical illness including metabolic disturbance, frequency of dysmorphic features or in the number of infants less than the 10th percentile for length, weight, or head circumference. This data suggests that jitteriness may be related to problems of the pregnancy itself and is frequently associated with other neurologic signs when the tremor is continuous. These infants (C) may be at risk for neurobehavioral difficulties.

PULMONOLOGY

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SEQUENTIAL PULMONARY FUNCTION STUDIES IN VERY LOW BIRTH WEIGHT INFANTS (VLBW) DURING THE FIRST WEEK OF LIFE. Endla K. Anday, Ann Godtar, Linda M. Sacks,

and Maria Delivoria-Papadopoulos. Univ. of Pennsylvania Sch. of Medicine, Dept. of Pediatrics. Philadelphia, Pa.

Twelve infants, $29 \pm .62$ wks. gestation, 1035 ± 11 g. without apparent respiratory distress were studied within 10 hrs. of birth. Measurements of intraesophageal pressure, air flow, and tidal volume (V_T) enabled calculation of lung compliance (C_L), lung inspiratory (RL_I) and expiratory (RL_E) resistance, and minute volume ($\dot{V}$) at 5-10 hr. intervals. Simultaneous blood gases were measured. Mean $C_L \pm SD$ in ml/cmH₂O/kg in the first 24 hrs. varied from 1.12 ± 0.23 to 1.19 ± 0.22 and then decreased to 0.09 ± 0.15 at 72 hrs. Subsequently C_L increased to 1.62 ± 0.53 at 150 hrs. The sequential C_L values varied from 2%-56% of the individual mean. V_T varied from 5.0 ± 0.58 to 7.6 ± 2.09 ml/kg in the first 24 hrs., remaining relatively unchanged at 6.65 ± 0.82 ml/kg at 150 hrs. Mean $\dot{V} \pm SD$ in ml/min ranged from 387 ± 60 to 311 ± 40 at 24 and 72 hrs. respectively and to 366 ± 29 at 150 hrs. The inspiratory (RL_I) and expiratory (RL_E) resistance increased in the first 72 hrs. from 73 ± 11 to 149 ± 40 cmH₂O/L/sec and 112 ± 21 to 159 ± 30 cmH₂O/L/sec respectively, followed by a decrease in RL_I over the next few days to 87 ± 15 cmH₂O/L/sec while RL_E remained unchanged. Blood gases and pH were within physiological range. These data indicate the variability of the mechanics of breathing in VLBW infants prone to periodic breathing may reflect unstable lungs due to changes in lung volume or to a degree of immaturity in the control of breathing.