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Reference values of plasma amino acid concentrations during parenteral nutrition in premature newborns and infants.

Complete parenteral nutrition using commercial solutions of crystalline amino acids may cause extreme amino acid imbalance, as we have published previously. In order to obtain reference values which can be used for estimating the proportion of these imbalances we studied the plasma amino acid concentrations by ion exchange chromatography in 1. the venous and arterial cord blood of 35 term newborns born by caesarean section without preceding labor, and 2. the peripheral venous blood of 40 term newborns, 3-20 days of age, who were exclusively breast-fed. **Results** (median  $\mu$  moles/l) 1. cord vein/cord artery: Tau 112/144, Urea 2700/3000, OH-Pro 21/20, Thr 208/199, Ser 113/103, Asn 40/37, Gln 386/434, Glu 55/62; Pro 130/129, Cit 10.4/9.3, Gly 193/178, Ala 434/283,  $\alpha$ -NH<sub>2</sub>adip.a. 4.8/4.9,  $\alpha$ -NH<sub>2</sub>but.a. 17.2/17.3, Cys 28/36, Val 176/149, Cystathionine 1.2/2.0, Met 26.7/23.6, Ile 50/42, Leu 87/73, Tyr 51/45, Phe 59/51, Orn 62/57, Lys 297/263, 1-Met-His 3.7/5.7, His 96/82, 3-Met-His 3.0/4.4 Arg 63/53, Try 47/43. 2. peripheral vein: Tau 50, Urea 2300, OH-Pro 40, Thr 104, Ser 109, Asn 53, Gln 610, Glu 63, Pro 212, Cit 12.6, Gly 183, Ala 253,  $\alpha$ -NH<sub>2</sub>adip.a. 4.2,  $\alpha$ -NH<sub>2</sub>but.a. 13.7, Cys 52, Val 153, Cystathionine 1.0, Met 20, Ile 49, Leu 104, Tyr 72, Phe 41, Orn 64, Lys 148, His 66, 3-Methyl-His 3.0, Arg 47, Try 44. During parenteral nutrition we propose to follow the reference values of cord blood in premature infants. In term newborns the values of breast-fed infants should serve as guidelines. Supported by DFG-SFB 87/D5.

**125** I. SKODOVA\* and D. DE RAEYMAECKER\* (Intr. by H.K.A. Visser). Childpsychiatry, Erasmus University & Sophia Childrens Hospital, Rotterdam, Holland.

A study of development in LBW children.

An evaluation of intellectual and emotional functioning has been done in 90 LBW subjects ( $\leq$  2000 gr.) and 40 controls, using an Intelligence Test and a Childpsychiatric interview. The LBW subjects form a heterogeneous group as far as medical history, social background and psychological climate within the families are concerned. One LBW group (17 boys, 33 girls) born in 1969/70 has been examined at the age of 5 years; another group (16 boys, 24 girls) born in 1972 has been seen at the age of 3 years, together with a matched control group of normal BW. On the SON (a Dutch nonverbal-intelligence-test) 50 five years old LBW subjects obtained the scores the mean of which did not differ from the Dutch population mean. 3 years old LBW children performed less well than the controls on the (Stutman) Intelligence Test ( $P < .001$ ). In both LBW groups and in the Control group boys did significantly less well than girls. On the results of Childpsychiatric interview: in the 5-years-olds group the girls are functioning better than the boys. At least half of the children present with obvious immaturity with regard to object relationships and ego strength. The 3-years-olds as a group have clear problems with the steps of the individuation-separation phase - are markedly different from the control group in this regard.

**126** D.R. HARVEY\*, J. PRINCE\*, W.J. BUNTON\* and S. CAMPBELL\* (intr. by P.A. DAVIES). Queen Charlotte's Maternity Hospital, London, U.K.

Abilities of children who were small for dates at birth and whose growth in utero was measured by ultrasonic cephalometry.

A follow-up study of 51 babies less than the 10th centile of weight at birth. All were born at term. The children were seen at a mean age of 5.1 years and assessed on the McCarthy Scale of Children's Abilities. In analysing the data, the children were divided into four groups according to when slow growth was first seen by ultrasonic cephalometry: before 26 weeks menstrual age; between 24 and 36 weeks; after 34 weeks; and a group in whom slow growth was not seen. The results were analysed by Student's t test. The first group had a significantly lower mean on the General Cognitive Index when compared to the other groups combined. The mean of the first group was also significantly lower on the following subscores: perceptual-performance; motor; quantitative; and memory. There were no differences on the verbal subscale.

An earlier follow-up at a mean age of 4.3 years showed that those children with slow growth before 34 weeks were shorter, lighter and had a smaller head circumference.

Prolonged slow growth in utero is associated with lower abilities later in childhood.

**127** A.P. WEEDON\*, T.E. STACEY\*, R.D.A. BOYD and R.H.T. WARD\*, Depts of Paediatrics and Obstetrics, University College Hospital Medical School,

University Street, London, W.C.1. Foeto-maternal electrical potential in the conscious sheep.

Transplacental passage of electrolytes will depend not only on the nature and activity of the placental barrier and on the foetal and maternal plasma concentrations but also on any transplacental potential difference (PD). We have measured PD between foetal and maternal blood streams on 31 days in 14 conscious, pregnant sheep using chronically implanted saline filled catheters linked via KCL-Agar bridges and calomel electrodes to a high impedance electrometer. In healthy foetuses PD ranged from 0 to 100 m.v. (foetus negative) and varied in individual sheep by up to 30 m.v. from day to day. PD fell with increasing gestational age (G.A.).

PD(m.v.) = 208 - 1.4 G.A. (days)

(n = 31;  $p < 0.001$ ; range 80 days to term). A fall of foetal pH, either spontaneous or induced was associated with a rise in PD.

PD(m.v.) = 327 - 41pH

(n = 88;  $p < 0.001$ ; pH range 6.8-7.5). There was a mean rise of 39 m.v. ( $\pm 6$  S.E.M.) in PD following foetal death which persisted over several days, but on killing the mother PD fell asymptotically to zero, halving its value in a mean time of 8 mins ( $\pm 1.5$  S.E.M.). It is possible to measure bidirectional sodium fluxes simultaneously with PD.

**128** J.S. ROBINSON, C.T. JONES, J.R.G. CHALLIS AND G.D. THORBURN. The Nuffield Institute for Medical Research, Univ. of Oxford, Oxford.

Observations on experimental intrauterine growth retardation in sheep.

Low birthweight in sheep is associated with increased perinatal mortality. The sheep uterus contains folds of endometrium (caruncles) which form the maternal cotyledon in pregnancy. Alexander (1964) removed caruncles & in a subsequent pregnancy observed a reduction of placental & fetal weight, increased incidence of premature labour & stillbirths. 4 small fetuses have been produced using this technique. Catheters were implanted into the ewe & the fetus between 105 & 110 d. Serial measurements of blood gases, pH, metabolites, cortisol & ACTH were made. The mean fetal carotid  $\text{PaO}_2$  & haematocrit were  $15.9 \pm 1.3$  mm Hg &  $37.4 \pm 2.2\%$  compared to  $21.6 \pm 1.0$  mm Hg &  $30.3 \pm 0.6\%$  in 7 control fetuses ( $P < 0.01$ ). There were no significant changes in  $\text{PaCO}_2$  or pH. Plasma glucose ( $0.66 \pm 0.03$   $\mu\text{mol/ml}$ ), lactate ( $0.9 \pm 0.02$   $\mu\text{mol/ml}$ ) and amino nitrogen ( $\alpha\text{NH}_2$ ,  $6.11 \pm 0.25$   $\mu\text{mol/ml}$ ) were lower than in control fetuses (glucose  $1.19 \pm 0.02$   $\mu\text{mol/ml}$ , lactate  $1.47 \pm 0.02$   $\mu\text{mol/ml}$  and  $\alpha\text{NH}_2$ ,  $7.64 \pm 0.02$   $\mu\text{mol/ml}$ ) suggesting a limitation of placental transfer. We have previously observed increased ACTH with hypoxaemia or hypoglycaemia. However, the concentration of ACTH ( $69.2 \pm 29.7$  pg/ml) and cortisol ( $21 \pm 8.2$  ng/ml) in the small fetuses was not significantly different from controls.

**129** M. ORZALESI, F. GLORIA-BOTTINI\*, P. BRISCOLINI\*, E. NERVEGNA\*, P. LUCARELLI\*, R. PALMARINO\* and E. BOTTI-

NI. Chair of Neonatology, University of Naples 2nd School of Medicine, Naples and Dept. of Genetics, University of Rome School of Science, Rome, Italy. Gestational age, birth order and placental alkaline phosphatase.

We have recently described an interaction between ABO and placental alkaline phosphatase (PAP) polymorphisms suggesting an important role of PAP in the maternal-foetal relationship. The present report is concerned with an analysis of 803 consecutive newborn infants from a Caucasian population of New Haven, Conn. U.S.A.. In first born infants PAP phenotype and gestational age were not related. In infants born from subsequent pregnancies the prevalence of S phenotype of PAP was significantly associated with gestational age ( $p < .01$ ). Both in pre-term ( $\leq 37$  weeks) and in post-term ( $\geq 42$  weeks) infants the proportion of S phenotype was significantly lower than expected, suggesting a normalizing action of this phenotype on the duration of gestation. S phenotype is the homozygote for the allele  $\text{Pl}^{\text{S}}$  which shows the highest frequency in all human populations. The present observation strongly suggest that PAP may have an important role in the maternal-foetal immunological relationship.