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Influence of the Mode of Delivery on Umbilical and Postnatal Plasma Levels of 7 Corticosteroids in the Newborn.

Cortisol plasma levels are higher in vaginal delivery than in cesarean section(CS). Do other corticosteroids differ accordingly and how long might such differences persist into the newborn period? Aldosterone(A), corticosterone(B), deoxycorticosterone(DOC), progesterone(P), 17-hydroxyprogesterone(17OHP), cortisol(F) and cortisone(E) were simultaneously followed in a 250 µl plasma sample from 7 term infants at 0,2,4,6,12,24h,4d and 7d after CS. In comparison with a matched group of 12 vag. delivered term infants, mean glucocorticoid (F,E,B) and precursor (17OHP) levels were generally lower (1.3-3.8x) in maternal and cord plasma after CS, whereas mineralocorticoids (A,DOC) were equal or slightly (1.8 x) higher. This different behavior of gluco- and mineralocorticoids seems to persist after birth: F,E,B + 17OHP were lower in the CS-group until 6-12h with less fluctuating F and B levels in the first 24h. A and DOC, however, remained higher until day 7 with maximum differences at 2 and 12h. The observed changes are most probably due to differences in partal stress and maternal fluid and electrolyte balance. (Approved by parents and ethical committee)

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Circadian Rhythm of Cortisol in Infants

Little is known about the diurnal pattern of cortisol secretion in infants. In spite of this one has to use a special dose scheme for replacement therapy in the case of cortisol deficiency. To investigate spontaneous cortisol secrition in early childhood we studied 17 infants (5 prematures, 5 newborns, and 7 infants at the age of 4 wks. to 6 ms.). They were compared with 5 older children (4-11 yrs.) and 5 adults (23-34 yrs.). During a 24 hour period blood was drawn every 60 min. in the infants and every 10-30 min. in older children and adults. Cortisol was assayed by a CPB-technique. Episodic cortisol variations were found in all groups. The 24 hour plot for premature and newborn infants did not show any of the extreme peaks or circadian rhythms present in the plots of the older infants, children, and adults. The quantities in the latter groups ranged between 30.3 ug/dl in the early morning and 0.2 ug/dl at night. The data suggest a lack of circadian rhythm of plasma cortisol until the age of 6 to 10 weeks. There may be a synchronisation between plasma cortisol variations and regular asleep/awake rhythms, which appear at this age in infancy.

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Study of the glycemic response to hydrocortisone (H) in small-for-gestational age (SGA) newborn infants.

Glucose homeostasis was evaluated in 17 SGA infants (groupA) and in 14 SGA infants (groupB) receiving a bolus I.V. H injection of 10 mg/kg. Mean gestational age (weeks) birthweight (g)/postnatal age (hours) were 38,2/1880/41 in groupA and 37,8/2090/43 in groupB. Two hours after H injection plasma [glucose] was higher ($p<0,05$) in groupB than in groupA (87 ± 5 vs 52,5 ± mg/dl) blood [pyruvate] lower ($p<0,01$) in groupB (37,4 ± 7 µM/l vs 89 ± 11) and plasma glucagon and insulin levels were lower in groupB ($p<0,05$). In groupA, an I.V. bolus of 150 mg/kg L-alanine (L-A) induced no significant change at 50 min. in plasma glucose (from 52,4 ± 5 to 47 mg/dl) glucagon (from 272 ± 3 to 355 ± 42 pg/ml) insulin levels (12 ± 0,8 to 11 ± 0,9 µIU/ml). In groupB, L-A induced an increase in plasma glucose from 87 ± 5 to 108 ± 5 mg/dl ($p<0,05$) without any change in plasma glucagon (207 ± 22 to 206 ± 20 pg/ml) and insulin (6,42 ± 0,5 to 7,36 ± 0,8 µIU/ml) levels.

These data suggest that H could contribute to increase gluconeogenesis in SGA infants.

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Increased affinity and number of insulin receptors in the fetus.

Insulin has been implicated as a growth factor in fetal life. Clinical and experimental studies have shown that fetal hyperinsulinism leads to macrosomia. Studies in adult humans have demonstrated that changes in insulin binding to mononuclear cells mirror changes in other tissues. In an attempt to clarify the role of insulin in the fetus, we have studied insulin receptors on mononuclear leukocytes in cord blood from 12 normal newborns. Eight healthy young adults served as controls. The average specific binding in the absence of unlabelled insulin was 24.3 ± 3.5% and 4.7 ± 0.9% in newborns and adults respectively. This increase in binding is caused by an increase in number of receptor sites per cell, as well as by an increase in receptor affinity. The newborns had an average of 44600 receptor sites per cell compared with 7100 for the adult controls. An average affinity constant $\bar{K}e$ was 5.9 x $10^8 M^{-1}$ for newborns, and 2.9 x $10^8 M^{-1}$ for the adults. This finding of markedly high concentrations of high affinity receptors for insulin on fetal cells may reflect the importance of insulin in intrauterine growth and development.

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Arginine Vasopressin (AVP) in plasma of premature infants (PI) treated by mechanical ventilation.

Dilutional syndrome has been observed after mechanical ventilation and the role of AVP hypersecretion questioned. 17 PI with respiratory failure submitted to positive and expiratory pressure therapy were compared to 21 PI without pulmonary disease. Plasma (P.Osm), Urinary (U.Osm) and plasma AVP (radioimmunoassay) were determined and results were as follow

	P.Osm	U.Osm (mOsm)	AVP (pg/ml)
ventilated PI	280.6 ± 3.7	270.4 ± 44	10.1 ± 2.3
controle	280.7 ± 3.2	150.6 ± 19.5	3.5 ± 0.3
P	NS	< 0.01	< 0.001

In conclusion : 1) AVP is significantly increased in PI submitted to mechanical ventilation and may be responsible for the differences in U.Osm between the 2 groups. Mean P.Osm are identical but patients with lower P.Osm have higher plasma AVP levels. 2) hypersecretion of AVP may be responsible for the dilutional syndrome observed in PI ventilated under positive and expiratory pressure.

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Prediction of adult height.

Different methods of height prediction were compared in healthy subjects of known adult height, 30 males and 30 females. Predictions were made yearly at ages 8-17 years. Epiphyseal bone age (BA) was determined with Greulich-Pyle Atlas (G-P) and TW 2 RUS. The methods assuming constant SDS for age (CD) or for BA (IPH), and the Walker method were inaccurate with mean absolute errors up to 10 cm, and systematic overprediction except for IPH with TW 2 RUS. The methods of Bayley and Pinneau (BP), Roche et al. (RWT) and Tanner et al. (T) had about equal accuracy with mean absolute errors of 2-4 cm. With G-P BA adjusted to the growth of Finnish children, the IPH was as accurate as BP, RWT and T. RWT, and BP in girls, tended to overpredict. The year-to-year variation of prediction was greatest with BP, IPH, and chronological age based T. In a group of 8 boys with delayed growth and maturation, IPH with the adjusted G-P BA proved to be the most accurate method.