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Longitudinal Study of 7 Plasma Corticosteroids (CS) in Mother and Child at Birth and during the Neonatal Period.*

The adrenal cortex seems to play an important role in the newborn's adaptation to extrauterine life. Since systematic studies on multiple CS in the same human newborn have not yet been reported, progesterone (P), deoxycorticosterone (DOC), 17α-hydroxyprogesterone (17α), corticosterone (B), aldosterone (A), cortisone (E) and cortisol (F) were followed in a single 250 µl peripheral plasma sample in 12 vaginally delivered full-term infants of either sex. Mean concentrations (after automated LH-20 multi-column chromatography and specific radioimmunoassays) were in ng/ml: (PMP=paired maternal plasma)

Steroid	PMP	Cord	2h	4h	6h	12h	24h	4d	7d
P	120	271	57	68	46	24	13	0.9	0.5
DOC	3.0	6.0	5.5	4.5	3.0	1.2	1.2	0.13	0.10
17α	11.0	33	8.9	6.0	4.0	2.0	0.9	0.8	1.24
B	36.3	10.5	9.3	3.0	2.8	5.2	5.3	7.9	2.5
A	1.0	2.1	3.0	3.7	3.5	3.3	3.4	2.1	1.4
E	60	138	83	87	75	57	41	23	22
F	548	69	104	49	28	76	27	57	35

Besides marked materno-fetal CS differences, P, 17α and DOC (predominantly of placental origin) disappear rapidly with varying half lives. A, B, E and F, however, remain elevated in comparison with later infancy, reflecting high adrenal biosynthetic activity. * (Approved by parents and Hospital's Ethical Committee)

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Adrenal function in premature infants with respiratory distress syndrome (RDS).

To evaluate the controversial role of adrenocortical hormones in RDS, plasma cortisol (F) and urinary excretion of tetrahydrocortisol (THF), tetrahydrocortisone (THE), and aldosterone were determined by specific radioimmunoassays during the first 8-10 days of life in 10 normal premature infants (group I) and in 10 premature infants with RDS (group II). In group I plasma F decreased from 15.8 ± 5.4 µg/100 ml on the 1st day to 4.1 ± 0.8 µg/100 ml after 1 week. Urinary THF (0.005 - 0.08 mg/m^2/24 h) and THE (0.01 - 0.1 mg/m^2/24 h) were low when compared with normal values of older children (THF 0.3 - 2.5 mg/m^2/24 h, THE 0.3 - 3.0 mg/m^2/24 h). In group II plasma F rose from 15.2 ± 1.7 µg/100 ml to 27.2 ± 8.7 µg/100 ml on the 7th day. Urinary THF and THE in group II were 2-3 times higher than in group I. Aldosterone excretion was high, but varied widely (1.0 - 60.0 µg/m^2/24 h) in group I and II, the normal adult values being 2.0 - 12.0 µg/m^2/24 h. No correlation to the sodium balance could be detected. There is no evidence for a postnatal adrenal insufficiency in premature infants with RDS. The low urinary THF and THE in the presence of normal or elevated plasma F levels can be explained by different metabolic pathways in premature infants.

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Early and late effects of neonatal cortisone on growth of rats.

Corticosteroids are being used to prevent or ameliorate respiratory distress syndrome. An evaluation of possible deleterious effects was undertaken in Caeserian-derived Sprague-Dawley rats by giving 1.25mg of cortisone acetate I.M. on the 4th day of life to 20 pups; 25 controls received 0.05ml saline. This dose is equivalent to approximately 70 mg/M^2 of prednisone. Pups were reared in litters of 8 (all treated or all control); terramycin was added to the drinking water. At age 21 days body weight, stem-length and tibia length were all less in the cortisone treated animals than the same measurements in the controls, but skeletal maturation was advanced in the treated animals.

	Treated	Control	P
Body weight, gm.	51.15	63.04	<0.001
Stem length, mm.	112.55	125.32	<0.001
Tibia length, mm.	16.88	20.35	<0.001
Ossif.center, no.	118.0	107.56	<0.05

At age 12 weeks, decreased body weight (male p 0.01<>0.001; female p 0.02<>0.01) and bone length (male p 0.10<>0.05; female p 0.05<>0.02) were still evident but the number of epiphyseal fusions was the same in treated and control animals. These findings have implications for the future growth of infants given corticosteroids because reduced linear growth and accelerated skeletal maturation will eventuate in short stature.

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Studies on prepyloric lipase in premature and full-term newborns.

Lipolytic activity of pharyngeal origin with pH-optimum 5.4 has been found in esophageal and gastric aspirates of adult subjects (Hamosh et al.: J.clin.Invest.1975;55:908). We studied the gastric contents of seven premature and 11 full-term newborns to find out if lipolytic activity is present in the stomach. The samples were acid enough to exclude pancreatic lipase. As substrates we used H^3-trioleate and ingested pasteurized milk, and the incubations were performed in 37°C at various pH in a 5 %-albumin-buffer solution. Mono-, di-, triglycerides and FFA were separated by TLC. Four out of seven premature and all full-term newborns had clear lipolytic activity in the stomach shortly after birth, starting in the former group from the gestational age of 34 weeks. The lipase activity differed from pancreatic lipase by lower pH-optimum and acid-resistance. A lipase activity of this kind was also shown in a gastric sample of one infant with pyloric stenosis, and in a sample from the upper segment of esophagus of a newborn with esophageal atresia. Our preliminary results suggest that lipase activity in gastric contents appears already in newborns and even in prematures with gestational age over 33 weeks, and that the lipase involved differs from pancreatic lipase. Some evidence is given for the origin of the lipase from the uppermost gastrointestinal tract.

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Glycoprotein synthesis by human small intestine in organ culture.

Glycoprotein synthesis was measured by the incorporation of 14-C-glucosamine into total acid precipitable protein of jejunal explants cultured in vitro. The rate of glucosamine incorporation remained constant up to 48 hours. During this time a continuous release of glycoprotein into the culture medium was observed. Pulse-chase experiments indicated that the mean half life of overall labelled tissue glycoprotein was about 20 hours. SDS-polyacrylamide-gel-electrophoresis of the isolated brush border membrane showed that all major protein bands of high molecular weight had incorporated 14-C-glucosamine. These proteins were identified as maltase-glucoamylase, lactase, sucrase-isomaltase, enterokinase and alkaline phosphatase. Specific enzyme activity could not be assigned to the two remaining labelled bands. After 5 hours of culture lactase showed the highest glucosamin incorporation. These results indicate that the organ culture method is suitable for studying the biosynthesis of human intestinal brush border enzymes in biopsies from patients with intestinal malabsorption syndromes.

50 S.AURICCHIO, G.ANDRIA*, L.GRECO* and G.MAZZACCA* (Department of Pediatrics and Department of Gastroenterology, University of Naples, Naples, Italy). Peptidases of brush border of human and rabbit small intestinal mucosa.

Three peptidase activities were found to be present in human and rabbit small intestinal mucosa: the aminopeptidase A, hydrolyzing the α-L-glutamyl-β-naphthylamide (BNA); the dipeptidyl aminopeptidase IV, hydrolyzing glycyl-L-proline from glycyl-L-prolyl-BNA; a carboxypeptidase, hydrolyzing N-CBZ-L-prolyl-L-alanine. These enzymatic activities are almost totally localized in the brush border and have maximal activity in the distal ileum: they were due to three different enzymes, which have been separated each from the other, as well as from the oligoaminopeptidase (hydrolyzing L-leucyl-BNA), and partially purified.

The identification of these new peptidases of the brush border demonstrates a previously unrecognized importance of this subcellular organelle in the digestion of proteins and peptides, in a complementary way to intraluminal and intracellular digestion.