619 RELATIONSHIPS BETWEEN TOTAL BODY WATER AND ANTHROPOMETRY IN YOUNG PERUVIAN CHILDREN

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Recent studies show that in preschool-aged children from poor marginal communities outside Lima, Peru, 90% are below the 50th %ile in height-for-age, while 68% are above the 50th %ile in weight-for-height. In order to describe body composition and develop equations to predict body composition, total body water (TBW) was measured on 134 Peruvian children by ^{18}O dilution, together with 34 anthropometric variables. TBW as a % of body weight averaged 67.5 ± 8.1%, corresponding to an average % fat of 13.6 ± 10.6%. TBW as a % of body weight is higher (and % fat is lower) than the values for Fomon's American reference children. TBW was significantly ($P < 0.05$) correlated with 23 anthropometric variables. Height and weight were the most highly correlated with TBW, both with $r = 0.92$. Equations to predict TBW from height or weight were significantly different from those developed for normal American children by Meilits and Cheek. Stepwise multiple regression showed that height, weight, suprailiac skinfold, sitting height, chest circumference, and height-for-age %ile score could account for 90% of the variation in TBW values. Conclusions: 1) TBW as a % of body weight is higher and % fat is lower in these children than in American children of comparable height, weight, and age; 2) height and weight are the anthropometric variables most highly correlated with TBW; and 3) a multiple regression analysis based on easily determined anthropometric measures can account for 90% of the variation in TBW values in this population.

† 622 DEVELOPMENT OF JEJUNAL NA-K ATPASE ACTIVITY.

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We studied effects of weaning on Na-K ATPase activity (which establishes the electrochemical gradient for active transport) in rat jejunal homogenates. Normal weaning (Day 21) led to an increase in enzyme activity after 24 hrs (4.26±.18 μmol P_i/mg/hr vs 2.31±.08 μmol P_i/mg/hr in suckling control littermates) ($p<.05$).

Effect of Precocious Weaning (Day 16) (Activity μmol P_i/mg/hr)

Day	Na-K ATPase Suckling	Na-K ATPase Weaned	
16	2.08±.32		
17	1.13±.20	2.56±.23	p<.01
18	1.96±.15	2.96±.49	p<.05
19	2.21±.17	3.32±.20	p<.01

Effect of Artificially Delayed Weaning (Pups weaned on Day 25)

Day		Na-K ATPase (μmol P_i/mg/hr)
24	suckling	2.18±.20
25	suckling	1.65±.30
26	weaned	3.31±.28

These data indicate: 1) that weaning on Day 21 leads to an increase in Na-K ATPase activity in 24 hrs suggesting activation of preformed enzyme, 2) precocious weaning leads to a gradual increase in enzyme activity suggesting synthesis of new enzyme, and 3) no increase in activity occurs until weaning when weaning is artificially delayed suggesting that Na-K ATPase activity is not induced by endogenous free corticosterone which increases on Days 16-19 of age, which induces other intestinal enzymes.

● 620 MECHANISMS OF TAURINE TRANSPORT BY PLASMA MEMBRANE VESICLES FROM RAT LIVER.

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Taurine (TAU) availability dictates the conjugation pattern of bile acids; this amino acid may also contribute to regulation of hepatocyte osmolarity, ion flux and membrane function. Therefore, we used basolateral (sinusoidal) liver plasma membrane vesicles (LPMV) prepared from suckling (14d) and adult rats (J Biol Chem 259:9295, 1984) to characterize the mechanisms of taurine uptake by the liver. In the presence of an inwardly directed 100 mM Na^+ gradient, TAU (10 μM) was rapidly taken up by LPMV from 14d and from adult rats and transiently accumulated at a concentration two-fold above equilibrium ("overshoot"). In contrast, with a 100 mM K^+-gradient, uptake was slower and no "overshoot" was observed. Na^+-dependent TAU uptake was significantly increased by a negatively charged intravesicular electrical potential (vesicles preloaded with 50 mM K^+-gluconate in the presence of the K^+-ionophore, valinomycin). The initial velocity (5 seconds) of Na^+-dependent TAU uptake was significantly greater in LPMV from 14d rats compared to adult rats (2.87 ± 0.29 [SE] vs. 0.63 ± 0.14 pmoles·mg^{-1} protein·5 sec^{-1}, $p < 0.001$). Na^+-stimulated TAU uptake, measured under "voltage-clamped" conditions, was saturable in LPMV from 14d rats (Km 92.1 ± 24 μM; Vmax 351 ± 40 pmoles·mg^{-1} protein·min^{-1}). Summary: Hepatic uptake of taurine is stimulated by a Na^+-gradient, associated with net movement of positive charge (electrogenic) and saturable. In contrast to other solutes, e.g., bile acids, taurine transport by the liver is well developed in early life perhaps reflecting the needs of the immature animal for this essential nutrient.

● 623 EFFECT OF HUMAN MILK AND VEGETABLE OIL-CONTAINING FORMULAS ON DOCOSAHEXAENOIC ACID OF PRETERM RED CELL MEMBRANE PHOSPHOLIPIDS.

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Docosahexaenoic acid (22:6n3) accounts for about 25% of brain gray matter phosphatidylethanolamine (PE) fatty acid, and is an important constituent of all cell membranes. Term human infants fed human milk (HM) compared to vegetable oil-containing formulas (VOF) have twice as much 22:6n3 in erythrocyte membrane phospholipids (PL) suggesting that dietary 22:6n3 is a major source of this fatty acid for infants. Most fetal accumulation of 22:6n3 occurs in the last trimester which could make the preterm infant more vulnerable to diets without 22:6n3. Infants less than 32 wks gestation were fed either HM (n=12) or one of several VOF (n=13). Diets were fed for between 6 and 12 wks. HM-fed compared to VOF-fed infants had significantly more 22:6n3 in PE as well as Pcholine and Pserine of the red cell membrane ($p<.005$). At delivery, membrane PE 22:6n3 was 7.6% of total fatty acids. This value declined to 4.8% ($p<.001$) in preliminary samples taken before full enteral feeding. With HM, PE 22:6n3 again increased to 6.2% ($p<.01$), and with VOF the value declined to 4.1% (n.s.). Three infants fed VOF for 3 mos. had a mean PE 22:6n3 of 2.7%. These findings suggest [1] that 22:6n3 is actively transmitted from the maternal/placental to the fetal unit, [2] that newborn infants have a limited capacity to synthesize 22:6n3 from linolenic acid, and [3] that dietary 22:6n3 makes a significant contribution to the membrane phospholipid 22:6n3 in preterm infants.

621 TISSUE DISTRIBUTION OF SELENIUM (Se) IN SUCKLING RAT PUPS.

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The information on Se is inadequate with regard to the relative tissue distribution and the reversibility of accumulation after the cessation of exposure in sucking subjects after the administration of the Se to their lactating mothers. Two lactating rat dams (dam A and B) were provided sodium selenite in their drinking water at the concentration of 0 and 3 ppm, respectively. There were 15 experimental pups (B) and 13 pups in control group (A). Experiment was carried out during the first 6 weeks post partum. Third group (C) comprised of 6 pups who were separated from dam B and adopted by dam A after the first 3 weeks. Se concentrations (μg/gm tissue) follows ($\bar{X}$+SD):

	Liver	Heart	Kidney	Blood	Hair(pups)	Hair(dam)
Group B	6.3±1.3	0.6±0.1	13.0±3.3	0.8±0.1	8.6±3.2	6.8±0.3
Group A	0.8±0.2	0.4±0.1	1.1±0.2	0.4±0.1	0.8±0.1	1.0±0.3
Group C	1.2±0.2	0.3±0.1	1.2±0	0.3±0.1	1.8±0.4	
B/A %	775*	101	1167**	216*	1119**	710**
C/A %	146	96	94	97	230*	

Standard t experimental versus control:*=<0.05, **=<0.01

Se concentrations were higher in tissues of pups B, however, pups C showed a reversal yet with persistence of higher levels in hair ($p<0.05$). There appears to be a transfer and accumulation of Se in tissues of suckling pups which is reversible. Hair Se determinations may be useful for assessment of internal organ Se status in Se exposed suckling subjects.

624 GROWTH PROGRESS OF LOW BIRTH WEIGHT INFANTS FED WITH A SEMIELEMENTAL, ADAPTED AND SPECIAL-FOR-PRETERM-INFANTS FORMULA.

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The ideal feeding for preterm infants, is not as yet a resolved problem. Our group has studied the variations of glucose, triglyceride, total protein, pH, BUN, osmolality plasma values, urine osmolality, growth and skinfold thickness of three groups of ten AGA premature newborns (e.g. from 30 to 33 week) alimented with the same caloric regimen of 120 Kcal/kg/day with an adapted formula (NAN® F1), a special-for-preterm-infants-formula (Alprem® F2) and a casein hydrolysate formula (Pregestimil® F3). The biochemical and auxological parameters were weekly studied until the babies reached a weight of 2100 gm. The growth with F1 and F2 was respectively 29,4 and 33,4 gm/day, but only 22,9 gm/day with F3.

	BIRTH WEIGHT gm	WEIGHT LOSS gm	BIRTH WEIGHT GAIN(BWG)days	DAYS FROM BWG to 2100 gm	GAIN IN WEIGHT from BWG to 2100 gm/wk
F1	1706±354	161.0±56.4	14.5 ± 2.1	16.4 ± 8.5	205.8 ± 65.4
F2	1600±337	131.8±78.0	13.0 ± 6.8	17.6 ±14.9	240.4 ± 91.8
F3	1723±354	138.3±56.7	11.8 ± 4.0	20.8 ±15.3	160.4 ± 26.9

Significant differences were found only between triglyceride plasma values of F3 in comparison with F2 and F1, probably due to the different lipidic composition of F3 formula (only vegetable lipids in addition to MCT).

1^ wk 57.8± 31.2 vs 75.5±22.6 (N.S.) and 111.3±35.3 ($p< 0.05$) mg/dl

2^ wk 40.8± 20.9 vs 96.5±51.9 ($p< 0.05$) and 105.8±37.3 ($p< 0.005$) mg/dl

3^ wk 40.0± 14.9 vs 111.3±52 ($p<0.025$) and 138.8±27.9 ($p< 0.001$) mg/dl

4^ wk 51.0± 14.3 vs 120.5±36.4 ($p< 0.01$) and 135.4±57.8 ($p< 0.02$) mg/dl

In conclusion F3 formula should be used only when specific indications exist.