96 ASSESSMENT OF PROTEIN TURNOVER BY N-15 GLYCINE IN ADEQUATE (AGA) AND SMALL FOR DATE (SGA) VERY LOW BIRTHWEIGHT INFANTS.

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To investigate differences in their growth characteristics a group of AGA (n=11, 32±1.5 weeks, 1560±250 g birthweight) and SGA (n=8, 35±2 weeks, 1520±330 g) were nursed identically and studied in parallel. Their weight gain was 18.2±2.6 respectively 17.6±3.0 g/kgxd. Mean age at study 21 and 24 d. The combined methods of calorimetry and stable isotope enrichment techniques gave:

	AGA	SGA	(m±SD)
Metabolizable energy	108±11	112±11	kcal/kgxd
Protein gain	2.1±0.4	2.0±0.4	g/kgxd
Protein synthesis (*p<0.05)	9.7±2.8	7.7±1.6*	g/kgxd

It is concluded that for the same gain in weight and in protein, SGA have a 20% slower protein turnover and thus have a more efficient protein gain/protein synthesis ratio.

97 Influence of carbohydrate on leucin oxidation in newborn infants measured with the ^{13}C-leucin breath test.

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The ^{13}C-leucin (L) breath test (LBT) measures leucin oxidation (LO) in vivo and can be used to investigate the metabolic role of branched chain amino acids in newborn infants: To study the influence of metabolic conditions on in vivo LO, especially its dependence on concomitant carbohydrate (C) intake, twelve LBT were performed in 5 infants at an age of 4 to 21 days, whose birthweights ranged from 1050 to 2800 g at gestational ages of 31 to 37 weeks. 3 infants were fed orally on a standard formula diet (180 ml/kg/day), a pair of twins was tested twice while receiving a standardized mixed oral and parenteral nutrition, the only difference between tests I and II being the C content of the infusion (2.7 vs 7.3 mg/kg/min). After a bolus injection of 1 to 5 mg/kg L, breath samples for a 5 hr period were collected at 15 to 30 min intervals into plastic bags by means of a mask with a two-way valve. The $^{13}CO_2$/ $^{12}CO_2$ ratio of expired air, analyzed by ratio-MS, increased significantly with a peak at 20 - 30 min ($\Delta\delta$ from 5.6 to 18.9 °/₀₀), and the 5 hr LO was found to vary very little in repeated tests under steady nutritional conditions(LO = 21.7 - 22.5 %). In the twins, the lower C infusion rates were correlated with higher LO (23.9 vs 18.6 %).

Conclusions: L-oxidation in newborns can reliable be measured by a LBT. The balance between LO and protein synthesis is influenced by nutritional factors like C-availability.

98 FAILURE OF MINERAL SUPPLEMENTATION TO REDUCE THE INCIDENCE OF RICKETS OF PREMATURITY IN INFANTS WEIGHING LESS THAN 1000G AT BIRTH

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The incidence of rickets of prematurity was studied over 3 different mineral intake periods. During 1981-83 48 infants were studied, they received 2000 units of Vit D a day but not additional calcium and phosphate. During 1984 31 infants were studied receiving 1000U Vit D daily but in addition 0.83mmols phosphate/kg/day. During 1985 21 infants were studied receiving 1000U Vit D, 0.83mmols/kg of phosphate and 1.62mmols/kg of calcium per day. The mineral supplements were only given to infants fed on expressed breast milk. The infants studied were all those of birthweight <1000g who survived at least 28 days. The diagnosis of rickets was radiological and based on the grading system of Koo et al(1) and grade 2 or 3 was defined as frank rickets. The highest alkaline phosphatase(A.P.) during each babies stay in the Unit was also recorded (three babies 1981-84 had A.P. measurements but no X-ray).

	N	Radiological grading(1) O/1	2	3	N	Alkaline Phosphatase U/ml Median	Range
1981-1983	48	22(46%)	18(38%)	8(12%)	51	684	168-2220
1984	31	18(58%)	12(39%)	1(3%)	31	484	139-1263
1985	21	6(29%)	12(57%)	-	21	605	166-1453

We conclude that mineral supplementation in extremely low birthweight infants does not eradicate rickets of prematurity.

(1) Koo, W.W. et al, Arch Dis Child 1982, 57;447-452.

99 ASSESSMENT OF CA AND P REQUIREMENTS AND PREVENTION OF OSTEOPENIA IN VLBW INFANTS.

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Severe postnatal bone demineralization has now been recognized to be a common event in the VLBW infant because of calcium (Ca) and phosphorus (P) deficiency. Formula supplemented with Ca and P may not prevent this condition which is due to the wide variation in net calcium absorption. **Hypothesis:** Intrauterine bone mineral accretion rate will be achieved in VLBW infants postnatally when Ca and P are administered in sufficient quantity to result in a urinary excretion of both elements. **Methods:** To test this hypothesis we studied 18 periods of 3 weeks in 12 VLBW infants who were fed BM or formula supplemented with Ca-gluconate and Ca-glycerophosphate to produce a urinary excretion of 2-5 mmol/L Ca and P. The increase in bone mineral content (BMC, mg/cm) of the mid humerus measured by photonabsorptiondensitometry was assessed with respect to weight gain. **Results:** The median increase of BMC was 5.5 mg/cm per 100 g weight gain (range 2.7-9.9). This value is similar to the intrauterine accretion rate (4.6) which we have calculated from the BMC of newborn infants with birthweights between 800 and 4000 g (1). The mineral accretion rate, however was higher than the intrauterine rate in half of the study periods. **Conclusion:** Measurement of Ca and P in urine is a simple method by which individual requirements of Ca and P supplementation in VLBW may be accessed. Catch up mineralization was observed in 9 of the babies.

(1) Bone mineral content in appropriate and small for gestational infants: a reference for the evaluation of postnatal bone mineralization. Pediat Res 19:1116 (abstr.) (1985).

100 APOLIPOPROTEINS A-I,A-II,A-IV,B AND APOLIPOPROTEIN A-I ISOPROTEINS IN NEWBORNS

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In order to study the rapid changes in the lipid transport system of the newborn,we determined apolipoprotein (apo)A-I,A-II and B (electroimmunoassay) and cholesterol (C) daily from day 1-5 in capillary serum of 15 healthy term newborns. Additionally, we investigated the pattern of apoA-I isoproteins, arising from proteolytic cleavage of proapoA-I to mature isoforms in plasma,and the occurrence of apoA-IV (an apolipoprotein of exclusively intestinal origin) by isoelectric focusing.Results (x̄±sd,mg/dl):

day	1	2	3	4	5	
C	72±16	75±18	92±18	105±16	118±22	(n=15)
apoA-I	53±16	50±15	54±16	56±16	60±16	(n=15)
apoA-II	23±8	22±7	23±5	24±7	24±7	(n=15)
apoB	24±14	34±17	51±17	64±28	61±24	(n=15)

ApoB and C increased significantly from day 2-3 and from day 3-4 ($p \leq 0{,}001$).The reason for the steep increase of apoBandC during the first days remains unclear.It may be related to the onset of feeding, to hormonalfactors or to a decreasing number of hepatic apo B/E receptors.Serum apoA-I was significantly higher at days 4and 5 than at day 1 ($p \leq 0{,}001$).The isoprotein pattern of apoA-I determined at birth and on day 5 appeared identical to that in adults,suggesting a similarmetabolism of apo A-I in both age groups.The presence of apoA-IV in cord serum could be established, which indicates a contribution of the intestine to lipoprotein biosynthesis before the onset of enteral nutrition.

101 Influence of dietary cholesterol on serum lipid and apolipoproteins in the first month of life.

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The evolution of serum lipid and apolipoproteins (apo) was studied during the first month of life (0,7,30 days) in 30 babies fed own mother's milk (MM) and in formula with resp. 91 (FI) and 57 mg/L (FII) cholesterol (C).

. Total serum C and phospholipid increase soon after birth and are function of diet. The increase is most pronounced in the LDL-fraction.

LDL-C :	MM	FI	FII	
0d.	24.5	17.3	19.6 mg/dl	*(p <0.05)
7d.	74.7	42.7*	51.5*	
30d.	67.5	49.8*	41.9*	

. HDL-C increases in MM, but not directly influenced by dietary C, as no difference in HDL-C between FI and II is seen.

. Triglycerides (Tg) increase 3x at 7 d and decrease at 30 d.

. Apo B, CII, CIII, E, increase during first week; Apo CII, CIII, E (parts of VLDL and HDL) reach maximum at 7 d. .* Apo AI steadily increases from 7-30 d while AII increases mostly from 0-7d.

. Higher dietary C results in higher total apo B, but not apo CII, CIII, E.

. At 0 d VLDL-composition resembles IDL, at 7 d adult VLDL and is not influenced by dietary C. The Km for hydrolysis of VLDL by lipase increases between 0-30 d together with Tg and apo CII of VLDL.

. Also apo AI is not directly related to diet C as only in MM importantly higher HDL-concentrations are seen. This effect is restricted to HDL 2b-fraction, in which higher C and apo AI are observed.