▲ 43

LIPID TOLERANCE IN NEONATES GIVEN 20% VS 10% MIXED MCT/LCT LIPID EMULSION - RANDOMISED TRIAL

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OBJECTIVE: LBW neonates have a decreased ability to clear intravenous lipids. The use of 20% rather than 10% long chain triglyceride (LCT) emulsion has been shown to result in lower plasma lipid concentration[1]. The aim of this study was to examine the effect of concentration of a mixed medium chain triglyceride (MCT)/LCT emulsion.
DESIGN & METHOD: Infants requiring parenteral nutrition were randomised to receive 10% or 20% Lipofundin MCT/LCT (Braun). This was commenced at 0.5 g/kg/day and increased stepwise to 3 g/kg. Triglyceride and cholesterol levels were measured twice weekly. Growth parameters, non-esterified fatty acids (NEFA) and ketone bodies (KB) were measured weekly.
RESULTS: 55 infants were studied, 26 of whom received 10% Lipofundin. The mean (SD) birthweight was 1274 (660 g) gestation was 28.9 (3.5) wks and duration of parenteral nutrition was 21 (11.4) days. There were no significant differences between the groups. Mean cholesterol in mmol/l at weekly intervals are shown below: ** $p < 0.001$ * $p < 0.05$

	Day 7	14	21	28
10% LCT/MCT	3.6	5.1**	5.4**	5.5*
20% LCT/MCT	2.9	3.2	3.5	3.5

Infants receiving 10% Lipofundin had significantly higher plasma cholesterol. Serum triglycerides tended to be higher in the 10% group and increase with time but this was not significant. There was no difference in NEFA, KB or growth parameters.
CONCLUSION: The preterm neonate tolerates 20% MCT/LCT infusion better than 10% infusion.
Ref 1. - D Haumont. J Pediatr 1989; 115: 787-93.

● 44

ASPECTS OF PRENATAL DIAGNOSIS IN HEMOPHILIA A (HA) AND B (HB)

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Prenatal diagnosis (PD) of genetic diseases is the accepted preventive medical application of clinical genetics in many severe diseases such as HA and HB. We observed 408 women at risk for HA and 77 for HB coming respectively from 223 and 58 families. From 1987 we performed 72 PD out of 60 women on chorionic villus sampling (CVS) by transabdominal approach, free hand under continuous ultrasound guidance, at 10 weeks gestation. Even if earlier sampling is possible, a delaied procedure allowed to cut down the risks of miscarriage and of fetal limb abnormalities. In our hands the fetal loss risk is about 1.5%. We diagnosed 12 affected males, 24 healthy males and 28 female fetuses. At the beginning in 3 cases the sample was not sufficient for DNA analysis and, after CVS, in 2 cases the mother was uninformative and in 3 cases the mother was diagnosed as non carrier. We did not observe any malformation or pregnancy loss in the patients analyzed for hemophilia, probably related to the absence of other risk factors. The use of PCR for DNA analysis, allowed us to improve the carrier detection and PD of HA and HB reducing the time of analysis, increasing the informativity with the detection of sequence polymorphisms and using less chorionic tissue. The last 15 PD were performed by PCR. We gave a genetic counselling to 13 pregnant women at risk, avoiding the CVS in non carrier females. Therefore the acceptance of antenatal diagnosis increased: 8/60 women performed more then one PD (5/8 two CVS and 3/8 three CVS). On 10 pregnancies we analyzed the fetal sex by PCR obtaining the sex diagnosis in few hours. In 9/10 the result was confirmed by chromosomal analysis and only in 1 case we missed the diagnosis.

▲ 45

DIETARY SUPPLEMENTATION OF LONG CHAIN POLYUNSATURATED FATTY ACIDS (LCPs) IN THE PREMATURE INFANT: EFFECT ON ENDOGENOUS SYNTHESIS. Virgilio P. Carnielli, Darcos JL Wattimena, Ingrid H.T. Luijendijk, Anneke Boerlage, Herman J. Degenhart, Pieter J.J. Sauer.
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Premature infants fed formulas devoid of LCPs exhibit low plasma levels in comparison with their human milk fed counterparts. Whether this results from a limited synthetic capacity or is merely a reflection of dietary intake is not known. With stable isotope technology and a high sensitivity tracer detection using gas-chromatography-isotope ratio mass spectrometry we have measured the conversion of LL and LN acid into their longer chain derivatives in 10 premature infants at one month of age. Five infants (BW 1.17±0.12 kg, GA 28.4±1.3 wks) were fed a standard formula (No LCP), while the other 5 (BW 1.07±0.09 kg, GA 28.8±0.6 wks) received a formula supplemented with ample amounts of LCP (Plus LCP). Uniformly labeled LL and LN acids were mixed with either formulas and administered continuously for 48 hours. Arachidonic (AA) and docosahexaenoic acid (DHA) content of plasma phospholipids (PL) at 48h from the beginning of the labeled diet are reported in table together with their isotopic enrichments, expressed in atom percent excess (APE)

Feeding	AA mol%	Enrich AA (APE)	DHA mol%	Enrich DHA (APE)
Plus LCP	10.8±0.8 [a]	0.095±0.021 [a]	2.98±0.21 [a]	0.044±0.034 [a]
No LCP	7.5±0.7 [b]	0.171±0.044 [b]	1.57±0.37 [b]	0.203±0.049 [b]

Values with different superscripts between columns are significantly different at $p < 0.05$

The premature infant does desaturate and elongate LL to AA and LN to DHA.
LCP supplementation up to levels found in breast-fed infants seems not to suppress synthesis. Preterm infants probably have no, or immature regulation of desaturation and elongation of the 18 carbon atom essential fatty acids.

● 46

MEDIUM CHAIN TRIGLYCERIDES (MCT) IN INFANT FORMULAS: METABOLIC INTERCONVERSION AND INFLUENCE ON ESSENTIAL FATTY ACIDS (EFA). Virgilio P. Carnielli, Katia Rossi, Tamara Badon, Barbara Gregori, Franco Zacchello. Dipartimento di Pediatria, Universita' di Padova, PADOVA- ITALY.

Limited information exist on (a) the metabolic inter conversions of MCT and on (b) the influence of these processes on EFA metabolism. The effect the MCT content of two infant formulas, on plasma fatty acids (FA) were studied in preterm infants. The MCT formula (**MCTF**) contained 46 mol% octanoic+decanoic acids and roughly half the palmitic, stearic and oleic acids of the long-chain triglyceride formula (**LCTF**) (4.8 mol% octanoic+decanoic). Both had similar amounts of linoleic and linolenic acids. The FA composition of plasma lipids was determined by gas-chromatography at birth and on day 28. The groups (MCTF n=8, LCTF n=12) had similar clinical characteristics, infants were fed solely the formulas from birth and did not receive parenteral lipids. Selected FA of plasma triglycerides (TG) and phospholipids (PL) (day 28) are in tables.

Table1 TG	octanoic	decanoic	palmitic	stearic	oleic
LCTF	0.30±0.01[a]	0.78±0.12[a]	29.5±0.5[a]	3.3±0.3[a]	31.3±0.7[a]
MCTF	2.71±0.55[b]	4.34±0.74[b]	26.7±1.5[a]	3.6±0.5[a]	26.8±1.4[b]

Table 2 PL	palmitic	stearic	oleic	arachidonic	docosahexaenoic
LCTF	30.1±0.5[a]	17.2±0.3[a]	8.9±0.1[a]	6.6±0.3[a]	1.73±0.07[a]
MCTF	30.5±1.2[a]	18.1±0.7[a]	7.6±0.4[b]	7.1±0.4[a]	1.38±0.07[b]

Values with different superscripts are significantly different at $p < 0.05$

In spite of striking dietary differences, palmitic and stearic were not different indicating that MCT are elongated or converted into saturated fatty acids. Oleic was lower in MCTF possibly because the Δ9 desaturation is limiting. Notwithstanding similar dietary and plasma linoleic and linolenic, docosahexaenoic was lower in PL of the MCTF fed infants. EFA metabolism may be influenced by the non essential FA fed concurrently.

● 47

STRUCTURAL POSITION AND AMOUNT OF PALMITIC ACID IN INFANT FORMULAS: EFFECTS ON FAT AND MINERAL BALANCE.
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The effect of the structural position and amount of palmitic acid on fat absorption and mineral balances were investigated in three groups of each 9 healthy term infants. Three formulas were compared: (a) formula 1, resembling most closely the structure of human milk fat (23% palmitic acid; 69% esterified at sn-2 position); (b) formula 2, an intermediate type of formula (23% palmitic acid; 39% esterified at sn-2 position); (c) formula 3, a currently marketed control formula (18% palmitic acid; 11% esterified at sn-2 position).The total amount of sn-2 palmitate was higher in formula 2 than in formula 3, while the amount of sn-1,3 was similar in these two feedings. The infants were randomly assigned to receive one of the three infant formulas exclusively from birth until at least five weeks of life. Seventy-two hour macronutrient and mineral balances were performed during the fifth week.
Most significant results are reported in table:

	Formula 1 (69%)	Formula 2 (39%)	Formula 3 (11%)
Fat absorption %	97.6±0.9 [a]	93.0±1.8 [b]	90.1±4.6 [c]
Calcium absorption %	53.3±19.3 [a]	35.4±14.0 [b]	32.7±16.6 [b]

Values with different superscripts are significantly different at $p < 0.05$

A formula containing palmitic acid predominantly at the sn-2 position has significant beneficial effects on the intestinal absorption of fat and improves calcium balance in healthy term infants.

● 48

INFLUENCE OF MODERATE NEONATAL HYPOXIA IN THE PARIETAL CORTEX OF ONE MONTH-OLD WISTAR RATS.

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INTRODUCTION: Morphologic studies performed in the cortex of newborn asphyxiated rats have been done under severe conditions of hypoxia (more than 3 h.) and ischaemia (Carotid ligation).
AIM:We studied the effect of moderate hypoxia on nuclei/cytoplasm index at different levels of the parietal cortex of the rat at 1 month of age.
MATERIAL AND METHODS: Eight brains coming from 2 litters of 1 month-old rats submitted to a neonatal hypoxia (Fi O_2=10%) and standardized to 10 animals per litter were processed and stained with Nissl method. Random slide of each case was selected and studied by digitalized microscopic pictures of 70 µm width and all the cortical structures depth. Measurements of main nuclei and cytoplasm diameters of neurons in different layers were taken and results compared with 6 controls brought up in the same circumstances. Mann-Whitney test was used to comparisons.

RESULTS:	LayerII/III	Layer IV	Layer V	Layer VI
Fi O_2=10%	0.723±0.042	0.720±0.042	0.690±0.025	0.736±0.027
Controls	0.716±0.057	0.719±0.050	0.654±0.025	0.725±0.018
	p=0.747	p=0.846	p=0.0142*	p=0.359

CONCLUSIONS: Nuclei/cytoplasm index of pyramidal cells was significantly greater among hypoxic than in control animals. We can conclude that slight hypoxic expositions can produce alterations in the rat neurons morphology in later stages of the development.