## 433 REVERSAL OF GROWTH ARREST IN CROHN'S DISEASE(CD): A NEW APPROACH.

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Severe impairment of linear growth without evidence of endocrine dysfunction frequently complicates CD in childhood. The impact of nutritional intervention was studied in 7 patients(pts) (5 boys, 2 girls, ages 9-17 yrs) with CD and linear growth arrest for at least 1 yr prior to study. 6/7 were less than 3rd%; height and bone ages ranged 5-11 and 6-13 yrs respectively. All were in clinical remission; 3 were maintained on a constant dose of steroid. Fasting somatomedin (3/3) and stimulated growth hormone levels (5/5) were normal. On metabolic balances prior to therapy, 5 pts demonstrated inadequate caloric intake(50±20 kcal/kg; normal for height 75-85 kcal/kg); none had positive nitrogen balance; 1 had steatorrhea. Oral feeding was supplemented with intravenous hyperalimentation to total daily intake of 77±8 kcal/kg for 6-8 wks. During treatment, lean body mass($^{40}K$) increased 2.2-7.3 kg in 5 pts studied. All pts exhibited weight gain(range 2.4-7.4 kg), linear growth (range 1.0-2.3cm), and a significant increase in growth velocity (0.7±0.2cm/month, $p<.001$). Linear growth persisted following therapy and averaged 0.4±.3cm/month($p<.02$) for 3-6 months. Subsequent growth in the 4 pts with long-term followup has totalled 2.5,9,10 and 20 cm respectively at 1.5-2.5 yr. The lowest growth increment occurred in the only pubertal pt. Conclusions: 1. Inadequate caloric intake explains the growth arrest in these children with CD; 2. Caloric supplementation via intravenous hyperalimentation produces improvement in anthropometric values and a dramatic linear growth spurt that continues after therapy is terminated.

## 434 SERUM BILE ACIDS IN PREMATURE INFANTS WITH TPN-ASSOCIATED LIVER DISEASE.

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The etiology of the cholestasis and/or hepatocellular damage observed in some children on total parenteral nutritioh (TPN) remains undefined. Although amino acid imbalance in the infused solution has been implicated, we have not demonstrated any consistent correlation between serum amino acids and liver disease. However, because of the unresolved question of the role of bile acids in the pathogenesis of the condition, we studied bile acids in 8 premature infants on a Freamine II-Intralipid-based solution and were able to separate them into two groups. Four developed hepatomegaly, marked elevations in serum enzymes (SGPT, LAP, GGT), and hyperbilirubinemia. Liver biopsies were obtained from 3 of the 4, and demonstrated canalicular cholestasis. The other 4 demonstrated less pronounced increases in serum enzymes and bilirubin, no clinically demonstrable hepatomegaly, and were not biopsied. Quantitative serum bile acids determined by TLC in the two groups demonstrated a 50% increase in serum levels of unconjugated, secondary bile acids (CDC, DOC, LiC) in the more severely affected group. Although this proves no cause-effect relationship between TPN-associated liver disease and serum bile acids, it documents a distinct difference in the serum bile acid concentrations of those infants with frank liver disease and others with only biochemical changes.

## 435 HYPERCHOLESTEROLEMIA AND LIPOPROTEIN-X(LP-X) IN INFANTS DURING INTRALIPID INFUSION.

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Ten infants of gestational ages 26-40 weeks with G.I. defects, but without cholestasis, received total parenteral nutrition with Intralipid (2-4g/kg/day) during the first 6 weeks of life. Within 24 hrs there was an increase in plasma free cholesterol of 38 ± 4mg% (mean±SEM, n=10). In 3 infants, infused for 1-3 weeks the increases in free cholesterol were 105, 115 and 117mg%. Cholesterol esters remained constant. The rise in free cholesterol occurred exclusively in the density range 1.006-1.063g/m. corresponding to low density Lipoproteins (LDL). Fractionation of this LDL on hydroxyapatite yielded 2 components, one corresponding to LP-X and the other an LDL-like particle with Apo B but increased cholesterol and phospholipid concentrations. LP-X, indistinguishable from that seen in cholestatic states, was confirmed by chromatographic and electrophoretic techniques; and on analysis contained free cholesterol (26%), phospholipid (65%), albumin and Apo C proteins (6%). Using agar electrophoresis LP-X appeared in the plasma within 8hrs of starting the Intralipid infusion and disappeared within 48hrs of stopping. LP-X appeared despite close monitoring of plasma Intralipid levels which were maintained at 100mg% or less. Because LP-X is associated with excessive tissue cholesterol accumulation, this Intralipid induced dyslipoproteinemia cannot be viewed as a trivial metabolic complication.

## 436 FACTORS AFFECTING LOWER ESOPHAGEAL SPHINCTER COMPETENCY IN CHILDREN.

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Esophageal manometry was performed on 40 children with severe gastroesophageal (GE) reflux less than 25 months of age. Lower esophageal sphincter (LES) pressures were recorded as end-expiratory pressure in mm Hg using gastric pressure as a base line. Patients with respiratory symptoms (Resp Sx) had repeated bouts of aspiration pneumonia and/or repeated apnea spells caused by aspiration.

| | N | LES mm Hg | Abd. Length | Total Length |
|---|---|---|---|---|
| GE Reflux | 40 | 13.3±1.2 | .43±.07 cm | 1.08±.05 cm |
| Medical Rx | 24 | 14.8±1.8 | .52±.08 cm >* | 1.12±.08 cm |
| Surgery Pre op | 16 | 11.3±1.6 | .34±.01 cm >+ | 1.03±.08 cm |
| Surgery post op | 16 | 8.3±0.6 | 1.03±.08 cm | 1.17±.06 cm |
| Reflux Resp Sx | 21 | 17.1±1.8 >* | .43±.09 cm | 1.08±.06 cm |
| Reflux No Resp Sx | 19 | 9.3±1.0 | .44±.06 cm | 1.09±.09 cm |

+p= <.05 paired t test *p= <.001 t test ±=S.E.M.

LES pressures were not depressed in reflux patients and did not increase after surgery. Resp Sx patients had elevated LES pressures and there was a significant decrease in postoperative LES pressure in the 5 patients requiring surgery. The intra-abdominal length of the LES was shorter in patients requiring surgery and increased after surgery. Factors other than LES pressure, especially the intra-abdominal length of the LES play a major role in sphincter competency in children.

## 437 EFFECTS OF TREATMENT WITH EMULSIFIED FAT SUSPENSION (IL) ON PLASMA FIBRINOGEN (F).

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A rise in circulating triglyceride or free fatty acids (FFA) is often associated with increased F, and recent data indicate that FFA may be involved in regulation of F synthesis. F was measured in young rats allowed access to regular chow while treated with a 10% suspension of IL (3 to 6 g/kg/day) administered p.o., by continuous i.v. infusion, or by serial i.p. injection. In parallel experiments, animals also received injections of heparin, 500 U (H). Controls were given saline by the corresponding route plus chow, or chow only. Animals were bled by aortic puncture at 48 hrs. F averaged 266 ± 0.14 (SEM) mg% in untreated and p.o. controls, 549 ± 0.35 mg% in i.v. controls, and 349 ± 0.54 mg% in i.p. controls. These differences in control values may reflect stress effects of confinement or injection (FFA release?). F in rats receiving IL or IL + H, respectively, increased by 21% (N.S.) and 71% ($p < 0.01$) in the p.o. series; 70% ($p < 0.001$) and 63% ($p < 0.001$) in the i.v. series; and 87% ($p < 0.001$) in the i.p. series. Thus, F increased significantly when fat was infused directly (i.v.) or indirectly (i.p.) into the circulation, or when H was administered with IL p.o. In contrast, IL administered p.o. without H had no effect on F. These results indicate that i.v. therapy with IL may be followed by a significant rise in F, with potential increase in blood viscosity and decrease in peripheral blood flow in polycythemic or severely stressed infants.

## 438 ESSENTIAL FATTY ACID (EFA) DEFICIENCY IN NEONATES: INABILITY TO REVERSE DEFICIENCY BY TOPICAL APPLICATION OF EFA-RICH OIL.

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Successful treatment of EFA deficiency by topical application of an EFA-rich oil has been reported. To further define efficacy of the topical route, serum EFA levels were measured in 10 neonates receiving fat-free parenteral nutrition (PN): six neonates before and 12 days after beginning topical application of 100 mg/kg/day of linoleic acid, and four neonates receiving long term PN and 800 mg/kg/day of topical linoleic acid. One of the six neonates receiving low dose EFA-rich oil had mild EFA deficiency (trienoic/tetraenoic ratio, or T/T, .93) which was reversed with the topical oil (T/T .37); the other five low dose patients had significant worsening of their EFA deficiency (mean T/T 1.4 and, later, 13.6). All four patients receiving long term PN developed severe deficiency (mean T/T 11.2) despite high dose topical EFA-rich oil; one of these four also developed a severe dermatitis secondary to EFA deficiency. In any patient, the topical application of an EFA-rich oil cannot be assumed to be effective in reversing or preventing EFA deficiency unless documented by appropriate blood and tissue EFA measurements.