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## PROTEIN-ENERGY MALNUTRITION (PEM): EFFECTS ON THE INTESTINAL ABSORPTION OF WATER AND ELECTROLYTES.

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We have previously determined the optimal conditions for H<sub>2</sub>O and Na absorption by the jejunum of the normal and tissue damaged rat using various formulae of oral hydration solutions (OHS). H<sub>2</sub>O absorption was inversely proportional to osmolality and Na absorption was directly proportional to its concentration. In the present study we investigated the characteristics of experimental hydration in an animal model of PEM. This was achieved with a low protein (4%), reduced carbohydrate diet fed to juvenile rats for 3 weeks. Absorption was assessed by an *in vivo* perfusion procedure using an OHS with (in mEq/l) 60 Na, 20 K, 50 Cl, 30 HCO<sub>3</sub>, and 111 mM glucose (Glu). Phenol red and <sup>3</sup>H<sub>2</sub>O were used as markers. The net H<sub>2</sub>O fluxes in PEM (M) rats were lower than in controls (C) (1.75±0.10 vs 3.11±0.06 μl/min x cm, P<0.001). This difference was due both to a decrease in the mucosa-to-serosa influx of H<sub>2</sub>O in M rats (M= 5.99±0.16; C= 6.43±0.14, P<0.05) as well as to a greater efflux of fluid (M= 4.22±0.12; C= 3.52±0.13, P<0.001). PEM also resulted in failure to absorb Na from that type of OHS (M= -1.4±5.2; C= 52.2±9.4 nEq/min x cm, P<0.001), as well as in a reduced absorption of K (M= 65.9±2.4; C= 75.1±3.7 nEq/min x cm, P<0.05), HCO<sub>3</sub> (M= 165±5; C= 181±5 nEq/min x cm, P<0.05), and Glu (M= 404±23; C= 479±22 nmoles/min x cm, P<0.05). The data suggest that an improvement of H<sub>2</sub>O and solute absorption in PEM could be achieved by specially formulated OHS with reduced osmolality and increased Na concentration, at the expense of K and Glu.

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## TRIGLYCERIDES (TG) AND FREE FATTY ACIDS (FFA) IN ENTERALLY FED PRETERM INFANTS. Marie R. Weinstein, Kathryn L. Haugen, John E. Hewett. (Spon. by C. Woodruff)

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Many preterm infants require intravenous lipid preparations while growing toward maturity. Recommendations have been to monitor plasma triglycerides in an attempt to document adequate metabolism. Since the existing guidelines are extrapolated from adult data, we examined 56 preterm infants born at 25-32 weeks gestation to determine values for TG and FFA in an enterally fed population. Weekly pre and 2 hour post prandial plasma TG and FFA were obtained beginning when enteral nutrition was tolerated and subsequently throughout the duration of the hospitalization. Type, amount and method of feeding was at the discretion of the primary care physician. Representative data is presented below at the selected post conceptual ages (PCA) of 32 and 36 weeks, and postnatal ages (PNA) of 4 and 8 weeks as mean ± S.D.

	PCA: 32 wks	36 wks	PNA: 4 wks	8 wks
TG (mg/dl) pre:	83±47	83±33	102±43	71±15
post:	100±66	100±45	111±45	89±21
FFA (mg/dl) pre:	6.9±3.9	6.8±4.1	8.1±3.8	5.4±2.5
post:	7.0±3.7	7.8±3.7	8.2±2.8	5.6±2.3

Data to be presented will include the complete summary analysis by gestational and postnatal age, the relationship of TG and FFA to the type, amount and method of feeding, as well as the possible influence of medications.

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## RECURRENT ABDOMINAL PAIN IN CHILDHOOD (RAP): PSYCHO-SOCIAL CHARACTERISTICS AND RELATION TO ACID-PEPTIC DISEASE.

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The social and psychological characteristics of children with RAP (RAP-pts) and the relationship of the pain to acid-peptic disease were investigated. The family background, medical history, family dynamics, life stress, and behavior problems of RAP-pts (n=31) were compared using standardized questionnaires to age, sex, race matched normal controls (CONT) drawn from the schools of the patients. RAP-pts also had a physical evaluation including UGI endoscopy and a structured psychiatric interview. After evaluation, RAP-pts entered a two-month blinded, placebo-controlled (Plac) trial of cimetidine (Cime) therapy.

RESULTS:RAP-pts missed more school, were more often described as unhappy, and more often had a positive family history of peptic ulcer than CONT. The Parent's version of the Child Behavior Checklist demonstrated internalization behavior to be significantly greater among RAP-pts than CONT. They did not differ with regard to attitudes toward school, other bowel complaints, pain in other body parts, life events in the last year, family dynamics, social competence, or behavior problems. Major environmental stress was frequently observed in both groups. Endoscopic findings in RAP-pts varied from normal to erythema, thickening, and nodularity, but biopsies were normal. The treatment trial demonstrated after 1 mo that 64% of Plac- and 88% of Cime-treated patients had >50% improvement in pain (p>0.1). Unimproved patients were given a month of Cime therapy which resulted in improvement in 4/5 Plac- and 1/2 Cime-treated patients. After 2 mo, 20/22 patients treated with Cime (with or without failing Plac) had >50% improvement in pain compared to 8/14 Plac-treated patients (p<0.05).

CONCLUSIONS: This study indicates that internalization of anxious feelings is characteristic of RAP-pts, but other features such as school avoidance thought to be associated are not. Despite a high Plac-response rate, the response to Cime warrants further trials of its role in the symptomatic treatment of RAP.

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## EFFECTS OF HEMORRHAGE (H) ON THE POSTPRANDIAL REGIONAL VASCULAR RESPONSES OF DEVELOPING PIGLETS. Alice

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Superior mesenteric (Mes), femoral (Fem) and renal (Ren) arterial blood flow (F) responses to feeding following H (15% blood volume) were studied in piglets, 1, 2 days (n=7) and 11, 2-4 wks old (n=9) using electromagnetic probes. Heart rate (HR), ECG, aortic pressure (AoP), temperature and blood gases were simultaneously monitored. Following H, AoP and F decreased while HR increased. 30 min following H, milk formula was gavaged fed (26 ml/kg) and F(ml/min) increases from control were: (Mean ± S.E.)

F Grp.	Prefeed Control	Minutes Postprandial			
		30	45	60	120
Mes I	24.5±3.6	4.3±0.7	4.1±2.0*	2.5±1.8*	3.4±2.6*
II	82.5±12.5	44.2±19.3	46.1±17.2*	43.2±16.5*	56.1±16.6*
Fem I	11.0±3.6	2.8±4.3	4.9±6.2	2.2±5.7	3.1±7.4
II	23.0±6.1	4.5±2.2	6.6±2.2	5.9±1.9	2.8±1.5

\*p<.05 value vs control, \*p<.05 Group I vs II

Postprandially, Mes vascular resistance (R) decreased in older animals. RenF, AoP and other R did not change significantly while HR tended to increase in both ages. Pulse pressure increased in older pigs. The results suggest age-related difference in the postprandial Mes and possibly Fem vascular responses of piglets following H. Thus, H may adversely affect Mes vascular response of neonates to feeding during first days of life.

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## ABSENCE OF EFFECT OF TAURINE ON GROWTH, ELECTRORETINOGRAMS (ERG), AND AUDITORY EVOKED RESPONSES (ABER) OF VERY-LOW-BIRTHWEIGHT INFANTS. J. Tyson,

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Animal studies suggest taurine is needed for eye and brain development. We have studied 33 healthy formula-fed infants < 1300 gm BW in a randomized blinded trial to assess taurine effects on amino acids and growth to 35d and Brazelton responses, ERG, and ABER (reliability verified; 3 stimuli used) at 37 postmenstrual wks. Infants with motor deficits, intraventricular blood, or >7 d ventilation were excluded. Taurine group (TG) and controls (CG) were similar before assignment to Similac Special Care ± taurine (48 mg/l) fed ad lib from 7d.

Results (x̄ ± SD) include:	TG	CG	P
Weight gain, gm/kg/d	16.8(2.3)	17.2(3.6)	NS
ERG A wave latency, ms	15.4(2.0)	14.7(1.4)	NS
A wave amplitude, μV	6.4(3.6)	8.6(3.7)	NS
B wave latency, ms	37.5(3.4)	37.2(3.4)	NS
B wave amplitude, μV	19.2(8.1)	23.0(8.8)	NS
ABER (20/s 70dBnHL stimulus)			
wave 1 latency, ms	2.7(0.5)	3.0(0.7)	NS
wave 1 amplitude, μV	0.1(0.04)	0.1(0.04)	NS
wave 3 latency, ms	5.3(0.5)	5.6(0.5)	NS
wave 3 amplitude, μV	0.2(0.04)	0.2(0.04)	NS
wave 5 latency, ms	7.6(0.6)	7.9(0.8)	NS
wave 5 amplitude, μV	0.2(0.09)	0.2(0.06)	NS

Our data provide no evidence of benefit from taurine.

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## CALCIUM, PHOSPHORUS AND FAT BALANCES IN PRETERM INFANTS FED FORMULAS CONTAINING VEGETABLE AND ANIMAL FAT BLENDS. Paul Y.K. Wu, Tareneh B. Aein, and

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Although the fat content of formulas produced in the United States is generally derived from animal sources. Previous studies suggested that butter fat may be less efficiently absorbed than vegetable oils. The absorption of calcium (Ca), phosphorus (P) and fat is intimately linked. While the relation of Ca and P in absorption has been well studied, the role of fat is relatively unknown. We performed 48 hours Ca, P and fat balances of 15 healthy, male, preterm infants (weight 1605.9±129.4g), using 3 isocaloric (20 cal/30 ml) formulas containing different fat blends. I. (5 infants) Similac (S-1) coconut 60%, corn 40% II. (5 infants) Similac (S-2) and III. (5 infants) Malyutka (M-2) USSR. Both the formulas II and III contain butter 36%, sunflower 36% and lard 28%. Infants were receiving a minimum of 110 kcal/kg/24h orally at the time of the balances. The variables were analyzed statistically with analysis of variance. Results: There were no significant differences in the percent apparent calcium (90-95%), phosphorus (59-68%) and fat (75-81%) retention. Serum Ca, P, and alkaline phosphatase were normal in all infants. All 3 formulas were well tolerated.

We conclude that the fat blends derived from vegetable and animal sources in the formulas studied are equally absorbed by healthy preterm infants. Fat blends from animal sources may have important economical and ecological implications.