661 CORRECTION OF BIOCHEMICAL INDICES OF ESSENTIAL FATTY ACID DEFICIENCY WITH INTRAVENOUS FAT IN SICK PREMATURE INFANTS. Gary R. Gutcher, Mari Palta, Sherryl Abplanalp, Anita Lax, Philip Farrell. Univ. of Wisconsin, Dept. of Pediatrics, Madison.

In order to determine whether biochemical indices of essential fatty acid deficiency could be corrected in the first week of life, six premature infants with ventilator-dependent RDS were infused with Intralipid at doses increasing from 0.5 to 2.0 g/kg/d for 18/24 hours on days 2-7 of life. Oxygenation was continuously monitored. Serum triglycerides (TG) and multiple measure of bilirubin binding were also monitored prior to and 6 hrs after the initiation of the lipid infusion. Total plasma lipid fatty acid (FA) composition was assessed daily 4-6 hrs after stopping the previous day's infusion.

		18:2 intake (g/kg/d)			plasma FA% (mean)	
day	mean	prec. 2 days	cumm	18:2	20:3w9	20:4w6
2	0.54	0.00	0.00	5.63	2.08	14.40
3	0.54	0.27	0.54	17.01	1.30	12.69
4	0.72	0.54	1.08	20.81	0.86	11.66
5	0.79	0.63	1.80	21.89	0.69	10.77
6	1.02	--	--	--	--	--
7	1.21	0.91	3.61	23.90	0.00	9.17

A linear model can be used to predict the plasma level of 18:2 based on the preceding two days' intake of 18:2; a curvilinear model describes the dependence on cummulative intake. We conclude that this dosage schedule closely approximates the FA pattern observed in enterally fed infants during the first week of life.

● **662** INTESTINAL REPAIR IN CHRONIC PROTEIN-CALORIE MALNUTRITION. Celina Guzman, Richard Hamilton, Div. Gastroenterology, Dept. Ped., Univ. Toronto, Res. Inst., Hospital Sick Children, Toronto, Ontario.

To assess impact of undernutrition on damaged small intestine we studied repair after ischemia in nutritionally deprived 10 wk rabbits. Rabbits that received 50% of control diet for 6 wks (Body wt, 1.95±0.2 vs control 2.68±.07 kg; p<.001) and underwent sham procedure or 90 min vascular occlusion of 20 cm mid intestine were studied 4 (acute injury), 24, 48 or 72 hr later. In sham groups, no significant differences between diet groups occurred in mucosal dimensions, enzymes (disaccharidases, Na-K-ATPase, thymidine kinase) or Na transport (Ussing chamber). At 4 & 24 hr, significant but similar abnormalities (reduced villus ht, mucosal enzymes and glucose stim. Na flux) occurred in both diet groups. Subsequent return to normal was not significantly delayed in undernourished rabbits.

	Sham		24 h		48 h		72 h	
	Cont.	Maln.	Cont.	Maln.	Cont.	Mal.	Cont.	Maln.
Vill.Ht(μ)	69±3	63±2	64±7	40±8	62±7	60±7	73±7	67±4
Sucr. (U/g)	138±12	113±14	26±3	27±9	50±9	64±21	94±5	89±16
T.Kin.(U/g)	4.7±.6	7.4±1	7.9±1	11.1±1	4.3±.9	6.6±.8	4.8±.7	4±.4
$\Delta Glu\ J_{ms}^{Na}$	2.5±.5	1.8±.4	.6±.4	1.2±.4			2.3±.4	2.2±.3

We conclude significant chronic nutrient deprivation did not delay repair after injury to limited segment small intestine. Clinical data suggesting prolonged diarrhea in undernourished patients may be explained by a) greater vulnerability of repair to malnutrition after the extensive injury of enteric infection or b) more severe initial injury from infection in undernourished host.

663 ADAPTATION OF HEPATIC UREA CYCLE ENZYMES DURING PREGNANCY AND LACTATION IN THE RAT Janice E. Harris and Norman Kretchmer. University of California - Berkeley, Dept. of Nutritional Sciences.

Little is known about mechanisms of nitrogen (N) conservation in pregnancy and lactation. The purpose of this study was to document adaptation of three of the five hepatic urea cycle enzymes during pregnancy and lactation in Sprague-Dawley rats fed a 20% casein diet ad lib. Rats were killed on days 14 and 21 of pregnancy, at 24 hr post partum, and on day 14 of lactation. In pregnancy, the specific activities of ornithine transcarbamylase (OTC), argininosuccinate lyase (ASL), and arginase in the liver are significantly lower than control values at days 14 and 21. On day 21, the specific activities expressed as a percent of control values are 74% for OTC, 64% for ASL, and 76% for arginase. Because livers of pregnant rats are larger than control livers at days 14 and 21 (14.97g vs. 10.80 at day 14 and 16.97g vs. 11.45g at day 21), total activities for the pregnant rats are not significantly different from control values for OTC and are greater than control values for ASL and arginase. Twenty-four hours post partum, liver weight and specific and total activities of OTC are not significantly different from control values. At the peak of lactation, day 14, the specific activity of OTC is not different from the control level; but because of a significantly larger liver weight (22.20g vs. 11.92g), the OTC total activity is significantly greater. These results suggest that adaptation of urea cycle enzymes is not the major basis for N conservation during pregnancy and lactation.

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† **664** DIMINISHED POLYMORPHONUCLEAR LEUKOCYTE ADHERENCE AND CHEMOTAXIS FOLLOWING PROTEIN CALORIE MALNUTRITION IN NEWBORN RATS: EFFECT OF NUTRITIONAL RESTORATION. M.C. Harris, J.C. Lee, R.A. Polin, J.S. Gerdes, M.M. Ziegler, S.D. Douglas. Univ. of Pa. Sch. of Med., Dept. of Peds, Children's Hosp. of Phila., Phila., PA.

Recent advances in neonatal intensive care have permitted the survival of very low birthweight infants who in the past might not have lived. Many of these babies, however, are difficult to nourish, and ultimately develop clinical and biochemical signs of malnutrition. These infants may be at greater risk for nosocomial infection than normally nourished hosts. We have compared neutrophil (PMN) adherence (ADH), and chemotactic response (CR) to formyl peptides in a rat model of protein calorie malnutrition (PCM). Wistar rats at 14 days gestation received either a normal (24% protein) or isocaloric (2.5% protein) diet. On day 3, rat pups were divided into 3 groups: 1) pups allowed to nurse on their own dam (normal); 2) normally nourished pups foster nursed onto a malnourished mother (depleted); or 3) malnourished pups foster nursed to a normal lactating dam (repleted). Daily wt. gain was significantly less in the depleted pups vs. the normal and repleted groups ($p < .001$). Fibronectin concentrations (ug/ml) were also less in the depleted animals (normal 220.5, repleted 218.0, depleted 151.2). PMNs from depleted pups demonstrated diminished adherence ($p < .02$) and diminished CR ($p < .03$) when compared to normal or repleted pups. Thus, PMNs from newborn rats demonstrate diminished ADH and CR following postnatal PCM, which may contribute to increased susceptibility to bacterial infection. Postnatal repletion may restore PMN functional responses.

665 INTESTINAL REDIFFERENTIATION IN THE INFANT RAT: IN VIVO EVIDENCE OF AN INTRINSIC PROGRAM. Gary E. Hartman, Linda K. Kwong, Norio Azumi, Kenneth K. Tsuboi, Philip Sunshine, Stanford Univ. Sch. of Med., Dept. of Pediatrics, Stanford, CA.

The enteric epithelium of the suckling rat undergoes dramatic functional and cytokinetic changes at the time of weaning. Evidence suggesting that this redifferentiation is preprogrammed and intrinsic has been obtained by surgical transplants of fetal intestines. In an attempt to alter this redifferentiation a 60% proximal intestinal resection was performed on suckling rats at 10 days of age. Animals surviving for 2 months were compared with sex and weight matched littermates who had undergone laparotomy or laparotomy with transection. The residual intestine was increased in diameter and weight per unit length, but not significantly lengthened. The segmental increase in weight was primarily accomplished by hyperplasia as evidenced by parallel increases in total protein and DNA content. This increase in cell number was associated with a modest increase in the segmental sucrase and maltase activities in the residual ileum. However, when expressed as activity per unit DNA, sucrase and maltase concentrations in the residual ileum were indistinguishable from control ileal segments. Lactase activity virtually disappeared from all segments of the residual intestine in resected animals. These results lend in vivo support to the concept of a fixed intrinsic program of enteric redifferentiation.

† **666** VISCERAL PROTEIN RESPONSES IN INFANTS ON PARENTERAL NUTRITION. Richard A. Helms, Roland N. Dickerson, Henry G. Herrod, University of Tennessee Center for the Health Sciences, Departments of Clinical Pharmacy and Pediatrics, Memphis, TN.

Current methods for assessing early nutritional recovery in infants receiving parenteral nutrition (PN) are unsatisfactory. Measurements of anthropometrics and transferrin and albumin are inadequate due to sluggish responses in these parameters. We have prospectively evaluated the usefulness of monitoring changes in the rapid turnover transport proteins, retinol binding protein (RBP) and prealbumin (PA), as early markers for nutritional recovery in 25 malnourished infants requiring PN. Subjects had an average weight of 2.6±0.8 kg, gestational age of 36.4±3.9 wk and postnatal age of 4.8±5.5 wk. Blood samples were obtained prior to PN, and approximately every third day (d) thereafter for 2 wks. PA and RBP determination were performed by radial immunodiffusion. An increase in both RBP and PA was noted after only 5-7 d of PN [RBP (mg/dl): 1.68±0.56 to 2.37±0.62 $p<0.005$; PA (mg/dl): 8.31±3.57 to 11.50±3.21 $p<0.005$]. This increase persisted throughout the 2 wk study period. Gestational development and mean protein intake influenced responses. Appropriate for gestational age (AGA) infants had a significant increase in both RBP and PA by 2-4 d that persisted throughout the study period. The increases in PA at both 2-4 d and 5-7 d was significantly greater in AGA infants than in small for gestational age (SGA) infants. SGA infants failed to show an increase in RBP values above baseline. Infants receiving >2gm/kg/d protein had significant increases in both RBP and PA. Those receiving ≤2gm/kg/d failed to show an increase in either protein after 2 wks. An average caloric intake of >100 cal/kg/d had no differential influence on RBP or PA when compared to infants on fewer calories. Linear regression analysis demonstrated that PA values correlated with RBP values observed simultaneously ($r=0.5888$, $p<0.0001$). These studies indicate that PA and RBP are useful measures of protein repletion in infants requiring PN.