475 ESOPHAGEAL LENGTHS IN CHILDREN CORRELATE WITH HEIGHT: APPLICATION TO THE TUTTLE TEST WITHOUT PRIOR ESOPHAGEAL MANOMETRY: Cory T. Strobel and William J. Byrne, (Spon. by Marvin E. Ament), UCLA School of Medicine, Department of Pediatrics, Los Angeles, California.

The Tuttle test in adults is highly sensitive in detecting gastroesophageal reflux (GER). A modification of this test as applied to children has been described.* To facilitate a more widespread application of this test in identifying GER, we undertook a two part study. Initially, 119 children, ages 3 weeks to 235 months, had esophageal length (EL) measured at manometric studies. EL was defined as the distance in cm from the lips or the nares to the pressure inversion point of the lower esophageal sphincter (LES). Correlation coefficients with body height (HT) in cm were 0.967 and 0.926 for respective oral and nares determinations, with regression equations of EL=6.7+0.226(HT) and EL=5+0.252(HT). T test gave 95% within ±3.1 cm (oral) or ±4.1 cm (nares). Subsequently, 20 patients, ages 1 to 180 months, had manometrics and Tuttle tests. The pH probe was placed at 87% of EL - 3.1 or 4.1 cm, as appropriate. In all cases, this placement for the Tuttle test was higher above the LES than the usual procedure.* 8 patients had a positive test for GER using this method. In the remaining 12 with a negative study, repeating the test by the usual technique* reconfirmed a negative study in all 12. This data confirms a highly significant correlation between EL and HT and substantiates the feasibility of documenting GER by Tuttle test without prior manometry.

*Euler, AR and Ament, ME: Pediatrics 60:65-68, 1977.

476 HOME PARENTERAL NUTRITION (HPN) IN CHILDREN WITH CROHN'S DISEASE PROMOTES GROWTH AND INDUCES CLINICAL REMISSIONS: Cory T. Strobel, William J. Byrne, J. Nevin Isenberg and Marvin E. Ament, UCLA School of Medicine, Department of Pediatrics, Los Angeles, California.

Long term HPN in adults may alter the severity of Crohn's disease. To assess such therapy, 16 children, ages 9¾ to 19½ years, received an initial course of HPN averaging 140 days. Disease extent was small bowel-1, large bowel-1 or both-14. All were symptomatic in spite of therapy with Azulfidine^{R} (14), steroids (11) and/or previous resections (6). All discontinued drugs once HPN was started. One needed subsequent steroids. 8 are in remission from 45 to 508 days after one HPN course. 6 relapsed within 140 days of the initial course. 3 completed a 2nd course averaging 121 days, with 2 relapsing within 90 days and 1 in remission to 204 days. Of the 9 in remission, only 5 are at >5 months. 1, 3 and 2 respectively have completed an initial, 2nd and 3rd course of HPN. 1 required surgery for a rectal fissure after an initial 122 days of HPN. All gained weight (11¼ kg average), had marked clinical improvement and resumed peer group activities while on HPN. 9 demonstrated "catch up" growth and 4 others had appropriate height increases. Enteric protein loss was reduced after HPN in 2 of 7 patients. Both are in remission >5 months. Complications included catheter removal (1 per 432 days) for sepsis (2), dislodgement (2), subcutaneous leak (1), thrombosis (1) and local infection (1). HPN can be safely used in managing children with severe Crohn's disease and may induce a remission, promote weight gain and growth, and improve social well-being.

477 EFFECTS OF CHOLESTYRAMINE ON SMALL INTESTINAL MUCOSA. M.H. Ulshen & R.J. Grand, Harvard Medical School, Children's Hosp. Med. Ctr., Boston, Mass. 02115

Cholestyramine (CHOL)is often used successfully in the treatment of diverse diarrheal disorders, yet its effects on small intestinal mucosa have not been evaluated. Accordingly, rat jejunal and ileal segments were studied before and after 3, 6 or 12 days of test diet containing 5% pure CHOL resin in powdered standard lab chow. Weight gain during study was comparable in both CHOL-fed and control groups. For jejunal mucosa, there was no significant difference in wet weight or total DNA content per segment, or in mucosal wet weight or total protein content per mg DNA in any diet period comparing CHOL-treated animals to controls. Similar results were obtained for ileal mucosa, except, at 12 days, mucosal wet weight per segment increased ($p<.05$) in the CHOL treated rats. Jejunal disaccharidases (U/gm protein) rose significantly after 12 days of CHOL(sucrase:control 74±10 vs CHOL-fed 102±5, $p<.02$; lactase: control 9.1±0.8 vs CHOL-fed 14.3±0.7, $p<.001$). Expressing the data as specific activity per segment or per mg DNA gave similar results. Ileal disaccharidases did not change significantly. Conclusions:CHOL feeding for 12 days does not influence jejunal mucosal mass (wet weight), cell number (DNA content) or cell size (mg protein/mg DNA), and has only a small effect on ileal mucosal mass. Jejunal disaccharidase content (U/segment)rises dramatically as does specific activity (U/mg protein, U/mg DNA)suggesting either a direct mucosal effect of CHOL or an alteration of the intraluminal phase sufficient to change brush border enzyme kinetics.

478 INTESTINAL UPTAKE OF ANTIGEN: EVIDENCE FOR ENHANCEMENT WITH INFLAMMATION AND GUT ANAPHYLAXIS. W. Allan Walker and Donald Bloch. Massachusetts General Hospital, Pediatric Gastrointestinal and Nutrition Unit, Boston, Massachusetts 02114.

In this study, the pathologic alteration of the mucosal surface of the rat small intestine was examined with respect to transport of intraluminal antigen in vivo. As a model for inflammation, rats were injected with Nippostrongylus brasiliensis; crypt hyperplasia and villous atrophy were noted in gut segments involved by infection. Bovine serum albumin (BSA) administered by gavage to such animals resulted in a marked increase in immunoreactive BSA (as measured by the Farr technique) in serum compared to controls over 6 hours. Following healing of the intestinal lesion, rats were subjected to mild systemic anaphylaxis by intravenous administration of worm antigen. This treatment led to changes in vascular permeability as measured by the accumulation of ^{125}I-rat serum albumin in the intestinal wall and secretions. Induction of mild systemic anaphylaxis in rats previously fed with BSA, resulted in marked enhancement of BSA uptake suggesting that changes in intestinal permeability occurred. These studies demonstrate that pathologic alterations (inflammation and anaphylaxis) in the rat intestine results in measurable increases in the uptake of antigen and antigen fragments. Enhanced uptake of such antigens may be harmful because of their intrinsic properties (toxins), because of their potential for forming immune complexes or because of their potential for inducing a systemic immune response.

479 DEVELOPMENT OF PANCREATIC SECRETORY FUNCTION. Steven L. Werlin and Richard J. Grand, Children's Hospital Medical Center, Boston, MA 02115.

Morphological maturation of rodent pancreas and developmental increases in enzyme content are virtually completed prenatally. However, very little is known about secretory function in the perinatal period. Accordingly, pancreatic amylase secretion was studied in vitro using tissue fragments suspended in continuously gassed Krebs-Ringer bicarbonate solution and exposed for varying periods of time to hormones or other secretagogues. Term fetal pancreas was refractory to all doses of carbachol and CCK-PZ used(10^{-4} and to 10^{-11}M). By contrast, amylase secretion was significantly augmented when tissue was exposed to Ca^{++} ionophore (A23187, 3 µg/ml) or to dibutyryl cyclic AMP (1 mM),8-bromocyclic GMP(1 mM) or theophylline(3 mM). The latter agent when combined with either cyclic nucleotide potentiated the secretory effects. Neither carbachol(10^{-6}M) nor A23187(3 µg/ml)increased intracellular levels of cyclic GMP in fetal pancreas despite presence of theophylline(3 mM) in incubation media. Postnatally (days 1 & 8),amylase secretion in response to hormones was brisk; as much as 36% of the total amylase content of the gland being released in 60min. By 8 days of age, both carbachol and A23187 produced 2-4 fold increases in tissue cyclic GMP levels within 5 min. of exposure. These data demonstrate that certain secretory mechanisms in term fetal rat pancreas are immature and that acquisition of mature function occurs rapidly after birth. The findings suggest that a critical perinatal event is responsible for the rapid and dramatic change in responsiveness to hormones.

480 SMALL BOWEL SECRETION INDUCED BY UNCONJUGATED BILIRUBIN. Peter F. Whitington. (sponsored by Gerard B. Odell). University of Wisconsin School of Medicine, Department of Pediatrics, Madison, Wisconsin.

Perfusion of 9α-bilirubin in isotonic bicarbonate buffered saline into hamster small bowel in vivo was performed in order to elucidate the mechanism of the diarrhea associated with phototherapy. Solutions of bilirubin, 0.125 to 0.75mM, produced dose dependent secretion (negative net flux) of H_2O and Na^+ (table); similar concentrations have been observed in the bile of the Gunn rat subjected to phototherapy. At 0.5mM significant protein loss occurred (table) but there was no biochemical evidence of significant enterocyte injury as measured by effluent loss of DNA, lactase and sucrase (table) or post-perfusion mucosal activities of lactase and sucrase, 5.3 ± 0.9 (SD) vs 5.6 ± 0.9 ($p>.05$) and 14.2 ± 3.1 vs 17.1 ± 3.5 ($p>.05$) units/mg/protein respectively. These data provide evidence that the diarrhea associated with phototherapy is the result of bowel secretion and not the manifestation of carbohydrate malabsorption as previously thought.

EFFLUENT VALUES	H_2O Flux L/min/g X10^6	Na^+ Flux Eq/min/g X10^6	Protein g/ml X10^5	Lactase U/ml X10^4	Sucrase U/ml X10^4	DNA g/ml X10^7
Control	58.9 ± 31.4(8)*	4.55 ± 4.12(8)	4.50 ± 1.20(6)	5.8 ± 6.2(12)	8.9 ± 6.0(12)	2.24 ± 1.58(5)
Bili. 0.5mM	-62.6 ± 53.1(7)	-14.1 ± 8.64(7)	25.10 ± 5.80(6)	40.3 ± 45.7(12)	21.8 ± 35.1(12)	2.84 ± 1.63(5)
	$p<.005$**	$p<.005$	$p<.005$	$p>.05$	$p>.05$	$p>.05$

*mean ± SD (n), ** Student's t test