† 649 FAT DIGESTION IN THE NEWBORN: COMPARATIVE PROPERTIES OF GASTRIC AND LINGUAL LIPASES. C.S. Fink, S.J. DeNigris, M. Hamosh, D.K. Kasbekar and P. Hamosh (Spon. by J.W. Scanlon). Georgetown University Medical Center, Washington, DC 20007.

Hydrolysis of dietary fat starts in the stomach. We have recently shown that a lipase is secreted by glands isolated from the gastric mucosa of rabbit (Am. J. Physiol., 1985.) and man (Clin. Res. 1985.). Thus, hydrolysis of fat in the stomach is catalysed by two lipases of oral and gastric origin. The present studies characterize rabbit gastric lipase (GL) as compared to rat lingual lipase (LL). GL activity on tricaprylin (TC) was 25-30 times greater than on triolein (TO). The pH optimum for both substrates was 5.5-6.0. Addition of bile salts (17 mM) shifted the pH optimum to the left (0.5-1.0 pH unit) and, in general, significantly inhibited GL activity on TO. Taurodeoxycholate completely inhibited GL activity on TO at pH $>$ 5.5, in marked contrast to its stimulatory effect on LL activity. During incubation with TO (90 min, pH 5.5), GL produces 35% more free fatty acids and 40% less monoglycerides than LL, suggesting a greater extent of complete lipolysis by GL. The data suggest that GL acts in the stomach and together with LL may be responsible for the significant preduodenal fat digestion in the newborn. (Supported by NIH grant HD-10823).

650 **DIFFERING PATTERNS OF INTESTINAL MOTILITY IN CHILDREN WITH CHRONIC CONSTIPATION AND ENCOPRESIS.** Jonathan A. Flick, Bruce M. Taubman, John T. Boyle. (Sponsored by John B. Watkins). Univ. of Penn. School of Med., Children's Hosp. of Philadelphia, Division of Gastroenterology.

Studies of colonic and rectal motility in children with constipation and encopresis have given conflicting results; the role of small intestinal motility has not been investigated. We studied mouth-to-colon transit time, colon transit time and the rectoanal reflex in 9 patients (2F, 7M age 8.8 ± .5 yr) with encopresis. All had significant fecal retention by an x-ray scoring system (Barr et al. Clin Pediatr 18:674) compared to age-matched sibling controls ($p < .05$). Enemas were given to reduce the score to normal prior to study. Mouth-to-colon transit time was measured by rise in breath H_2 after ingestion of lactulose; colon transit time by passage of 50% of ingested radio-opaque markers and anorectal manometry by an 8-lumen perfused catheter. **RESULTS:** There was no difference in mouth-to-colon transit time between patients and controls (105 ± 9 vs. 107 ± 18 min). Based on colon transit time, patients fell into 2 groups; in one group (4/9) transit was similar to controls (2.4 ± .4 vs. 2.6 ± .6 d) while in the other (5/9) it was prolonged (>5 d). There were no differences between these 2 groups for resting sphincter pressure (95 ± 14 vs. 85 ± 11 mmHg) or anal sphincter length (2.9 ± .4 vs. 2.6 ± .4 cm). An inhibitory reflex in the proximal anal sphincter was present in all patients. 7/9 patients had a delayed (>5 sec) contractile reflex in the distal anal sphincter following proximal relaxation. **CONCLUSIONS:** (1) Children with constipation and encopresis have normal small intestinal transit time. (2) They are a diverse group with variable disorders of colonic motility. (3) Disordered external sphincter function may be an important mechanism in encopresis.

† 651 EPIDERMAL GROWTH FACTOR BINDING AND BIOLOGICAL EFFECTS ON GASTROINTESTINAL MUCOSA PROLIFERATION. J. Paul Frindik, Pat Walker, Wojciech Zawada, Stephen F. Kemp, M. Joycelyn Elders. University of Arkansas for Medical Sciences, Department of Pediatrics, Little Rock, Arkansas.

Epidermal growth factor (EGF) is a polypeptide hormone with multiple biological effects in mice and in culture systems. These include premature eruption of teeth, precocious eye opening, increased keratinization, and precocious development of gastrointestinal enzymes. EGF has been variously reported to stimulate mucosal proliferation in the gastrointestinal tract or to have no effect. We have studied the binding of ^{125}I EGF to mucosal cells and the effects of this growth factor on mucosa cell proliferation in mice. C3H/HeJ 10-day-old suckling mice were injected with 10 ng of EGF for 3 days prior to sacrifice. Eighteen hours prior to sacrifice the animals were injected with 50 µci of ^{3}H-thymidine for measuring radioactive precursor into DNA. At sacrifice total weight of EGF-treated animals was not significantly different from that of control animals. Specific organ weights for EGF-treated animals compared to controls were: small intestine-208%; skin-133%; stomach-117%; liver-103%; large intestine-92%; heart-87%. EGF receptor binding was greatest in skin, stomach, and heart. The binding per µg of protein in mucosa cells was less for small intestine than large intestine. ^{3}H-thymidine uptake into DNA in EGF-treated animals compared to uninjected control animals was: small intestine-266%; skin-179%; liver-168%; heart-139%; large intestine-110%. The data suggest epidermal growth factor receptors are present in these multiple tissues and may have a direct effect on cell proliferation and function.

652 EOSINOPHILS IN THE COLONIC EPITHELIUM OF INFANTS. Naomi Fukagawa, Manuel Marcial, Donald Antonioli, Harvey Goldman, and Harland Winter. Dept. of Gastro. and Path., Children's, Beth Israel and Brigham and Women's Hosp., Harvard Medical School, Boston, MA., (spon. J. Udall).

Little information exists about histologic change in the colonic mucosa of infants with possible colitis. We retrospectively reviewed the medical records and pathologic specimens of infants 3 mos. of age who had rectal biopsies from 1976-1983. All biopsies were coded and read without knowledge of clinical information. Three groups of patients were studied: the control group, (n=7) who had no rectal bleeding and had suction biopsies for suspected Hirschsprung's disease; a disease control group (n=8) who were identified subsequently to have enteric infections; and the study group (n=27) with rectal bleeding, negative bacterial cultures and examinations for ova and parasites. The frequency of clinical symptoms (bleeding, mucus in stool, colic, fever, vomiting, diarrhea) and laboratory findings did not differ between the disease control and study group. The overall architecture was normal in all 3 groups. Epithelial cell injury was not present. In contrast with controls, in both disease control and study group, eosinophils were present in the surface and crypt epithelium. Eosinophils were increased around the base of the crypts in the study (26±8/10 HPF) group compared to that of combined control and disease control (8±3/10 HPF) ($p < 0.05$ by student's t-test). Conclusion: In the absence of epithelial cell injury, eosinophils, especially located around the base of the crypt, are greatly increased in the colonic mucosa of infants with probable idiopathic colitis.

● 653 A RABBIT MODEL FOR THE PATHOPHYSIOLOGY OF TOTAL PARENTERAL NUTRITION-ASSOCIATED CHOLESTASIS. EE Gleghorn, RJ Merritt, DH Henton, FR Sinatra. (Spon. by Thomas G. Keens) Department of Pediatrics, Childrens Hospital of Los Angeles and University of Southern California School of Medicine, Los Angeles, CA.

Gastrointestinal stasis, bacterial overgrowth and accumulation of toxic bile acids may be etiologically related to total parenteral nutrition (TPN)-associated cholestasis. New Zealand White rabbits were studied to investigate interrelations between these factors. TPN-infused animals received 150 kcal and 5 gm protein/kg/d. Pair-fed animals were fed rabbit chow to supply 5 gm protein/kg/d (PF). Free-fed animals ate >5 gm protein/kg/d (FF). Gastrointestinal transit time, as assessed by a solid marker technique, was <48 h in 95% of fed animals and >72 h in 100% of TPN animals. Colons of TPN animals contained bilious liquid rather than semi-solid feces. There was no bacterial overgrowth in duodenal contents in any animal; gall bladder bile was sterile. Although the Mole % total primary bile acids (BA) and total secondary BA were equivalent in gall bladder bile in the 3 groups, the Mole % glycolithocholic acid (GLCA) was significantly increased ($p<.001$) in TPN animals (4.28 Mol%) compared to PF (1.68 Mol%) and FF (1.35 Mol%). Serum total primary BA and gamma glutamyl transpeptidase concentrations were higher in TPN animals ($p<.02$). In this rabbit model TPN led to decreased gastrointestinal motility, increased relative biliary concentration of the toxic monohydroxy bile acid GLCA and increased serum markers of cholestasis. This animal model, which exhibits changes consistent with human TPN-associated cholestasis, should facilitate experimental studies of the etiology of this syndrome.

● 654 EFFECT OF FEEDING VARIOUS MONOSACCHARIDES ON THE ACTIVITY AND THE IMMUNOREACTIVE AMOUNT OF LACTASE AND SUCRASE IN ADULT RAT JEJUNUM. Toshinao Goda, Sergio A. Bustamante, O. Koldovský. University of Arizona College of Medicine, Departments of Pediatrics and Physiology, Tucson, AZ.

Two-month-old rats were fed for 7 days a low carbohydrate (LC) [BBA 676:108] diet; subsequently they were force fed three times in 12 hours (to insure a controlled intake of food) carbohydrate diets (40 cal%) containing either glucose (Glu), galactose (Gal), fructose (Fru) or α-methylglucoside (α-MG). Activity of sucrase (SA), lactase (LA), and amount of immunoreactive lactase (IRL) and immunoreactive sucrase (IRS) [using electroimmunoassay] were determined in jejunal mucosa.

Group	LA	SA	LA/IRL	SA/IRS
	(µmol/mg prot/hr)		(µmol/µg/h)	
LC	0.29±0.07*[a]	0.74±0.11[a]	0.78±0.06	0.38±0.05
Glu	0.56±0.09[b]	1.59±0.30[b,c]	0.83±0.02	0.51±0.04
Gal	0.59±0.04[b]	1.68±0.10[b]	0.88±0.01	0.46±0.03
Fru	0.77±0.09[b]	2.03±0.08[c]	0.88±0.02	0.45±0.02
α-MG	0.66±0.16[b]	1.61±0.21[b,c]	0.85±0.04	0.52±0.10

*Mean±SEM; a-c stat signif from each other if not sharing a common superscript. N (group): 4-7.

Conclusion. (a) All the monosaccharides studied evoked a parallel increase of activity of disaccharidases and corresponding immunoreactive proteins as demonstrated by the constant ratio of enzyme activity/immunoreactive protein. (b) Fructose was the most effective "inducer"; the effect of α-methylglucoside, a non-metabolizable sugar, is very intriguing.