17 FREQUENCY AND INHERITANCE OF FRUCTOSE MALABSORPTION. A STUDY IN 205 UNRELATED SCHOOL CHILDREN AND 10 FAMILIES.

H.K. Harms, N. Seidel, C. März, R.M. Bertele-Harms
Universitäts-Kinderklinik München

Abdominal pain is a frequent symptom in school children. Since incomplete fructose absorption may be the cause, we studied fructose absorption by H2 breath tests in 205 unselected school children, i.e. 72 boys and 133 girls aged 10-19 years. The fructose load was 1 g/kg, max. 40 g, in a 10% solution. H2 values were corrected for atmospheric contamination and fasting levels. The results are shown in the table. Accompanying symptoms, which occured above 40 ppm peak H2 values, were mainly abdominal pain and flatulence.

peak H2 values adjusted to 40 Torr CO2	male	female	symptoms in m. and f.
0-19 ppm H2	29 %	35 %	0.05%
20-39 ppm H2	23.7%	22.5%	0.07%
40-59 ppm H2	16.7%	15.7%	54.5 %
> 60 ppm H2	30.6%	26.8%	45.0 %

In 10 families with a symptomatic index child we studied fructose absorption in parents and siblings. In each family we found at least one parent with symptomatic fructose malabsorption. Among the 21 children 12 showed incomplete and 9 complete fructose absorption. Conclusions: In school children incomplete fructose absorption is common and may be the cause of abdominal pain. Most likely the inheritance follows an autosomal dominant pattern.

18 *POLYAMINES INDUCE PRECOCIOUS INTESTINAL MATURATION IN THE RAT.*

Forget P., Dufour C., Dandrifosse G. and Romain N.
Dept of Pediatrics and General and Comparative Biochemistry, University of Liège, Liège, Belgium.

Intestinal polyamine concentrations and disaccharidase activities show a peak at the time of postnatal maturation in the rat. In the present study, we aimed at inducing maturation by oral administration of polyamines. Three groups of 5 rats each received twice daily either saline, spermidine (5 µmol) or spermine (3 µmol) orally on the 12th, 13th and 14th postnatal days. Rats were sacrificed on day 15. Mucosal protein levels and disaccharidase activities were measured according to the methods of Bradford and Dahlqvist respectively.

Results :

	Protein	*Lactase*	*Maltase*	*Sucrase*
	mg g^{-1} w.w.	*µmol min^{-1} g^{-1} protein*		
Control rats	*94 ± 3*	*80 ± 9*	*116 ± 19*	*10 ± 3*
Spermidine	*98 ± 2[a]*	*51 ± 5[b]*	*315 ± 37[c]*	*34 ± 2[c]*
Spermine	*104 ± 4[a]*	*28 ± 2[c]*	*419 ± 63[c]*	*46 ± 5[c]*

[a]: not significant, [b]: $p<0.05$, [c]: $p=0.01$ (versus control rats)

Conclusion: In rats, orally administered polyamines induce precocious intestinal maturation. Sucrase and maltase activities reach adult levels on the 15th postnatal day. Lactase activities decrease. The changes do perfectly mimick the natural maturational process.

19 MACROMOLECULAR ABSORPTION IN INFANTS AND CHILDREN WITH COW'S MILK ALLERGY (CMA).

Juvonen P., Jakobsson I., Lindberg T*., Lothe L.
Departments of Paediatrics University of Lund, Malmö and University of Umeå*, Sweden.

A radioimmunological method for measuring macromolecular absorption has been developed. Serum concentrations of human alpha-lactalbumin (LA) were measured after a meal of human milk. (1).
The aim of the study was to measure macromolecular absorption in infants with CMA, and to compare the results with those in healthy infants. Serum samples were analyzed at 30 and 60 minutes after an intake of human milk. The results are expressed as ug LA/l serum/l human milk/kg body weight. Samples have been analyzed from 32 healthy infants of different age, from 16 infants with acute symptoms of CMA and from 18 infants with suspected CMA during a challenge with cow's milk.
Infants with CMA who had either gastrointestinal or skin symptoms showed higher concentrations of LA than the control infants. Six infants with a clinically positive milk challenge showed increased serum concentrations of LA, while 12 infants with a clinically negative challenge did not.
Conclusion: Infants with gastrointestinal or skin symptoms due to CMA have an increased macromolecular absorption. Analysis of LA in serum during a milk challenge could be a valuable complement to the observation of clinical symptoms.
1) Jakobsson et al: Gut 27:1029-34, 1986.

20 MOTHERS OF INFANTS WITH COW'S MILK ALLERGY VS. CONTROLS HAVE LESS IgA ANTIBODIES TO COW'S MILK PROTEIN IN MILK AND PLASMA

E. Savilahti, L. Salmenperä, V.-M.Tainio, P. Arjomaa, M.A. Siimes, J. Perheentupa.
Dept. of Paediatrics, University of Helsinki, Finland

During a follow-up of 198 infants from birth to age 12 months, 7 developed allergy to cow's milk. In 2 of these eczema appeared even during exclusive breast feeding (at ages 1 and 5 months), and in the others shortly after the introduction of cow's milk (between ages 3 and 10 months). The allergy was verified by test challenge in hospital. Of the 7 infants, 6 had supranormal plasma levels of IgE, and IgE antibodies to cow's milk. In the development of total and anti-cow's milk IgA, IgG and IgM plasma levels the 7 infants did not differ from the others. IgA antibodies to beta-lactoglobulin were lower in the mothers of the 7 infants than in the other mothers in colostrum and in milk 4 months post partum ($p=0.05$). There was no such difference in milk beta-lactoglobulin concentrations. The total IgA levels in milk were also lower in the 7 mothers throughout lactation; the difference was significant at 4 and 6 months post partum. The levels of IgG and IgM cow's milk antibodies were low in breast milk and showed no such difference. Plasma levels of IgA cow's milk antibodies were also lower in the mothers of the 7 infants than in the other mothers. We infer that immunoglobulins in breast milk may influence the infant's immune responses to food antigens.

21 EFFECT OF AGE AND SITE ON BASAL AND E.COLI ST-STIMULATED INTESTINAL GUANYLATE CYCLASE ACTIVITY IN CHILDREN.

A.Guarino, M.B. Cohen, R.A.Giannella. Division of Digestive Diseases, University of Cincinnati, OHIO (USA).

E.Coli heat-stable enterotoxin (ST) induces diarrhea through the stimulation of the guanylate cyclase (GC)-cGMP system. The effect of ST on the human intestine has not been investigated nor is any information available on the activity, distribution, or development of GC activity in the human intestine. We have characterized these aspects of GC activity by measuring its basal and ST-stimulated activity in intestinal specimens, obtained operatively from 35 infants and children of 1 day to 16 years of age. GC activity was linear with protein concentration and time. Basal activity was similar in small intestine and in colon. In the small intestine, however, basal GC activity varied with age. It was maximal in children 1 day of age, then decreased linearly with age up to 8 months and became quite variable thereafter. In colon, an age-related pattern was not found. E.Coli ST stimulated GC activity in a dose-related manner. The effect of ST was linear with protein concentration and with time. In the small intestine, ST-stimulation of GC was twice that found in colon. Age affected the response of small intestinal GC to ST. Maximal response to ST was observed in children of 1 day of age and ST stimulation was significantly greater in children less than 1 year of age than in older children. In the colon, the response of GC to ST did not change with age. The greater responsiveness of small intestinal GC to ST in younger children may explain the severity of diarrhea induced by ST at that age.

22 ADHERENCE OF SALMONELLA TYPHIMURIUM TO ENTEROCYTES

B.L. Lindquist, E. Lebenthal, P.C. Lee, M.W. Stinson, J.M. Merrick. Internat. Inst. Infant Nutr. and G-i Dis., Dept. Pediatrics and Microbiology, State University of New York at Buffalo, USA.

Adherence of S. typhimurium to intestinal epithelial cell surfaces is believed to play a primary role in the pathogenesis of this organism. The major known adherent component of S. typhimurium is the type-1 fimbriae. However, in vitro studies implicating type-1 fimbriae in the attachment of S. typhimurium to cultured non-intestinal cells (HeLa or HEp-2) have been controversial. To resolve this issue, we investigated the binding of ^{3}H-labelled S. typhimurium to freshly isolated rat enterocytes. The results clearly established that fimbriated strains adhered in much higher numbers than non-fimbriated strains. Adherence was inhibited by mannose and alpha-methyl-D-mannoside. Cultivation under conditions that do not permit expression of fimbriae yielded bacteria which adhered in lower numbers than fimbriated bacteria. There was no difference between enterocytes from proximal or distal small intestine. The level of adherent bacteria increased significantly during postnatal development and reached adult levels at weaning time. The results indicate that the adherence of S. typhimurium to enterocytes is facilitated by type-1 fimbriae. There appears to be an age dependent postnatal development of available receptors on rat enterocytes for S. typhimurium.