

fecting antigen uptake are largely unknown. Studies relating molecular size to the clearance of macromolecules from intestinal loops suggest a diffusion phenomenon. However, the uptake of horseradish peroxidase and fluorescent-labelled gamma globulin by epithelial cells is affected by metabolic inhibitors suggesting an energy-dependent process. To clarify mechanisms of antigen absorption the uptake of horseradish peroxidase (HRP) (M.W. 40,000) and two C<sup>14</sup>-dextrans (M.W. 15,000 and 60,000) were studied in rat everted gut sac preparations. Electron micrographs showed that HRP progressed from membrane-bound structures within epithelial cells into the intercellular space and finally into the lamina propria. Absorption of HRP was five times greater in the jejunum than in the ileum and jejunal uptake was inhibited by S-13, an uncoupling agent. Large weight dextran was absorbed at three times the rate of small weight dextran at equivalent concentrations. Experiments performed at 0° or under nitrogen reduced the absorption of the large weight dextran to that seen with smaller weight dextrans. These studies suggest that the uptake of some antigens occurs by an energy-dependent pinocytotic mechanism. The uptake appears to be greater in the jejunum than the ileum and the jejunal absorption shows a more marked energy-dependency. The energy dependent uptake of the larger dextran suggests a mechanism for absorption of macromolecules other than diffusion. (Work supported by grants from The John A. Hartford Foundation, Inc.)

#### Role of bile acids in fat absorption in low birth weight infants.

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Low birth weight (L.B.W.) infants absorb fats with greater difficulty than normal term infants. The possible role played by intestinal bile acid concentrations (B.A.C.) in this defect was studied. Seventeen L.B.W. infants aged 10 to 34 days weighing 1540-2300 Gm. (mean-1790) were intubated and duodenal contents were aspirated for a period of one hour starting between 2-3 hours after feedings of unsaturated fat formula. Aspirates were kept on ice and were subsequently assayed for lipase activity and total B.A.C. (Method of Iwata). Concurrent 48 hr. stool collections were analyzed for fat. Lipase activity was normal in all infants (6.5-16 I.U./ml.). In infants with duodenal B.A.C. below 2mM/L (critical micellar concentration) coefficients of fat absorption were 48%-77% (normal 80%). In 7 of 8 infants with levels greater than 2mM/L, fat absorption was above 80%. Attempts to correlate ages or weights of the infants with levels of fat absorption did not yield consistent relationships. However, when age of the infants was related to total B.A.C., 10-19 day old infants (12) showed a mean value of  $2.07 \pm 1.3$  mM/L, compared to 20-34 day old infants (7) with a mean of  $5.8 \pm 2.7$  mM/L. Control babies of three weeks to 8 mos. of age (8) had a mean B.A.C. of  $6.8 \pm 2.7$ . Four younger L.B.W. infants were restudied after 2-3 weeks and showed a three-fold rise in B.A.C. Conclusions from these preliminary studies indicate that L.B.W. infants display lower levels of duodenal B.A.C. than do older and larger infants. There is a good inverse correlation between B.A.C. and steatorrhea.

Enhanced calcium and magnesium absorption in premature infants by feeding formulas containing medium chain triglyceride (MCT). PHIENVIT TANTIBBEDHYANGKUL and SAMI A. HASHIM

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Thirty-four premature infants were divided into three groups of comparable weight and fed three formulas differing only in fat composition. Group 1 (control) corn oil, oleo, and coconut oil (39:41:20); Group 2: MCT, corn oil, and coconut oil (40:40:20); Group 3: MCT and corn oil (80:20). Formula feeding was begun within 1 week after birth and continued throughout hospital stay. In all groups two 5-day stool collections were made early and late during the study and analyzed for fat, Ca and Mg. Mean absorption values  $\pm$  SE for the three groups of infants are:

Group	Ca Absorption: % of dietary Ca		Mg Absorption: % of dietary Mg	
	early period	late period	early period	late period
Control	29.5 $\pm$ 3.7	39.1 $\pm$ 4.1	56.1 $\pm$ 4.2	58.4 $\pm$ 4.5
40% MCT	60.1 $\pm$ 4.0	64.3 $\pm$ 3.3	66.0 $\pm$ 4.6	64.6 $\pm$ 2.7
80% MCT	75.0 $\pm$ 2.9	81.2 $\pm$ 3.0	83.6 $\pm$ 2.2	87.5 $\pm$ 2.7

In the MCT groups Ca absorption was significantly increased when compared with control ( $p < .001$ ). The 80% MCT group absorbed more Ca than the 40% MCT group ( $p < .01$ ). When the 80% MCT group was compared with the 40% MCT and control groups, significantly higher Mg absorption was observed ( $p < .005$ ). There was a positive correlation between improvement in fat absorption and both Ca and Mg absorption. The results indicate that calcium and magnesium absorption can be improved in premature infants by administration of MCT-containing formulas.

Congenital defect in folic acid absorption. PEDRO J. SANTIAGO-BORRERO, RAFAEL SANTINI, ENRIQUE PÉREZ-SANTIAGO and NORMAN MALDONADO (Intr. by Antonio Ortiz). *University Hospital, Univ. of Puerto Rico Sch. of Med., San Juan, Puerto Rico.*

A caucasian girl was noted to have persistent diarrhea and progressive pallor since age of two months. Hematologic evaluation at 3 months revealed anemia of 6.0 gm/100 ml and severe megaloblastic erythropoiesis. She failed to respond to oral treatment with folic acid, but she had a prompt hematologic and gastrointestinal response with folic acid I.M. She remained free of anemia and diarrhea and kept growing and developing adequately while receiving parenteral therapy with folic acid. Anorexia and severe stomatitis and glossitis developed regularly three to four weeks after the administration of 15 mg of folic acid I.M. Evaluation at age 11 yrs., 3 weeks after the last dose of folic acid I.M., revealed a normal girl except for moderate stomatitis and glossitis and some hypersegmented PMN leukocytes. Her serum and whole blood folates were 2.0 and 60 ng/ml, respectively, and the serum B-12 was 500 pg/ml. Intestinal absorption tests were normal. Gastric and jejunal biopsies revealed normal mucosa. Folic acid and citrovorum factor absorption tests with 5 mg doses showed flat curves. Forty mg. of folic acid orally also failed to produce an increase in serum folate or to control the early signs and symptoms of folic acid deficiency. The clearance of folate after the administration of 5 mg. of folic acid intravenously was normal, but the urinary excretion of folate was unusually low (100  $\mu$ gm) in 8 hours. Studies for the presence of a folate inhibitor in the plasma were negative. These studies demonstrate an alteration in the