role of associated anaemia in hepatic transferrin synthesis during nutritional iron deficiency. Net synthesis of transferrin was correlated with net uptake of iron (both total and ferritin) by the isolated perfused rat liver.

Nutritional iron deficiency (Hb 5.0±0.3 g/100 ml, serum iron 46.5±5.5 µg/100 ml, TIBC 1021±37 µg/100 ml) was associated with an increased rate of transferrin synthesis (from 1.26±0.14 mg h⁻¹ 300 g body wt⁻¹ to 2.08±0.35 mg h⁻¹ 300 g⁻¹). An enhanced uptake of iron into ferritin (from 1.2±0.2 µg 10 g liver wt⁻¹ to 13.8±9.9 µg 10 g⁻¹) was noted at all levels of perfusate iron saturation, while ferritin iron stores were much reduced. Refeeding with iron produced a marked rise in serum iron and little change in TIBC and Hb but promoted a return towards normal of transferrin synthesis, ferritin iron uptake and ferritin iron content. Acute correction of anaemia by red cell transfusion without changing serum iron or hepatic iron stores failed to reduce transferrin synthesis. Phenobarbitone feeding for 20 days in normal rats resulted in a predominant enhancement of transferrin synthesis (compared to albumin synthesis) with a marked rise in TIBC together with a fall in ferritin iron but no change in Hb levels, total hepatic iron or serum iron concentration. We suggest that phenobarbitone may have diverted iron from storage protein into haem protein synthesis. This data and that presented for the specific sorption of dipeptides, amino acids, electrolytes (Hellier, 1973, Gut, 11, 947). Isotonic saline solutions containing either the dipeptide glycyl-l-alanine (Gly-Ala) at concentrations of 10 mM, 20 mM, 40 mM, 80 mM and 140 mM or equivalent amounts of glycine (Gly) and l-alanine (Ala) in the free form, were perfused.

Water and solutes were absorbed in isosmotic proportions during all the perfusions. Compared with water absorption seen during perfusion of isotonic saline, Gly-Ala at concentrations of 10 mM, 20 mM, 40 mM, 80 mM and 140 mM or equivalent amounts of glycine (Gly) and l-alanine (Ala) in the free form, were perfused. During dipeptide absorption, either brush border hydrolysis precedes uptake of liberated free amino acids or intact dipeptide molecules are transported into the mucosal cells (Silt, 1974, Gut, 15, 494). The observed values of water absorption during perfusion of Gly-Ala at concentrations of 40 mM or above were less than the water absorption expected on an osmotic basis, calculated on the assumption that complete brush border hydrolysis precedes amino acid uptake. At these concentrations, the observation that solute and water were absorbed in isomotic proportions can only be explained if the bulk of infused dipeptide enters the mucosal cell intact.

The results thus show that the products of protein digestion provide an important physiological drive to the post-prandial absorption of water and electrolytes from the normal human jejunum. The findings also suggest that at high luminal dipeptide concentrations, intact dipeptide transport is the major mode of absorption.

8. EFFECT OF HYPOPHYSECTOMY ON INTESTINAL ADAPTATION AFTER SMALL BOWEL RESECTION IN THE RAT

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Studies in parabiotic and cross-circulated animals suggest that hormonal factors may stimulate adaptive changes in the intestinal remnant after small bowel resection. We therefore looked at the effect of pituitary hormones on mucosal regeneration by studying the structural and functional changes in the residual intestine after small bowel resection in hypophysectomized male Wistar rats.

There were three major groups: (1) hypophysectomized rats; (2) animals pair-fed with group (1) (studied because hypophysectomy decreases food intake, which in turn affects the adaptive response); (3) normally fed controls. These main groups were further sub-divided into rats with: (a) 50% proximal small bowel resection, (b) 50% distal resection, and (c) intestinal transection (sham resection).

Effective hypophysectomy was confirmed by histology of excised pituitary and by adrenal and testicular weights which fell from 14±4±19 mg/100 g b.w. to 4±8±0.4; P<0.001, and from 1.14±0.2 g/100 g b.w. to 0.21±0.01; P<0.001, respectively. Intestinal structure (mucosal wet weight, villous height, crypt depth) and in vivo absorption of 64 mM galactose were studied 4 weeks later.

The hyperplasia seen in the jejunum after distal resection was inhibited by restricting food intake in the pair-fed group (mean villous height 475±SEM 57 µm) but was reduced even further by hypophysectomy (342±23 µm; P<0.001). Similarly, restriction of food intake reduced ileal adaptation after jejunectomy, the mean villous height in the pair-fed group of 537±117, falling to 348±42 after hypophysectomy (P<0.02). There were comparable changes in crypt depth, mucosal wet weight and in galactose absorption.

These results suggest that while food intake influences mucosal regeneration, hypophysial hormones play an additional role in the adaptive response of the small intestine after resection.