

tion with *H pylori* (69/70=99%) compared with the smaller risk (RR=8) with antral infection with *H pylori* (85/96=89%).¹

In our series^{2,3} the frequency of duodenal ulcer in patients with *H pylori* in their duodenum was double the frequency of ulcers in the duodenum of patients with *H pylori* in their antra, which is why we suggested 'that duodenal *H pylori* may be more closely correlated with duodenal ulceration than is antral infection'.²

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Influence of treatment with pancreatic extracts on pancreatic enzyme secretion

SIR,—The article by Mossmer and colleagues (*Gut* 1989; 30: 1143-9) is a carefully conducted attempt to study the possible negative feedback regulation of pancreatic enzyme secretion. The authors point out a possible flaw in their design, in that they perfused the jejunum with enzymes, rather than the duodenum. Nevertheless they failed to show any negative feedback of pancreatic enzyme secretion. In fact their results are consistent with stimulation of CCK release from the jejunum by the protein load, with consequent increased pancreatic enzyme secretion. Similar results were obtained by two groups independently^{1,2} in studies in the dog. Duodenal perfusion with pancreatic juice in the basal state stimulated rather than inhibited pancreatic enzyme secretion.

Mossmer and colleagues cite the evidence for negative feedback inhibition of pancreatic enzyme secretion in the rat, pig, and chicken.

Their study emphasises once again the difficulties of extrapolating into man from results obtained in other species. Recommendations for expensive treatment with pancreatic extracts that are based on such experimental studies must be viewed with caution. If a clinical benefit for these treatments is demonstrated, this study suggests that a mechanism other than negative feedback inhibition might be involved.

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Helicobacter pylori infection in Meckel's diverticula

SIR,—We were interested to read that Dr Morris and colleagues found *Helicobacter pylori*

colonisation of gastric mucosa in a resected Meckel's diverticulum (*Gut* 1989; 30: 1233-5). We have recently published a similar study of 69 Meckel's diverticula, in which four of 13 diverticula containing gastric mucosa were colonised by organisms indistinguishable from *H pylori*.¹ There was an active histological 'gastritis' present in all four cases containing the bacteria, while four others showed 'gastritis' but no organisms. In one case where organisms were present there was a perforating ulcer within the focus of heterotopic mucosa, while in the other cases the bacteria were clearly not related to the patient's symptoms. Bacteria were scanty in three of the four cases.

The odds would seem to be stacked against *H pylori* successfully colonising what is often only a tiny focus of gastric mucosa at this site. Studies on reflux gastritis have shown that colonisation of gastric mucosa is inhibited in the presence of alkaline duodenal contents.^{2,3} Furthermore, the organism does not colonise small intestinal mucosa,⁴ and in some diverticula the heterotopic tissue is situated beneath the normal surface epithelium, where colonisation could presumably not occur. In view of these adverse factors, the finding of even infrequent colonisation of Meckel's diverticula by *H pylori* is significant, as it suggests that large numbers of bacteria are likely to be traversing the length of the bowel while still remaining viable. If this is so, transmission of *H pylori* from person to person by the faecal-oral route is entirely feasible.

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Acrodermatitis enteropathica with normal zinc concentrations

SIR,—I was extremely interested to read of the abnormalities of Paneth cells characteristic of acrodermatitis enteropathica aiding the diagnosis in a child with normal serum zinc concentrations.¹ I must comment on the statement 'that the high zinc content of the normal Paneth cell renders it particularly vulnerable to zinc deficiency'.

The belief that human Paneth cells contain high concentrations of zinc is based on the histochemical findings in rat small intestine using dithizone and the concentration of zinc^{2,3} by these cells.² We have shown that human Paneth cells are dithizone negative and that human and rat Paneth cells on x ray microanalysis contain no more zinc than other intestinal cells⁴ and that in man Paneth cells had lower zinc levels than goblet cells, stem cells, and enterocytes in jejunum and ileum.⁴

Our study on Paneth cell abnormalities in acrodermatitis enteropathica and the effect of zinc therapy is cited by Dr Mack and colleagues. We agree that zinc deficiency is associ-

ated with Paneth cell abnormalities. Rat Paneth cells have been reported to contain the zinc binding protein metallothionein (MT)⁵ and we have done some preliminary immunohistochemical studies on human Paneth cells using a monoclonal antibody raised in mice to horse MT1 and MT2.

Paneth cells were strongly positive but both goblet and crypt epithelial cells showed punctate positivity as well.

We conclude that present evidence does not indicate that the Paneth cell has an exceptionally high zinc content when compared with other intestinal epithelial cells, but do not disagree with the suggestion that it may be sensitive to changes in body zinc status.

The role played by metallothionein in zinc metabolism of intestinal epithelial cells including Paneth cells needs further investigation.

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Reply

SIR,—We thank Dr Elmers for her interest in our recent paper. We are also grateful for her comments regarding her work on x ray microanalysis of zinc in intestinal tissues which adds further to the discussion in our case report. Dr Elmers also raises an interesting topic with regards to the metallothionein content of Paneth cells.

Although there has been speculation that metallothionein plays a homeostatic role in the metabolism of zinc, the true role remains unknown. Metallothioneins are inducible by a number of agents, including the heavy metals.¹ It appears that Paneth cells contain greater levels of metallothioneins than other cells in the small intestine.²

Whether this increased metallothionein level is a primary event and in some way responsible for greater susceptibility of the Paneth cell to changes in body serum zinc status when compared with other markers, or whether this is secondary to increased synthesis will be an interesting relationship to explore.

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Some possible pathological consequences of peptic ulcer therapy

SIR,—The past 25 years have produced