Comment

Is the apparent hyposecretion of acid by patients with gastric ulcer a consequence of a broken barrier to diffusion of hydrogen ions into the gastric mucosa?

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The recent papers by Johnson, Love, Rogers, and Wyatt (1964) and Langman, Hansky, Drury, and Jones (1964) clearly distinguish between ulcers of the oxyntic gland area of the stomach on one hand and ulcers of the pyloric gland area and of the duodenum on the other. The former are true 'gastric' ulcers. The fluid recovered from the stomachs of patients with gastric ulcers is large in volume but low in acid; this is interpreted as demonstrating hyposecretion of acid. The patients frequently have chronic gastritis, and they belong to a population having greater than predicted frequency of blood group A. In contrast, patients with pyloric or duodenal ulcers display hypersecretion of acid, have a histologically normal gastric mucosa, and belong predominantly to blood group O. There is obviously some profound physiological and genetic difference between the two types of patients.

We are impressed by the report that patients with gastric ulcers secrete a large volume of juice containing little acid. Most experimental evidence demonstrates that the gastric mucosa secretes acid at a high concentration and that only the rate of secretion varies. Finding a large volume of dilute acid in the stomach indicates either that hydrogen ions have been diluted and neutralized by additional secretions or that hydrogen ions have disappeared by diffusing into the mucosa. The normal gastric mucosa has a high barrier opposing diffusion of hydrogen ions into it. For example, if 250 ml. of 160 mN HCl is placed in the empty human stomach, the concentration of acid in the fluid removed 15 min. later is 130 to 156 mN (Lindner, Cohen, Dreiling, and Janowitz, 1963). Similar results are obtained when pouches of the oxyntic gland area of the canine stomach are irrigated with acid solutions. The barrier to hydrogen ions can be broken. Topical treatment of the mucosa with eugenol, aspirin, or acetic acid causes a transitory change in the barrier which allows hydrogen ions to diffuse rapidly from the lumen into the mucosa. In this circumstance, the mucosa frequently bleeds (Davenport, 1964; Davenport, Warner, and Code, 1964). Furthermore, a mucosa so treated appears to be unable to secrete acid at the normal concentration; when stimulated by histamine, it secretes instead juice containing much sodium but little acid. This apparent inability to secrete acid is, however, an illusion. The mucosa retains its ability to secrete, but because its barrier to diffusion has been broken, hydrogen ions diffuse back into the mucosa, and sodium ions take their place in the contents of the lumen.

Is the reported secretion by patients with gastric ulcers of a large volume of juice containing little acid a similar illusion? Might not the mucosa of such patients be initially abnormally permeable to hydrogen ions, and might not the abnormal permeability be genetically determined? If this is the case, patients with gastric ulcers may actually secrete a large volume of juice containing a high concentration of hydrogen ions, but these ions diffuse back into the mucosa. We know from animal experiments that diffusion of hydrogen ions through a broken barrier can cause bleeding; is the same process a cause of bleeding in man?

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