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Effect of Large Dose of Gastrin I on Pepsin Secretion.* (30205)

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Gillespie and Grossman(1) showed that rapid intravenous injection of large doses of a partially purified gastrin extract inhibited secretion of acid from a vagally denervated pouch. Gregory and Tracy(2), using a pure gastrin polypeptide, confirmed this action of gastrin and showed that secretion of pepsin was markedly stimulated at the same time that secretion of acid was inhibited. The present study describes the effect of a pure gastrin polypeptide, gastrin I of Gregory and Tracy(2), on histamine stimulated secretion of acid and pepsin in dogs with both a vagally denervated Heidenhain pouch and a vagally innervated gastric fistula.

Methods. Three dogs with gastric fistula and Heidenhain pouch were prepared as previously described(3). Several months after the surgical procedures and after an 18-hour fast, the tests were performed. Histamine dihydrochloride was given by continuous intravenous infusion (Harvard peristaltic pump) at a dose of 0.4 mg per hour throughout the tests. After 7 15-minute periods of collection from both the pouches and the fistulas, a single rapid intravenous injection of 50 μg of gastrin I was given. Collections were continued for an additional 10 15-minute periods. Concentration of acid was measured by titration of samples of juice with an Autoburet Titrator (Radiometer, Copenhagen). Pepsin concentration was measured by a method that uses radio-iodinated albumin as substrate(4).

Results. Gastrin I inhibited secretion of acid by more than 90 per cent in both the pouch and the fistula (Fig. 1). The inhibition was maximal immediately after the injection but full recovery had not occurred even 150 minutes later. The concentration and output of pepsin from the pouch rose markedly (Fig. 2), confirming the findings of Gregory and Tracy(2). The concentration of pepsin in the juice secreted by the gastric fistula did not change when gastrin I was injected and therefore the output fell to the same extent as did the output of acid. At the time when the maximal effect on output of pepsin from the pouch occurred, 60 to 90

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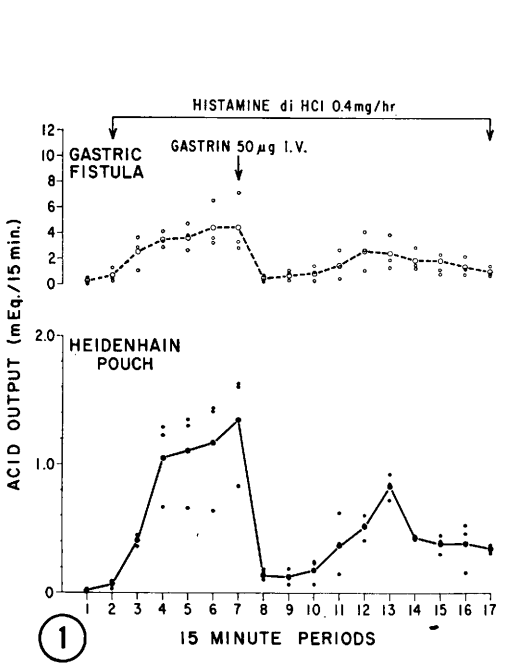

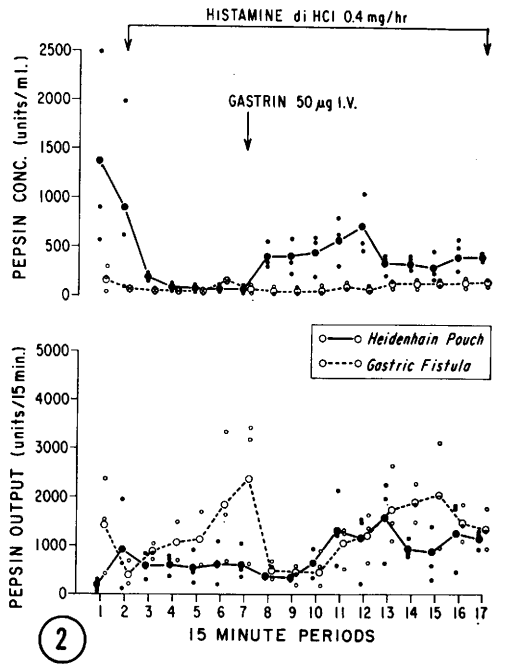

FIG. 1. Effect of single rapid intravenous dose of gastrin I on acid output from Heidenhain pouch and from gastric fistula stimulated by constant intravenous infusion of histamine. Lines connect the mean values; points not connected by lines are observations in individual dogs.

FIG. 2. Effect of single rapid intravenous injection of a large dose of gastrin I on pepsin concentration and pepsin output from Heidenhain and from gastric fistula stimulated by constant intravenous infusion of histamine. Lines connect the mean values; points not connected by lines are observations in individual dogs.

minutes after injection of gastrin I, the pouch was secreting as much pepsin as the main stomach although at these times acid secretion from the main stomach was about 3 times as high as from the pouch.

Discussion. The ability of gastrin to stimulate secretion of pepsin when given in large doses by rapid intravenous injection appears to be dependent on the absence of vagal innervation although the depression of acid secretion occurs equally in vagally innervated and vagally denervated portions of the stomach. Another instance in which vagal denervation is attended by an increased response in regard to pepsin secretion is with the choline ester bethanechol(5).

Summary. Rapid intravenous injection of gastrin I caused inhibition of histamine stimulated secretion of acid in both vagally innervated gastric fistulas and vagally denervated Heidenhain pouches. Accompanying the inhibition of acid secretion, there was stimulation of pepsin secretion in the pouches but not the fistulas.

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