Effects of a Gastro-Secretory Substance from Hog Pancreas (GSP) and Gastrin on Bile Secretion of the Rat* **

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Summary. The effect of GSP, a gastrosecretagogue fraction extracted from hog pancreas, on bile secretion has been studied in rats provided with a bile duct cannula and compared with the effect of antral gastrin. GSP showed no effect on bile secretion, concentration and output of bilirubin and electrolytes in the bile. On the other hand gastrin is significantly increasing bile output, bilirubin concentration and output in the bile. No effect of gastrin on the excretion rate of sodium and potassium in the bile has been observed.

Key words: Gastrosecretagogue — Gastrin — Rat — Bile.

In the course of an experimental attempt to extract gastrin from the pancreas of normal pigs, Pointner et al. were successful in obtaining a fraction which has a stimulating effect on gastric acid secretion of the rat [10]. This fraction is designated as GSP (gastro-secretory substance from the pancreas). It has the characteristics of a peptide; it is separated from antral gastrin by gel filtration on Sephadex, on ion exchangers, and by electrophoresis. Its gastro-secretory effect is similar to gastrin. To determine further biological characteristics the influence of GSP on bile secretion was examined and compared with the effect of porcine gastrin. The results of these examinations are the basis for the following presentation.

Material and Methods

44 male Wistar rats weighing between 250 and 300 g are used. The animals are anesthetized with Urethane (0.7 ml of a 20% solution per 100 g body-weight i.p.). According to the method of Lai [9] a cannula was inserted through the esophagus into the stomach. A second cannula was inserted transduodenally into the antrum.

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after epigastral laparotomy. A third tube was then bound into the hepatic duct just below the portal fissure, in order to obtain bile without pancreatic juice. The laparotomy was closed with a few sutures and perfusion of the stomach was initiated with normal saline solution (1 ml per minute). The real experiment was started 1 h after the end of the preparation.

The animals were divided into three groups: 20 animals were used for experiments with GSP, 14 with gastrin and 10 as controls. Bile was collected in 20-min portions, stomach perfusion solution in 10-min portions during the course of 2 h. Following a preliminary period of 20 min the animals received intravenous injections of GSP or gastrin. The control animals got injections of 0.9% saline solution. Gastric acid secretion was determined by titration with N/100 NaOH using phenol-red as indicator. Bile volume was measured by weighing the samples. The bilirubin concentration was photometrically determined (E 420). Sodium and potassium in the bile were determined with a flame photometer. At the end of the experiment 1 µg pentagastrin was injected intravenously to each animal and the increase of the gastric acid secretion was determined. This served as evidence that the animals remained responsive until the end of the experiment: animals without at least twofold increase of basal acid secretion as a result of this stimulus were excluded from the evaluation.

GSP: GSP was extracted from fresh hog pancreas [10]. The rats received a dose corresponding to 1.0 g of fresh pancreas per kg body weight.


Statistics: the results were examined for significance by means of the student t-test.

Results

1. Stomach Secretion

Gastrin as well as GSP cause a distinct increase of acid secretion. Gastric acid secretion remains unchanged in the controls throughout the experiment (Fig. 1).

2. Bile Secretion

a) Volume. In all groups there is a gradual decrease of the excreted bile volume. Bile volume after GSP injection does not differ from that of control animals. However, 20 to 60 min after gastrin injection there is a significant increase of bile output as compared to control animals and the GSP group (Fig. 2).

b) Bilirubin. There is a slow increase of the bilirubin concentration in the control and in the GSP group without any significant difference between both groups. In the gastrin group, on the contrary, the bilirubin concentration increased significantly as compared to the controls (Fig. 2).

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