

Quadrant II – Transcript and Related Materials

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Module Name: Hormonal control of secretion of enzymes in Gastrointestinal tract

Module No:06

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Notes

Hormonal control of secretion of enzymes in Gastrointestinal tract

Introduction

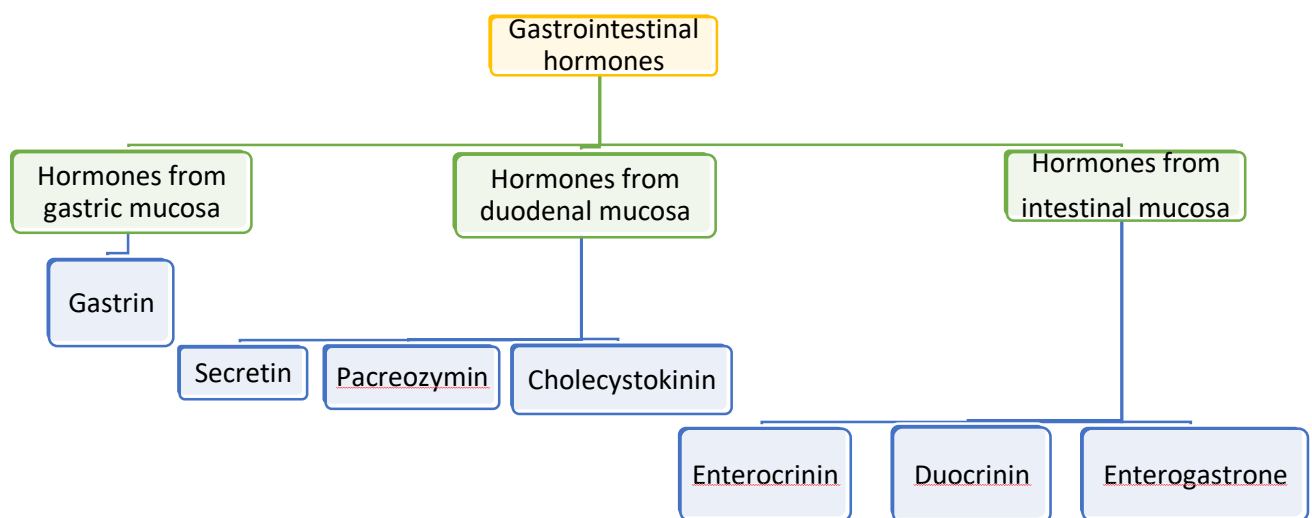
Hormones are blood borne chemical messengers that are secreted directly into the blood, which carries them to organs and tissues of the body to exert their functions.

Gastrointestinal hormones

The gastrointestinal hormones (or gut hormones) constitute a group of hormones secreted by entero-endocrine cells of the alimentary canal viz. stomach, pancreas, and small intestine that regulate various processes of digestion. These hormones stimulate and regulate secretion of digestive enzymes or digestive juices from the glands present in mucosal membrane of the Gastrointestinal tract and also from the liver and pancreas. The gastrointestinal hormones are secreted from the following three regions of the Gastrointestinal tract:

1. Hormones from gastric mucosa
2. Hormones from duodenal mucosa
3. Hormones from intestinal mucosa

All the gastrointestinal hormones that are secreted in the Gastrointestinal tract that help in the process of digestion are shown in the below figure.



A) HORMONES FROM GASTRIC MUCOSA

1. Gastrin

The hormone Gastrin is released by the mucosa of the pyloric stomach near the duodenum. The G cells (gastric cells) in the stomach and the duodenum secrete Gastrin hormone. Distension of the stomach and the alimentary canal provides stimulus for gastric secretion. This hormone stimulates the gastric glands to secrete greater amounts of gastric juice containing HCl and pepsin (parietal cells which have CCK2 receptors for gastrin secrete HCl and chief cells secrete pepsinogen). Stomach movement is also stimulated by this hormone

B) HORMONES FROM DUODENAL MUCOSA

The entry of chyme (food) from the stomach into duodenum stimulates the secretion of these hormones. Following are the three hormones that are secreted from the duodenal mucosa.

Secretin

Pacreozymin (PZ)

Cholecystokinin(CCK)

1. Secretin

Secretin is the first hormone to be discovered in 1902 by Bayliss and Starling. This hormone is secreted from S cells in the duodenum in response to H⁺ and fatty acids in the lumen. Specifically, a pH less than 4.5 signals arrival of gastric contents, which initiates the release of secretin. It stimulates cells of pancreatic lobules for secreting fluid portion (water and electrolytes such as Sodium bicarbonate) of pancreatic juice. It stimulates the secretion of large amount pancreatic juice low in digestive enzymes.

2. Pacreozymin (PZ)

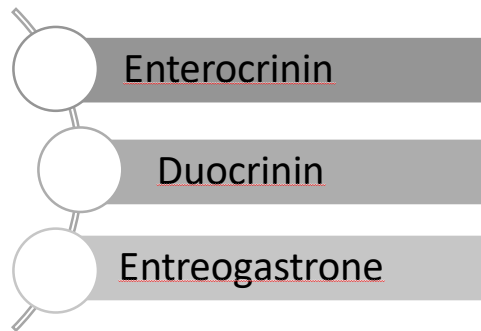
Along with Secretin, Pancreozymin is another hormone secreted in gastrointestinal tract. It stimulates the pancreatic acini to secrete enzymatic part of pancreatic juice.

3. Cholecystokinin (CCK)

Bile is a very important secretion in the process of digestion. Wherein the acidic chyme is converted into alkaline chyme which is necessary for the process of digestion to take place. This massive secretion of bile from the gall bladder is stimulated by another Gastrointestinal hormone called Cholecystokinin. It stimulates rhythmic contractions in the wall of gall bladder and thus causes release of bile juice from gall bladder into duodenum. Meat extracts and fats are the most effective stimuli for the liberation of Cholecystokinin.

C) HORMONES FROM INTESTINAL MUCOSA

Mucous membrane of small intestine secretes following three hormones.



i) Enterocrinin

It stimulates the release of intestinal juice (*succus entericus*) from the crypts of Lieberkühn in intestinal mucosa.

ii) Duocrinin

It stimulates and controls secretion of viscous mucus from Brunner's glands into the intestinal mucosa

The above two hormones i.e Enterocrinin and Duocrinin influence the secretion of intestinal juice.

iii) Enterogastrone

Enterogastrone hormone inhibits gastric secretion and gastric motility. It thus stops gastric secretion after the digestion in stomach is completed. By reducing gastric motility, this hormone delays emptying of stomach to ensure complete digestion in stomach. Secretion of enterogastrone is stimulated by presence of fat in food (chyme) that enters the intestine.