

Gastrointestinal hormones

Gastrointestinal hormones are biologically active polypeptides produced by glandular and nerve cells in the mucosa of the gastrointestinal tract. These hormones are mostly paracrine, but they are also secreted into the blood. ^[1]

We divide hormones of the gastrointestinal tract into two main groups:

- **gastrin group** - the main representatives are **gastrin and cholecystokinin**
- **secretin group** - the main representatives are **secretin , glucagon , GIP , VIP** .

Gastrin

More detailed information can be found on the [Gastrin website](#) .

Gastrin **stimulates the secretion** of gastric and pancreatic juice , insulin and glucagon , **motility** of the stomach and intestine, increases the tone of the lower esophageal sphincter and has a **trophic effect** on the mucous membrane of the digestive tract. G-cell secretion of gastrin is stimulated by an increase in gastric **pH** , the presence of **amino acids and peptides** in the stomach, and a **parasympathetic nervous system** . In contrast, a decrease in gastric pH and the hormone somatostatin have a depressant effect on gastrin secretion.

Cholecystokinin (CCK)

See the [Cholecystokinin page](#) for more information

CCK induces **gallbladder contractions and relaxes Odi's sphincter** , stimulating the **secretion** of enzyme-rich pancreatic juice. **It inhibits gastric emptying** , has a trophic effect on the pancreas , increases **enterokinase** secretion , may increase the **motility of the small intestine and colon** , stimulates **glucagon** secretion , temporarily increases **intracellular calcium concentration** .

Secretin

You can find more detailed information on the [Secretin page](#) .

The main effect of secretin is to **stimulate pancreatic secretion** , especially pancreatic ducts. It increases the secretion of HCO_3^- , water and ions, and thus the secretion of aqueous alkaline pancreatic juice. It reduces the secretion of gastric juice and can cause a contraction of the pyloric sphincter. **It dampens the movements of** the large intestine .

Glucagon

See the [Glucagon page](#) for more information

It is formed in the A cells of the islets of Langerhans and probably in some cells of the GIT wall. The stimulus for its secretion is hypoglycemia.

It suppresses the secretion and motility of the stomach and small intestine, reduces the tone of the lower esophageal sphincter .

Gastric Inhibitory Polypeptide (GIP)

See the [Gastric Inhibitory Polypeptide page](#) for more information .

The hormone is produced by the **K cells** of the duodenal and jejunal mucosa . Secretion is stimulated by the presence of **glucose** and the breakdown products of **fats and proteins** . Its main effect is to **stimulate** insulin secretion, so the hormone is also referred to as Glucose -dependent **Insulinotropic Peptide** .

Vasoactive Intestinal Peptide (VIP)

See the [Vasoactive Intestinal Peptide page](#) for more information .

The hormone is secreted in the **jejunum** , in addition to the gastrointestinal tract, it also acts in the CNS, adrenal medulla and autonomic ganglia. Its effects are stimulation **of water and electrolyte secretion** in the intestine, **relaxation of the smooth muscle** of the intestine and sphincters, **vasodilation of peripheral blood vessels**, **suppression of hydrochloric acid secretion** in the stomach and suppression of stomach movements. VIP is also an important neurotransmitter and neuromodulator.

Motilin

It is released by enterochromaffin cells in the stomach, small intestine and large intestine, especially during fasting. It causes **contractions of the smooth muscles** of the stomach and intestines, **increases the motility** of the stomach. Its concentration is increased during non-digestion.

Somatostatin

See Somatostatin for more information .

Somatostatin **inhibits the secretion** of growth hormone and thyrotropin in the adenohypophysis , glucagon and insulin in the endocrine part of the pancreas, gastrin, secretin, [cholecystokinin and other gastrointestinal hormones in the digestive tract. It also inhibits the secretion of gastric and pancreatic juice, gastrointestinal motility and nutrient absorption in the small intestine. Somatostatin **suppresses the feeling of hunger** and in some parts of the brain probably acts as a neurotransmitter.

Substance P

It is found in the endocrine and nerve cells of the digestive tract, in the adrenal medulla , in the basal ganglia and in the hypothalamus. Increases small bowel **motility and smooth muscle contraction** . In the nervous system, it generally acts as a modulator and neurotransmitter associated with **pain perception** .

Pancreatic polypeptide (PP)

It is produced by the endocrine cells of the islets of Langerhans of the pancreas . The stimuli for its production are proteins, fats and glucose in the upper part of the small intestine, as well as vagal stimulation.

Its main effect is a **decrease in gastric secretion and motility** . It reduces the effectiveness of secretin and CCK.

Neuropeptide Y

It is produced by GIT endocrine cells and is a peptide mediator. Its production is triggered by fat in the intestinal lumen .

It suppresses exocrine secretion of the pancreas and stomach and also suppresses **intestinal and gastric motility** .

Neurotensin

It occurs in the mucosa of the ileum and occurs as a neurotransmitter in enteric plexus neurons. The stimulus for its secretion is the fats present in the ileum.

Suppresses secretion and motility in the stomach and **suppresses gastric emptying** . It also **causes vasoconstriction** .

Gastrin-releasing polypeptide (GRP)

The gastrin releasing peptide (*GRP*) is released as a neurotransmitter in the nerve endings of the vagus nerve in the stomach. It stimulates the release of gastrin, CCK, pancreatic polypeptide, glucagon, GIP and somatostatin. Indirectly via gastrin stimulates the secretion of HCl, pancreatic juice, and indirectly affects intestinal motility.

Ghrelin

Ghrelin is formed in various parts of the GIT, but the main secretion site is the endocrine cells of the gastric fundus. It is most produced during the period when the stomach and small intestine are empty (so-called interdigestive phase). It binds to ghrelin receptors on hypothalamic neurons and **signals an empty stomach** . The feeling of hunger is activated and, as a result, **food intake is increased** . Ghrelin receptors are also found on cell membranes of other tissues. In the adenohypophysis, it is found on the cells that make growth hormone and stimulates its release. Through growth hormone, ghrelin promotes anabolic processes associated with food intake .

Links

References

1. GANONG, William F. *Overview of Medical Physiology*. 20th edition. Prague: Galén, 2005. 890 pp. 487. ISBN 80-7262-311-7 .
2. ↑ KITTNAR, Otomar, et al. *Medical physiology*. 1st edition. Prague: Grada, 2011. 790 pp. ISBN 978-80-247-3068-4 .

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