

Overview of gastrointestinal hormones

Digesting, absorbing and assimilating a meal requires precise coordination of a huge number of physiologic processes. Control over gastrointestinal function is, as one would expect, provided by nervous and endocrine systems.

The hormones most important in controlling digestive function are synthesized within the gastrointestinal tract by cells scattered in the epithelium of the stomach and small intestine. These endocrine cells and the hormones they secrete are referred to as the enteric endocrine system. Interestingly, most if not all "GI hormones" are also synthesized in the brain.

If you are like most people, you eat several meals and occasional snacks each day, but rarely think about the immense number of tasks that must be performed by your digestive system to break down, absorb and assimilate those nutrients. Robust control systems are required to coordinate digestive processes in man and animals, and are provided by both the nervous and endocrine systems. Endocrine control over digestive functions is provided by the so-called enteric endocrine system, which is summarized elsewhere.

The classical GI hormones are secreted by epithelial cells lining the lumen of the stomach and small intestine. These hormone-secreting cells - endocrinocytes - are interspersed among a much larger number of epithelial cells that secrete their products (acid, mucus, etc.) into the lumen or take up nutrients from the lumen. GI hormones are secreted into blood, and hence circulate systemically, where they affect function of other parts of the digestive tube, liver, pancreas, brain and a variety of other targets.

There are *a bunch* of hormones, neuropeptides and neurotransmitters that affect gastrointestinal function. Interestingly, a number of the classical GI hormones are also synthesized in the

brain, and sometimes referred to as "brain-gut peptides". The significance of this pattern of expression is not clear.

The following table summarizes the effects and stimuli for release of the major gastrointestinal hormones, each of which is discussed in more detail on subsequent pages:

Hormone	Major Activities	Stimuli for Release
Gastrin	Stimulates gastric acid secretion and proliferation of gastric epithelium	Presence of peptides and amino acids in gastric lumen
Cholecystokinin	Stimulates secretion of pancreatic enzymes , and contraction and emptying of the gall bladder	Presence of fatty acids and amino acids in the small intestine
Secretin	Stimulates secretion of water and bicarbonate from the pancreas and bile ducts	Acidic pH in the lumen of the small intestine
Ghrelin	Appears to be a strong stimulant for appetite and feeding; also a potent stimulator of growth hormone secretion.	Not clear, but secretion peaks prior to feeding and diminishes with gastric filling
Motilin	Apparently involved in stimulating housekeeping patterns of motility in the stomach and small intestine	Not clear, but secretion is associated with fasting
Gastric inhibitory polypeptide	Inhibits gastric secretion and motility and potentiates release of insulin from beta cells in response to elevated blood glucose concentration	Presence of fat and glucose in the small intestine