# Somatostatin

Somatostatin is a hormone secreted by D cells in the pancreas and scattered throughout the GI mucosa. It has many functions but primarily inhibits the gastrointestinal system by way of decreasing secretion of gastric acid and pepsinogen, decreasing pancreatic and small intestine fluid secretion, decreasing gallbladder contraction, and decreasing glucagon and insulin secretion. Somatostatin is upregulated by acid in the duodenum and downregulated by vagal stimulation. Its analog, octreotide, is used in carcinoid syndrome and esophageal variceal bleeding.




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**Secreted by D Cells**
Delta portal
Somatostatin is a peptide hormone that acts on G protein-coupled receptors. In the gastrointestinal system, it is released by D cells found in pancreatic islets and gastrointestinal mucosa.

**Pancreas**
Pancreas
The pancreas is one of the main sources of somatostatin in the GI tract. Specifically, it is secreted by the D cells.

**GI Tract**
GI-guy
Somatostatin is secreted by D cells which can be found throughout the gastrointestinal mucosa. In the GI tract, they appear histologically as flask-shaped with long processes that are used in communicating with neighboring cells.

## Action

**Decrease Secretion of Gastric Acid and Pepsinogen**
Down arrow acid lemon and pepsi-gin
Broadly, somatostatin acts to inhibit the actions of the gastrointestinal system. One of the specific actions of somatostatin is to act via inhibitor G-protein coupled receptors to inhibit secretion of gastric acid and pepsinogen, an inactive enzyme that is secreted in the stomach and activated into pepsin, which aids in the breakdown of proteins.

**Decrease Pancreatic and Small Intestine Fluid Secretion**
Down arrow-seltzer water by pancreas and GI guy
Another action of somatostatin is to decrease fluid secretions by the GI tract and pancreas. This has important implications for patients who have severe secretory diarrhea, as the use of octreotide, a somatostatin analogue, can help ameliorate their symptoms.

**Decrease Gallbladder Contraction**
Sea-gull bladder with weak arm
Somatostatin decreases gallbladder contraction, which leads to decreased gallbladder emptying. This can contribute to formation of gallstones, as decreased gallbladder emptying leads to collection of bile in the gallbladder, AKA biliary stasis, which increases the chance of the precipitation of gallstones.

**Decrease Glucagon and Insulin Secretion**
Down arrow Glue-King-Kong and insect-syringe
Another action of somatostatin is to inhibit the release of insulin and glucagon by the pancreas via inhibitor G-protein coupled receptors.

## Regulation

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**Secretion is Increased by Acid**

Up-arrow acid next to Sumo-Santa

Meal ingestion and gastric acid secretion increase somatostatin output from gastric D-cells.

**Secretion is Decreased by Vagal Stimulation**

Down-arrow vagus sign

Somatostatin release is also regulated by the CNS via vagal stimulation, which inhibits release.

## Clinical Use

**Octreotide**

Octo-tree-ride

Octreotide, a somatostatin analogue, is used in the treatment of various conditions related to the GI tract due to its ability to decrease various GI functions.

**Carcinoid Syndrome**

Cars-in-droid

Carcinoid syndrome is a condition typically seen associated with certain malignancies, and is characterized by excess secretion of hormones and peptides that act on the GI tract, namely serotonin and histamine among others. One of the most prominent symptoms this leads to is excess fluid secretion by the GI tract, causing severe diarrhea. Octreotide can be used to relieve these symptoms due to its inhibitory effect on the release of many GI-active hormones.

**Variceal Bleeds**

Ferris-wheel Bleeding

Variceal bleeds are usually related to portal hypertension, in which backed up blood flow to the liver through the portal vein results in excessive dilation of blood vessels where portal and systemic venous systems anastomose, such as in the esophagus as well as in the abdomen and rectum. The somatostatin analogue octreotide can be used to help treat variceal bleeds as it reduces GI and hepatic blood flow, reducing the backup.

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