

Composition of pancreatic secretion:

- The more important enzymes for digestion of proteins are trypsin, chymotrypsin, and carboxypolypeptidase, which are secreted in the inactive forms trypsinogen, chymotrypsinogen, and procarboxypolypeptidase.
- The pancreatic digestive enzyme for carbohydrates is pancreatic amylase, which hydrolyzes starches, glycogen, and most other carbohydrates (except cellulose) to form disaccharides and a few trisaccharides.

The main enzyme for fat digestion is pancreatic lipase, which hydrolyzes triglycerides into fatty acids and monoglycerides; cholesterol esterase, which causes hydrolysis of cholesterol esters; and phospholipase, which splits fatty acids from phospholipids.

Bicarbonate Ions and Water Are Secreted by Epithelial Cells of the Ductules and Ducts.

Bicarbonate ion in the pancreatic juice serves to neutralize acid emptied into the duodenum from the stomach.

Pancreatic Secretion Is Stimulated by Acetylcholine, Cholecystokinin, and Secretin

- Acetylcholine, which is released from nerve endings, mainly stimulates secretion of digestive enzymes.
- Cholecystokinin, which is secreted mainly by the duodenal and jejunal mucosae, mainly stimulates secretion of digestive enzymes.
- Secretin, which is secreted by the duodenal and jejunal mucosae when highly acidic food enters the small intestine, mainly stimulates secretion of sodium bicarbonate.

Function of pancreatic secretion:

Pancreas are involved in blood sugar control and metabolism within the body and also in secretion of pancreatic juices that help in digestion.

- Blood glucose regulation(cells within pancreas help to maintain blood glucose levels, when blood glucose levels are low alpha cells secrete glucagone which increases blood glucose levels. When blood glucose levels are high beta cells secrete insulin to decrease glucose in blood. Delta cells in pancreas also secrete somatotatin which decreases release of insulin and glucagon.
- Digestion (digestive enzymes are secreted helps to breakdown carbohydrates, proteins and lipids).

- Additional functions (pancreas also secretes pancreatic polypeptide. enterochromaffin cells of pancreas secrete the hormones motilin, serotonin and substance)

Regulation of pancreatic secretion:

Pancreatic Secretion Occurs in Three Phases

Cephalic phase.

The nervous signals that cause gastric secretion also cause acetylcholine release by vagal nerve endings in the pancreas; this accounts for about 20% of the pancreatic enzymes after a meal.

- **Gastric phase.** The nervous stimulation of enzyme secretion continues, accounting for another 5% to 10% of the enzymes secreted after a meal.

- **Intestinal phase.** After chyme enters the small intestine, pancreatic secretion becomes copious, mainly in response to the hormone secretion. In addition, cholecystokinin causes still much more increase in the secretion of enzymes.

Secretin Stimulates Secretion of Bicarbonate, Which Neutralizes Acidic Chyme. When acid chyme enters the duodenum from the stomach, the hydrochloric acid causes the release of prosecretin and activation to secretin, which is subsequently absorbed into the blood. Secretin in turn causes the pancreas to secrete large quantities of fluid that contain a high concentration of bicarbonate ion.

Cholecystokinin Stimulates Enzyme Secretion by the Pancreas.

The presence of food in the upper small intestine also causes cholecystokinin to be released from cells called I-cells in the mucosa of the duodenum, jejunum, and upper ileum. This effect results in particular from the presence of proteases and peptones (which are products of partial protein digestion) and of long-chain fatty acids; hydrochloric acid from the stomach juices also causes cholecystokinin release in smaller quantities.