

Pancreas

It is an accessory gland to digestive system located in the abdomen. It plays an essential role in conversion of food we eat into fuel for the body's cells. The pancreas has two main functions, an exocrine function that helps in digestion and an **endocrine** function that regulates blood sugar.

Location of the Pancreas: The pancreas is located behind the stomach in the upper left abdomen. It is surrounded by other organs including the small intestine, liver, and spleen.

Length and nature: It is spongy nature and about 6-10 inches long.

Shape: Its shape is leaf like or flat pear or a fish extended horizontally across the abdomen.

Color: It is pinkish or light in color

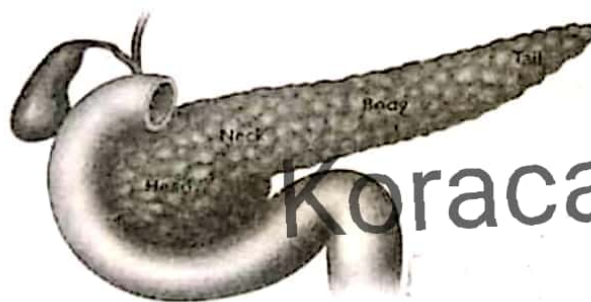
Weight: It is 88 g in adult individual

Parts: Pancreas is divided into following parts

Head: The wide part, called the head of the pancreas, is positioned toward the center of the abdomen. The head of the pancreas is located at the junction of stomach and duodenum. This is where the stomach empties partially digested food into the small intestine, and the pancreas releases digestive enzymes into chyme.

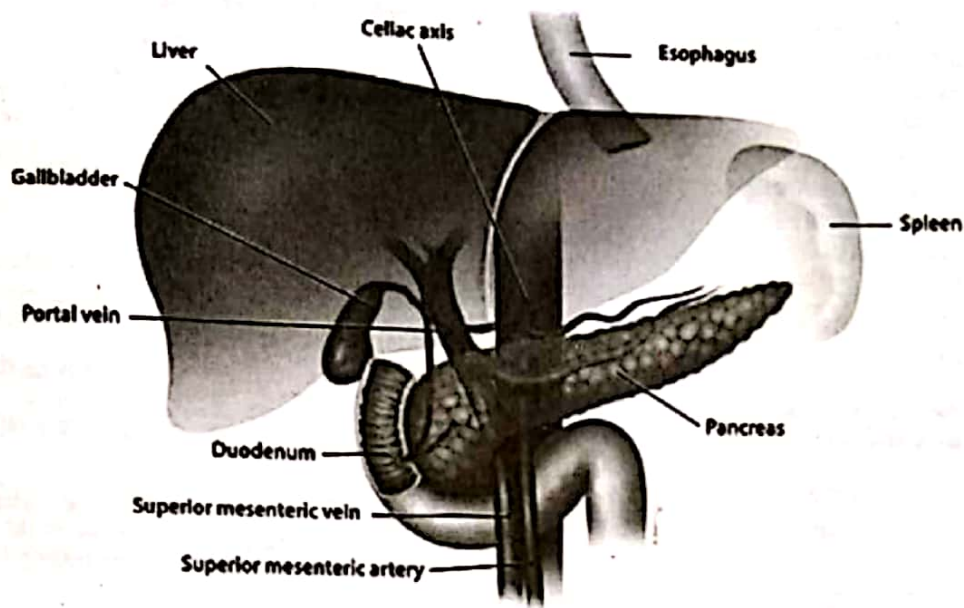
Body: The central section of the pancreas is called the neck or body.

Tail: The thin end is called the tail and extends to the left side pointed towards the hilum of spleen.



Parts of the pancreas labeled

Blood supply: Several major blood vessels surround the pancreas, the superior mesenteric artery, the superior mesenteric vein, the portal vein and the celiac axis, supplying blood to the pancreas and other abdominal organs.



Pancreas with surrounding vessels and organs

Almost all of the pancreas (92-95%) consists of exocrine tissue that produces pancreatic enzymes for digestion. The remaining tissue consists of endocrine cells called islets of Langerhans. These clusters of cells look like grapes and produce hormones that regulate blood sugar and regulate pancreatic secretions.

Functions of the Pancreas: A healthy pancreas produces the correct chemicals in the proper quantities, at the right times, to digest the foods we eat.

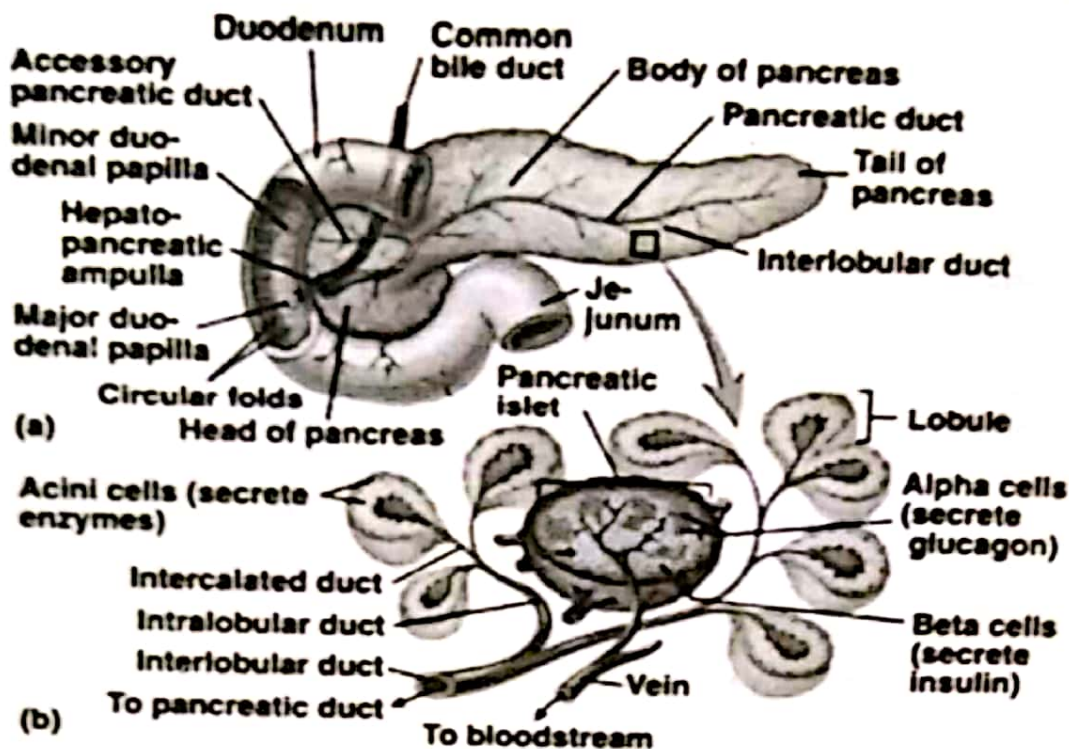
Exocrine Function: The pancreas contains exocrine glands that produce **enzymes** important to digestion. When food enters the stomach, these pancreatic juices are released into a system of ducts that reach in the main **pancreatic duct or duct of wirsung**. The pancreatic duct joins the **common bile duct** to form the **ampulla of Vater** which is located in the first portion of pancreas then it leads into the small intestine, called the **duodenum through the sphincter of Oddi**. The common bile duct originates in the liver and the **gallbladder** and produces another important digestive juice called **bile**. The pancreatic juices and bile that are released into the duodenum, help the body to digest fats, carbohydrates, and proteins.

Exocrine gland: The gland which secretes its secretions into duct then transported to a target site is called exocrine gland. The secretions of exocrine glands are called enzymes. There are two main parts of exocrine part of pancreas.

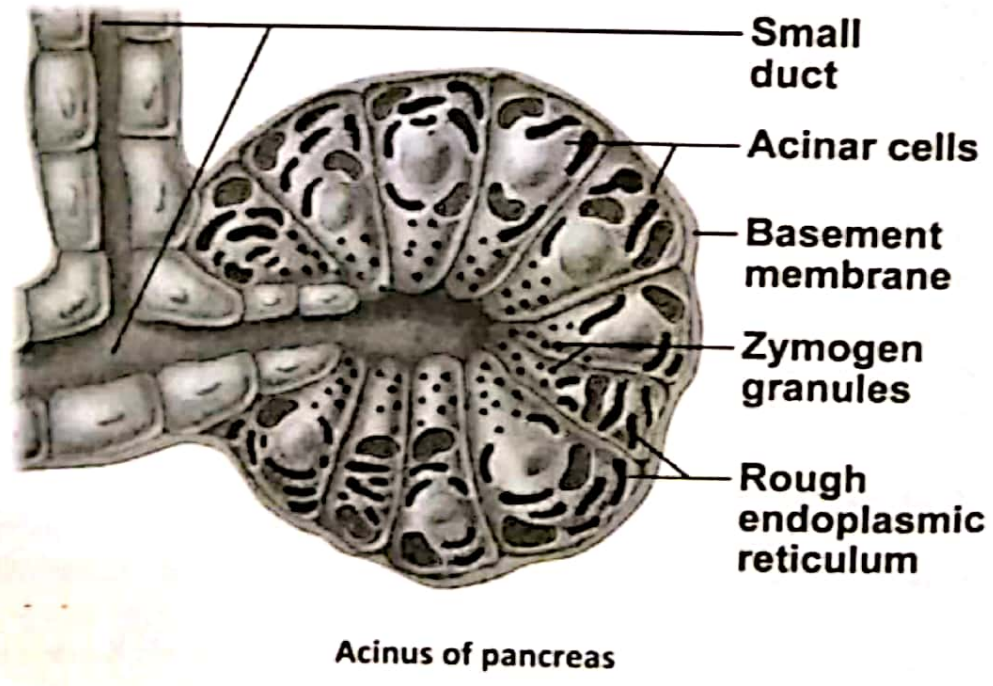
- i. **Acinar cells and Centroacinar cells:** If 20-40 acinar cells unite to form a unit known as acinus. Acinar cells secrete digestive enzymes. Another type of cells in acinus known as centroacinar cells which secrete electrolytes and bicarbonates. Acinar and centroacinar cell's secretions are collectively known as Pancreatic juice.
- ii. **Ducts:** Its main function is transportation of pancreatic juice. Pancreas has following types of ducts.
 - Inter callated ducts:** These ducts receive secretions from acinar cells.
 - Centroacinar ducts:** Acinar ducts extend into lumen of acinus to form a duct known as centroacinar ducts.
 - Intralobular ducts:** The ducts within the lobules are called intralobular ducts.
 - Interlobular ducts:** These ducts are found between the lobules.

Duct of conduit: The duct which carry pancreatic juice to duct of wirsung.

All these ducts take the secretion of exocrine part of pancreas and carry it pancreatic duct.



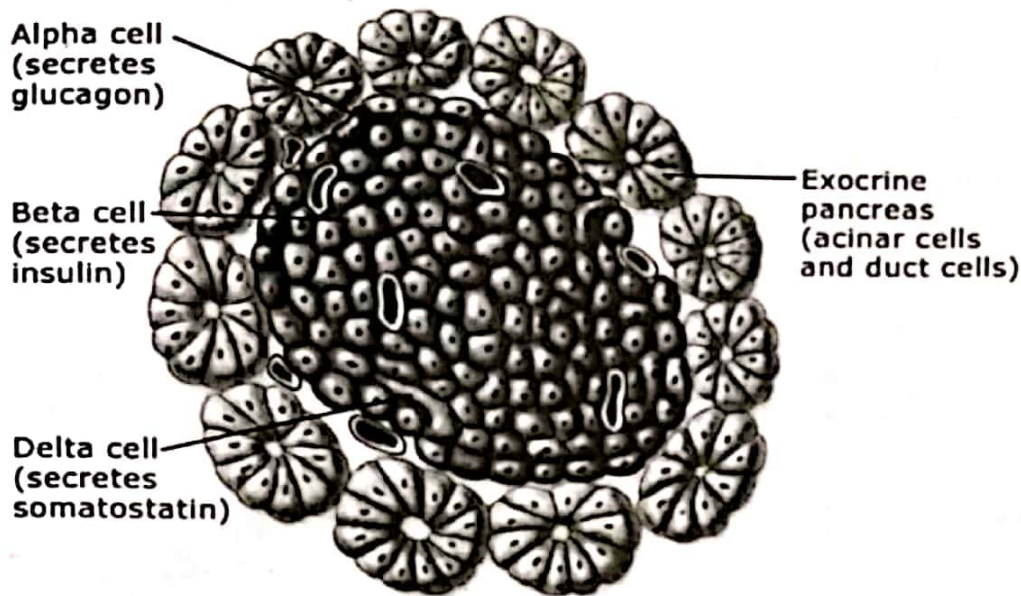
Pancreatic Juice: Pancreatic juice is color and odorless fluid secreted by acinar and centroacinar cells in response to secretin which comprises Trypsinogen, Endopeptidase, Nuclease, Pancreatic amylase, pancreatic lipase, and pancreatic elastase Carboxypeptidase, Chymotrypsinogen, Bicarbonates and Electrolytes.



Acinus of pancreas

Endocrine Function: Endocrine cells contribute 2 % of pancreas i-e Islets of Langerhans. There are one million Islets scattered all around pancreas which contain four major types of cells which are Alpha cells, Beta cells, delta cells and F or PP cells are secreting the hormones glucagon, insulin, somatostatin, and pancreatic polypeptide (PP). The endocrine component of the pancreas consists of islet cells (islets of Langerhans) that create and release important hormones directly into the bloodstream. Two of the main

pancreatic hormones are **insulin**, which acts to lower blood sugar, and **glucagon**, which acts to raise blood sugar. Maintaining proper blood sugar levels is crucial to the functioning of key organs including the brain, liver, and kidneys. Somatostatin regulates secretion of glucagon and insulin while pancreatic polypeptide is working in appetite.



Islet of Langerhans

Disorder of digestive system and food eating habits

Ulcer

Definition: Peptic ulcers are open painful sores that develop on the inside lining of stomach and in the upper portion of small intestine (duodenal ulcer). The most common symptom of a peptic ulcer is stomach pain. Ulcer pain may not correlate with the presence or severity of ulceration. It is also known as peptic ulcer disease.

Causes and Mechanism: Single factor for ulcers is still unknown though it is known that imbalance between digestive fluids in the stomach and duodenum causing it. Most happen because of an infection in the lining of the small intestine with a type of bacteria called *Helicobacter pylori* (*H. pylori*) which is stimulated by high HCl concentration in stomach than normal which lower the pH and thus increase acidity which stimulate *H. pylori* to bore lining of stomach and slough the mucous. Bacteria escaped acidity in this way. Boring and sloughing of mucous become painful sores which is termed ulcer. It is thought and traced medically that use of painkillers called nonsteroidal anti-inflammatory drugs like aspirin, ibuprofen, and naproxen, family background or a history of ulcers in a family, old age, drinking alcohol smoking cigarettes, chewing tobacco, stress, spicy foods, use of anticoagulants as a drugs, medical problems like liver, kidney, or lung disease and radiation treatment to the area all causes more secretion of HCl into stomach, which is the ultimate cause of ulcer formation.

Symptoms: Common symptoms of ulcer include;

- Burning pain in stomach between meals or at night
- Bloating
- Heartburn
- Nausea or vomiting
- Loss of appetite
- Dark or black stool

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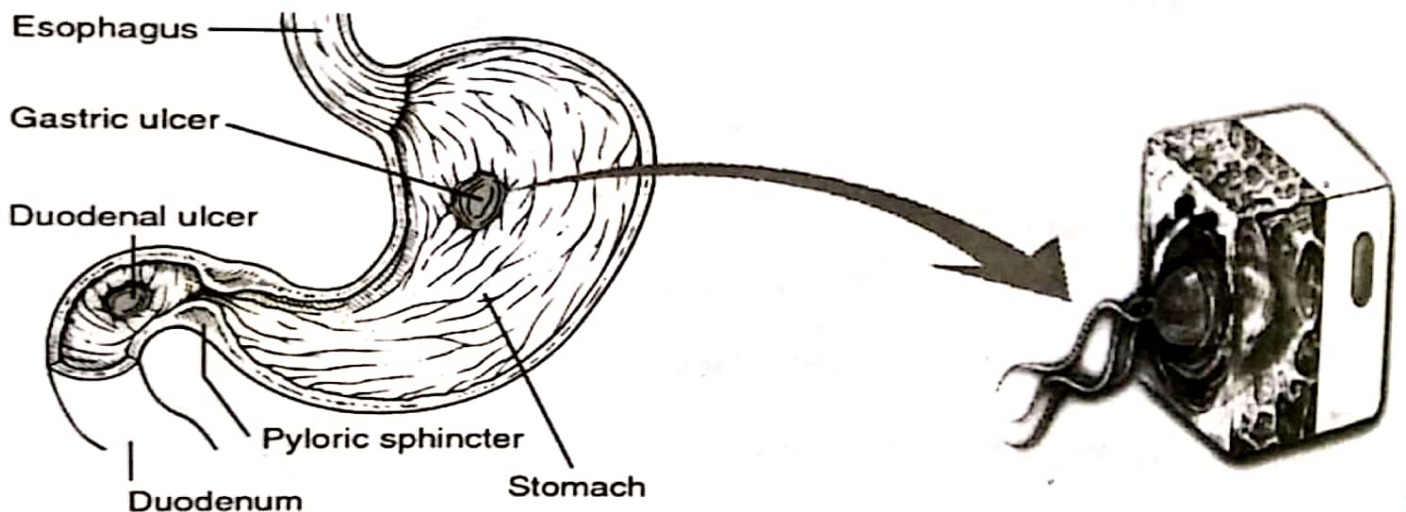
- Vomiting blood
- Weight loss

Diagnosis: Doctor may suspect an ulcer just by patient's symptoms. But to make sure, different tests are prescribed e.g. blood, breath, stool and upper endoscopy. A small, lighted tube (an endoscope) is put in down esophagus and into stomach to look around. If symptoms are severe or they keep coming back then endoscopy is recommended.

Treatment: There are several ways to treat ulcers, including;

Lifestyle changes: If smoke or drink is the causative factor then stop its usage.

Medications: Physician may prescribe triple therapy having two antibiotics and one Proton pump inhibitor for a week or two.



H. pylori boring mucosa of stomach