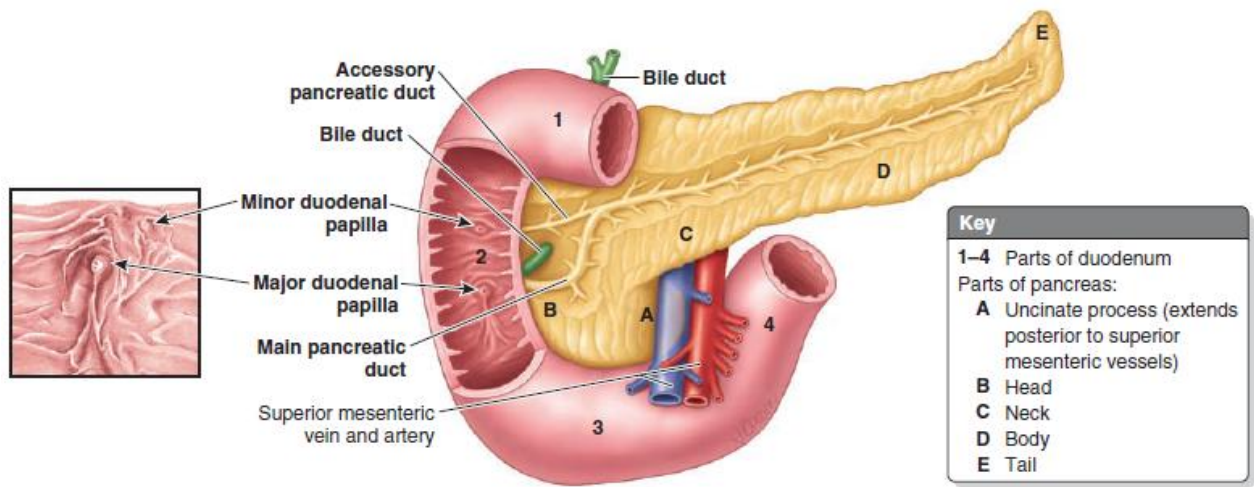




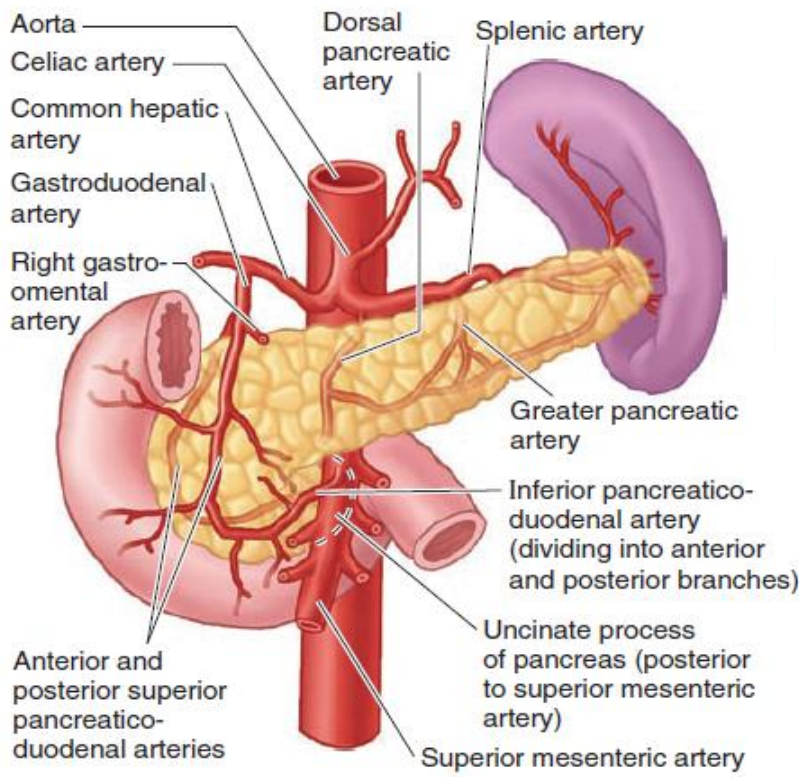
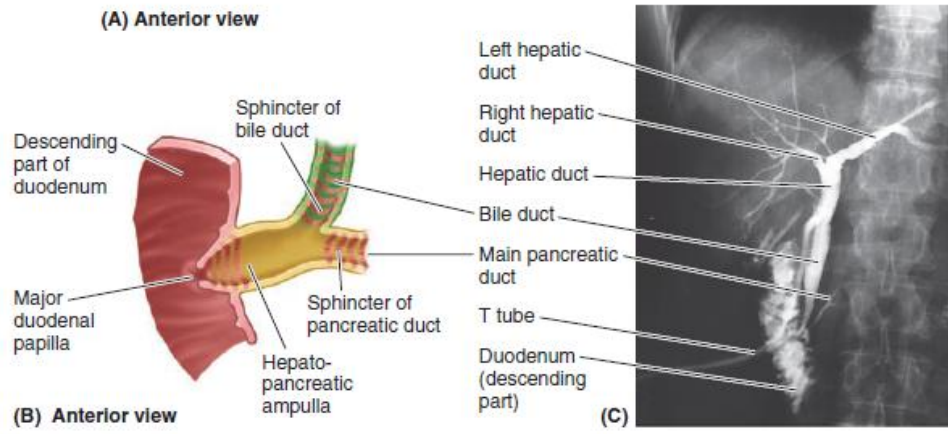
- **Location of the pancreas:**
  - Retroperitoneally located.
  - Transversely across the posterior abdominal wall.
  - Behind the stomach.
  - Between duodenum on the right and spleen on the left.
- **Pancreatic secretions:**
  - **Exocrine:** pancreatic juice produced by acinar cells.
  - **Endocrine:** insulin and glucagon from islets of Langerhans
- **Four parts of the pancreas:**
  - **Head:** embraced by the C-shaped curve of the duodenum – uncinata is posterior to superior mesenteric artery.
  - **Neck:** overlies the superior mesenteric vessels which are forming a groove on its posterior aspect.
  - **Body:** to the left of superior mesenteric artery and vein.
  - **Tail:** closely related to the hilum of the spleen (within splenorenal ligament). notice that it is mobile.
- **The main pancreatic duct begins in the tail, then it turns inferiorly and merges with the bile duct in the head of the pancreas.**

**Notes:**

- ✓ The bile duct crosses the posterosuperior surface of the head.
- ✓ Both the bile duct and the main pancreatic duct will form the hepatopancreatic ampulla which is entering the duodenum at the major duodenal papilla.
- **Sphincters:**
  - **Sphincter of the bile duct:** controls the flow of bile.
  - **Sphincter of the pancreatic duct:** prevents reflux of bile into the main pancreatic duct.
  - **Hepatopancreatic sphincter (sphincter of Oddi):** prevents duodenal content from entering the hepatopancreatic ampulla.
- **Note:** the accessory pancreatic duct drains the uncinata process & opens at the minor duodenal papilla.
- **Pancreatic arteries:**
  - **Arteries supplying the head of the pancreas:**
    - ✓ Anterior and posterior superior pancreaticoduodenal arteries (branching from the gastroduodenal artery).
    - ✓ Anterior and posterior inferior pancreaticoduodenal arteries (branching from the superior mesenteric artery).
  - **Body of the pancreas is supplied by splenic artery.**
- **Pancreatic venous drainage:**
  - **Most of the drainage by the splenic vein.**
  - Some drainage by superior mesenteric vein.
- **Lymphatic drainage of the pancreas:**
  - By the pancreaticosplenic lymph nodes & pyloric lymph nodes which will drain to the superior mesenteric lymph nodes + celiac lymph nodes which in turn will drain to the hepatic lymph nodes.
- **Innervation of the pancreas:**
  - **Parasympathetic:** by vagus nerve (X) → which is secretomotor.
  - **Sympathetic:** by abdominopelvic splanchnic nerves.



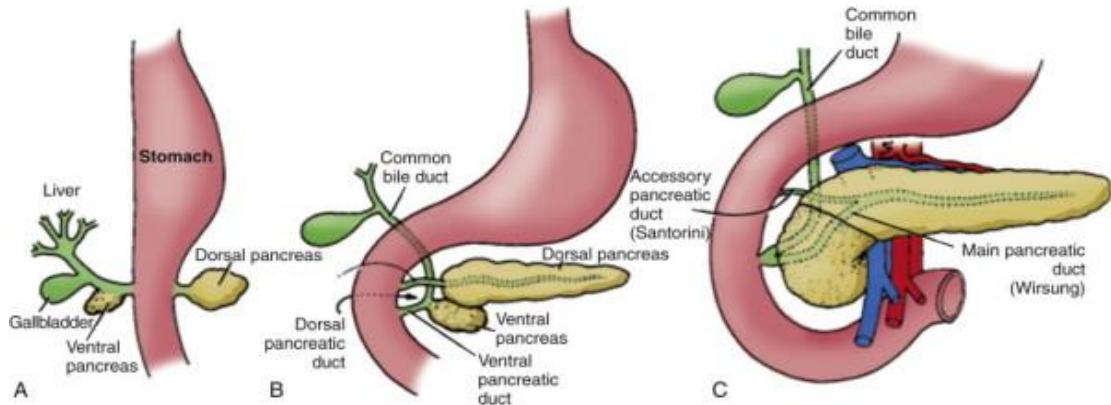
(A) Anterior view





### - Embryology of the pancreas:

- Most of the pancreas is derived from the dorsal pancreatic bud, which appears before the ventral pancreatic bud.
- the ventral pancreatic bud forms the uncinete process and part of the head of the pancreas. It also gives rise to main pancreatic duct.
- Annular pancreas: it is resulting from the growth of a bifid ventral pancreatic bud around the duodenum. The parts of the bifid ventral bud then fuse with the dorsal bud, forming a pancreatic ring. The ringlike, annular part of the pancreas consists of a thin, flat band of pancreatic tissue surrounding the second part of the duodenum. An annular pancreas may cause obstruction of the duodenum shortly after birth, but many cases are not diagnosed until adulthood. Males are affected much more frequently than females.



### - Histology (endocrine pancreas):

- **Features:**
  - ✓ Called: islets of Langerhans
  - ✓ Scattered among exocrine acini.
  - ✓ Pale-staining.
  - ✓ Highly vascularized units (fenestrated capillaries).
  - ✓ Each islet is surrounded by fine fibers of reticular connective tissue.
- **There are four types of cells in the islet of Langerhans:**
  - ✓  $\alpha$ -cells (composing around 20%): they are located in the islet periphery – secrete glucagon in response to low levels of glucose.
  - ✓  $\beta$ -cells (composing around 70%): they are located in the center of the islet – secrete insulin in response to high levels of glucose.
  - ✓ Delta cells: secrete somatostatin which inhibits the secretion of both  $\alpha$  and  $\beta$  cells.
  - ✓ Pancreatic polypeptide cells (minor): inhibit the production of pancreatic enzymes.

