

Anatomy of Pancreas

Greek πᾶν (pân, “all”) & κρέας (kréas, “flesh”)

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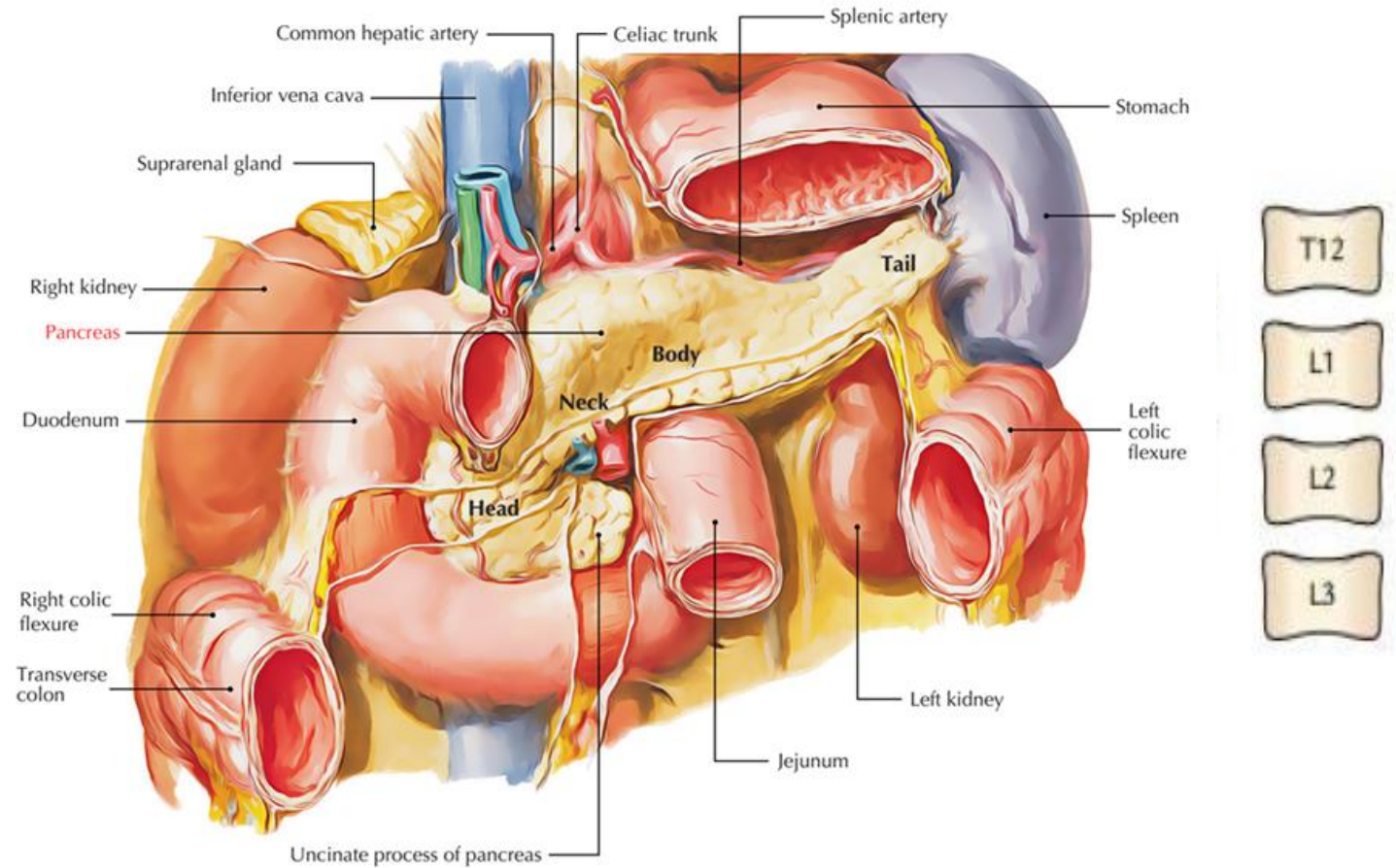
Learning Objectives:

By the end of this teaching session the MBBS 1st year students should be able to-

- **Identify the location of pancreas**
- **Enumerate & describe the parts of pancreas**
- **Describe the relations of pancreas**
- **Write a note on exocrine and endocrine parts of pancreas**
- **Name the pancreatic ducts**
- **Describe the ducts and their openings**
- **Describe the arterial supply, venous drainage, lymphatic drainage of pancreas**
- **Write a short note on nerve supply of exocrine pancreas**
- **Write a short note on applied anatomy of pancreas**

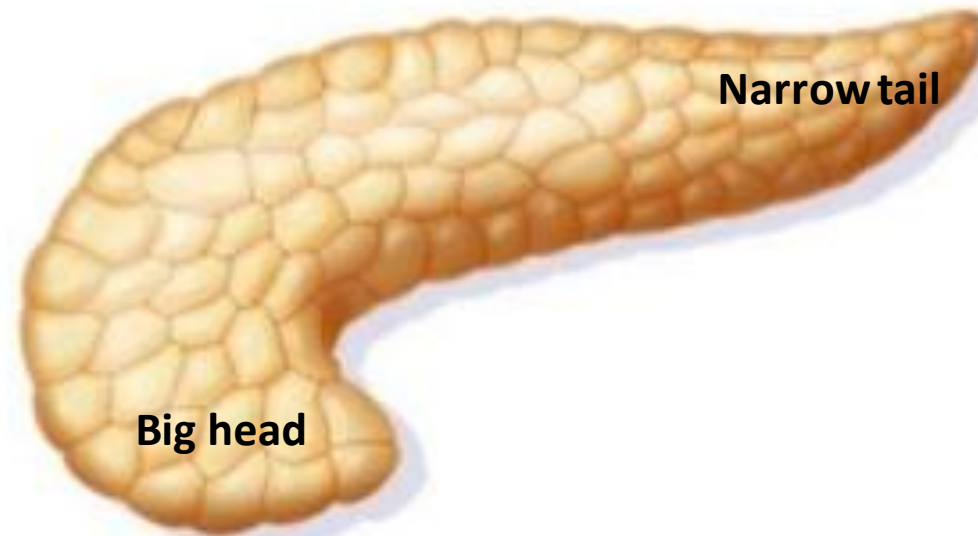
Location

- **Retroperitoneal organ**
- **Lies on the posterior abdominal wall**
- **Extent T12-L2**
- **Obliquely placed behind the stomach (behind the lesser sac)**



Size & shape

- J shaped/ Retort shaped
- Measurements:
 - Length- 12-15 cm
 - Width – 3-4 cm
 - Thickness – 1.5 – 2cm
 - Weight – 80-90 gm



Parts

Subdivided into:

- Head with uncinete process
- Neck
- Body with tuber omentale
- Tail

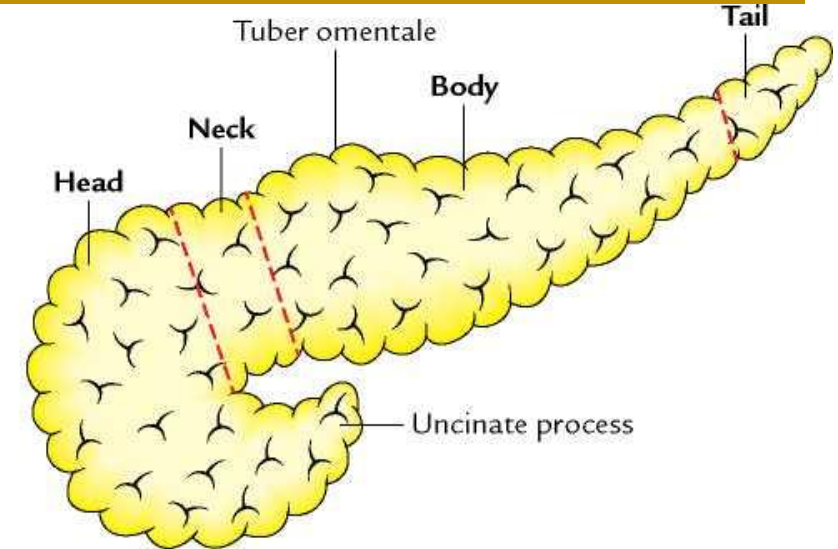
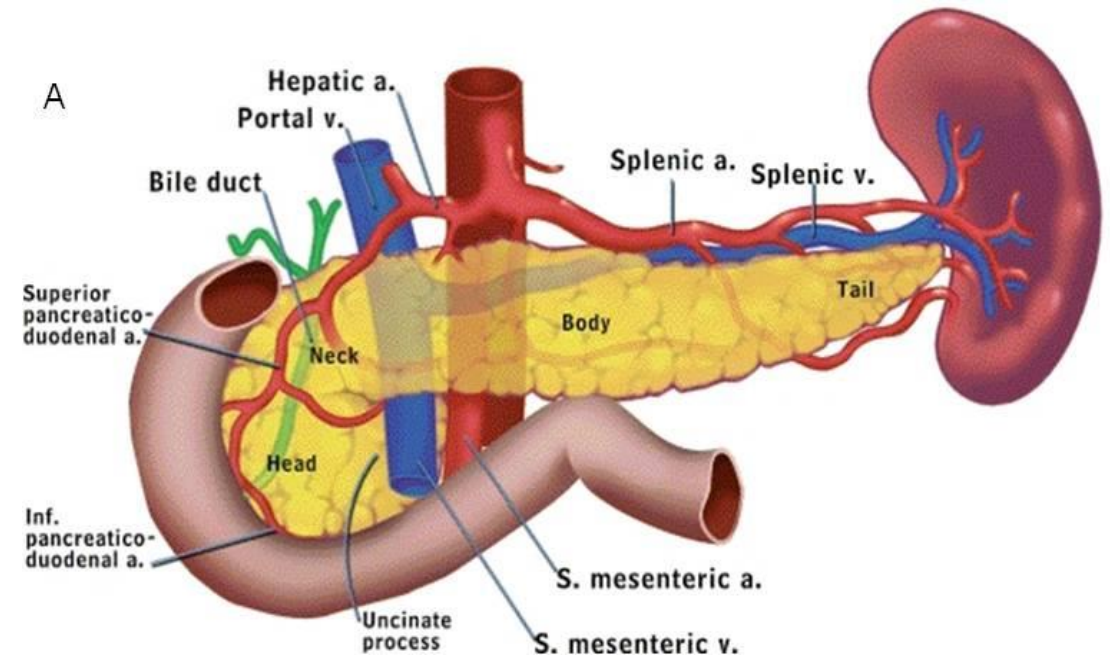


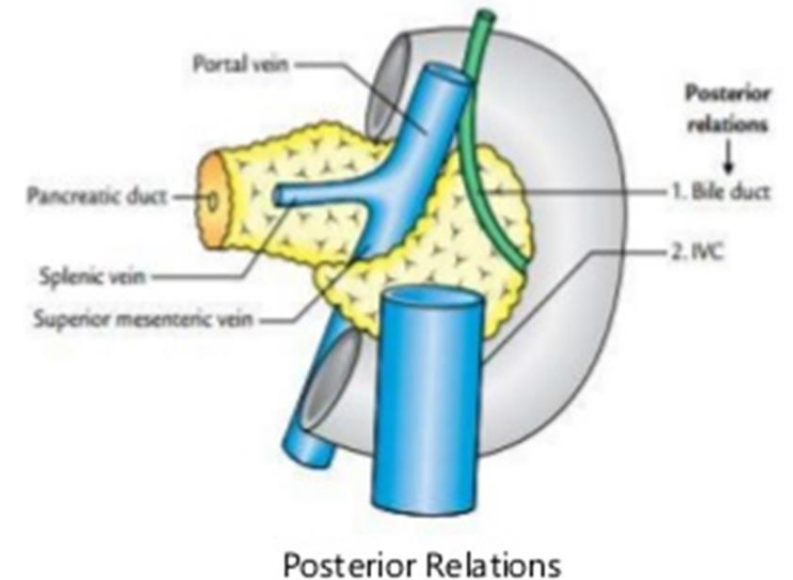
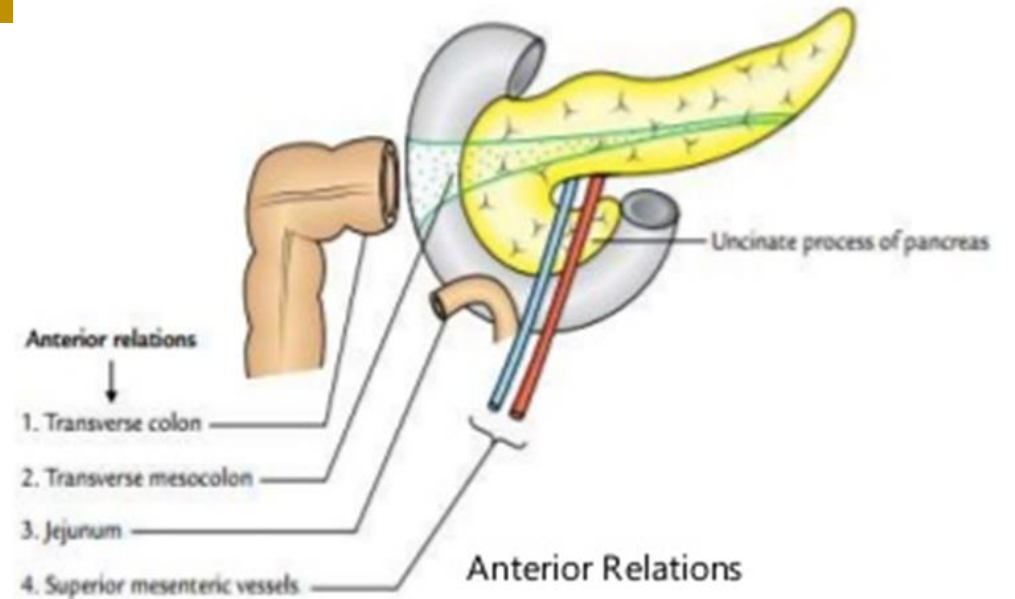
Fig. 9.13 Parts of the pancreas.

- Head within curvature of duodenum
- Tail reaches hilum of spleen



Description of Head

- Enlarged, right extremity, within curvature of duodenum, opposite L1 & L2
- 2 surfaces, 4 borders, 1 process
- ANTERIOR RELATIONS:
 - peritoneum in lower part
 - Uncinate process related anteriorly to Superior mesenteric vessels
- POSTERIOR RELATIONS:
 - IVC & both renal veins, Bile duct, right celiac ganglion, right suprarenal



Description of Neck

- Constricted part between head & body
- 2 cm long
- Projects anterior
- 2 surfaces, 2 borders

RELATIONS:

Anterior:

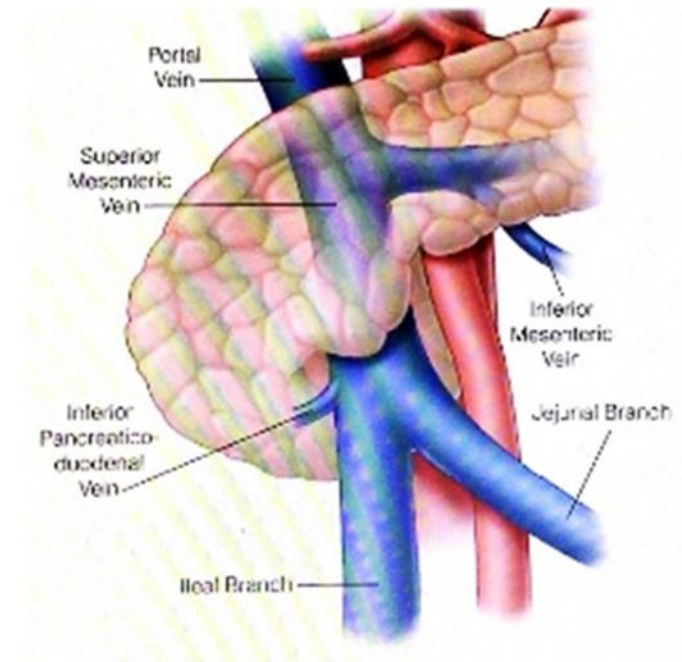
Lesser sac, pyloric part of stomach

Uncinate process- Superior mesenteric vessels

Posterior:

Lower part -SMV

Upper part-portal vein



Description of Body

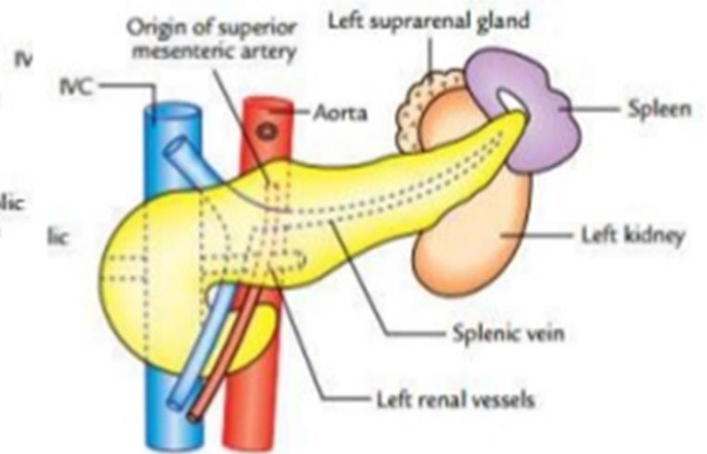
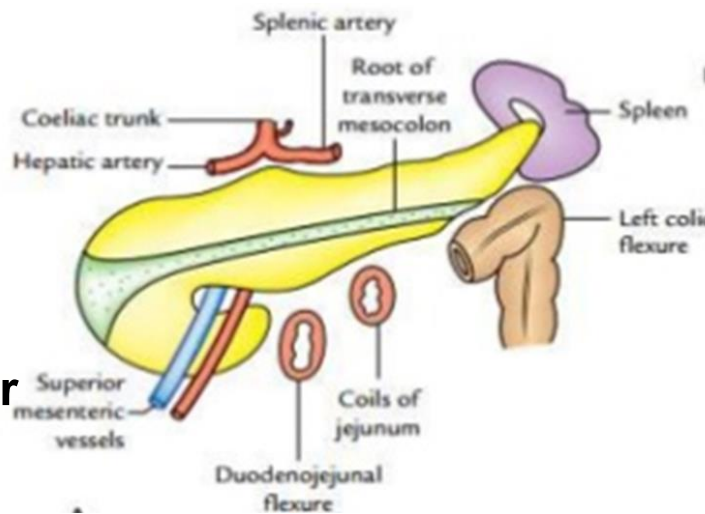
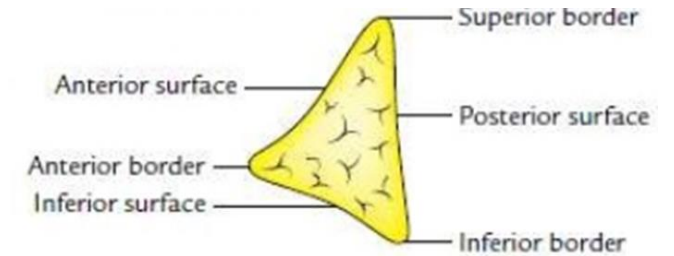
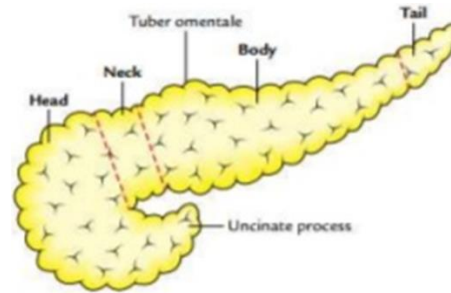
- between neck & tail
- passes obliquely upwards, backwards, towards left
- At / just below transpyloric plane
- Triangular : 3 borders, 3 surfaces, 1 process – tuber omentale

RELATIONS:

Anterosuperior surface: peritoneum of lesser sac, Stomach

Anteroinferior surface: peritoneum of greater sac, coils of jejunum

Posterior surface: aorta, left psoas major, left suprarenal, left kidney, left renal vessels



Description of Tail

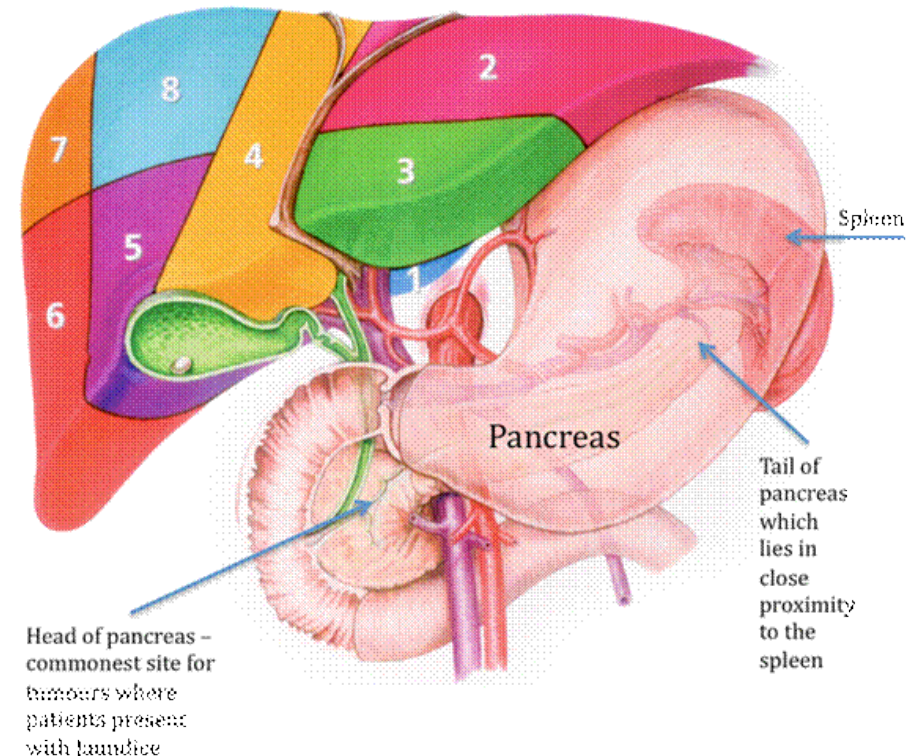
- **Narrow, left end, reaches T 12**
- **Hilum of spleen, within lieno renal ligament**
- **Most mobile**
- **CONTAINS largest number of ISLETS OF LANGERHANS per unit of tissue**

RELATIONS:

Anterior: lesser sac, stomach

Posterior: splenic vessels

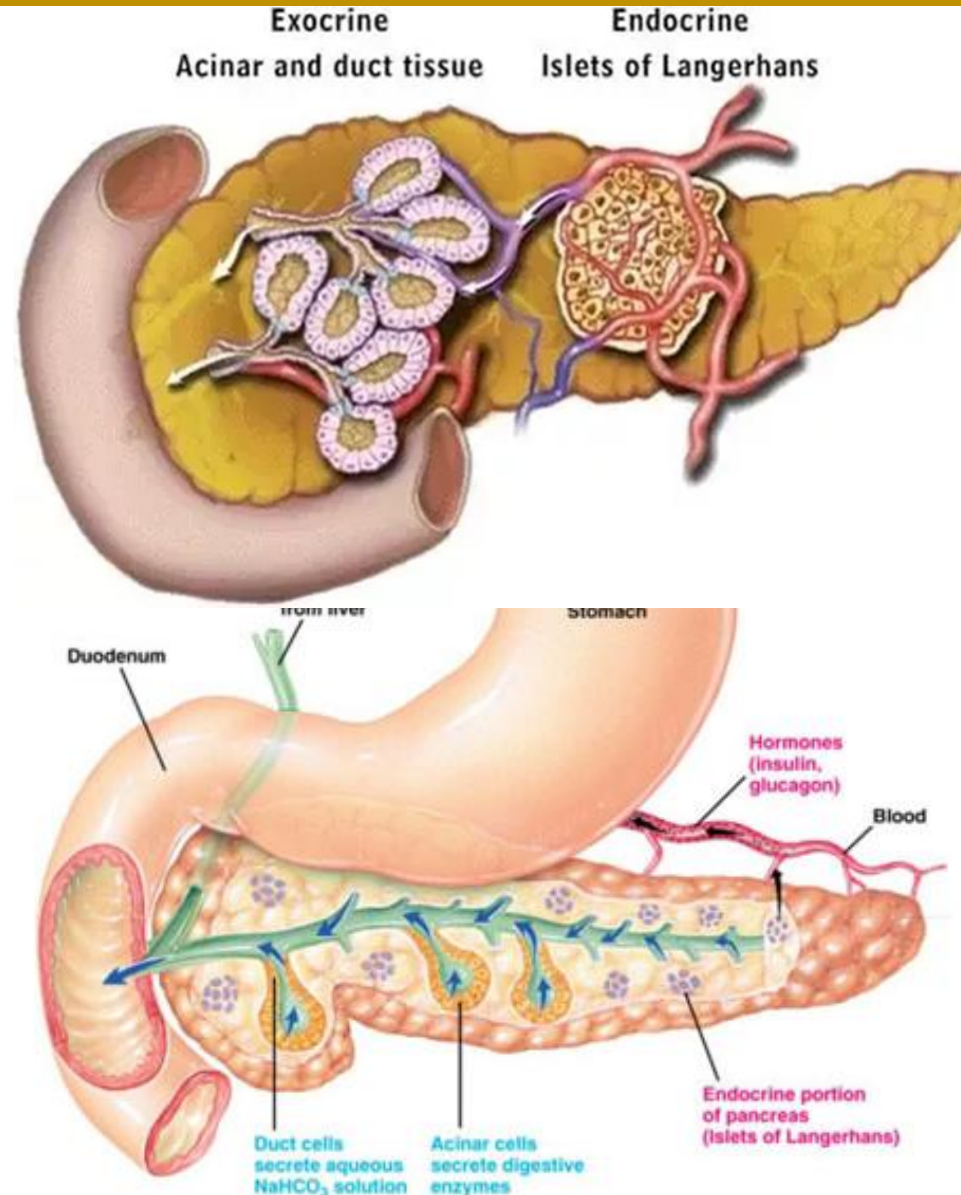
Below: splenic flexure of colon



Structure/Function of Pancreas

Exocrine part

- Compound racemose gland
- Lobules, acini –duct system
- 2 secretory products critical to proper digestion:
 - digestive enzymes (proteases, lipase and amylase)
 - bicarbonate.
- enzymes are synthesized and secreted from the exocrine acinar cells
- bicarbonate is secreted from the epithelial cells lining small pancreatic ducts.



Endocrine part

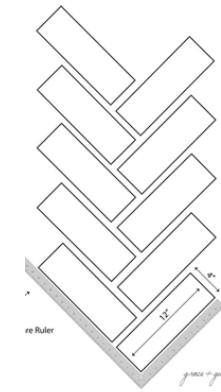
- Isolated colonies of ovoid cellular masses
- Islets of Langerhans
- 1 million islets
- Within islet cell mass – Alpha (20%), Beta (68%), (Delta 10%), PP cell (2%)
- Minor cell types- D 1 cell, Enterochromaffin cell

Pancreatic ducts

- Usually 2 ducts

- A. Main Duct (Duct of Wirsung)

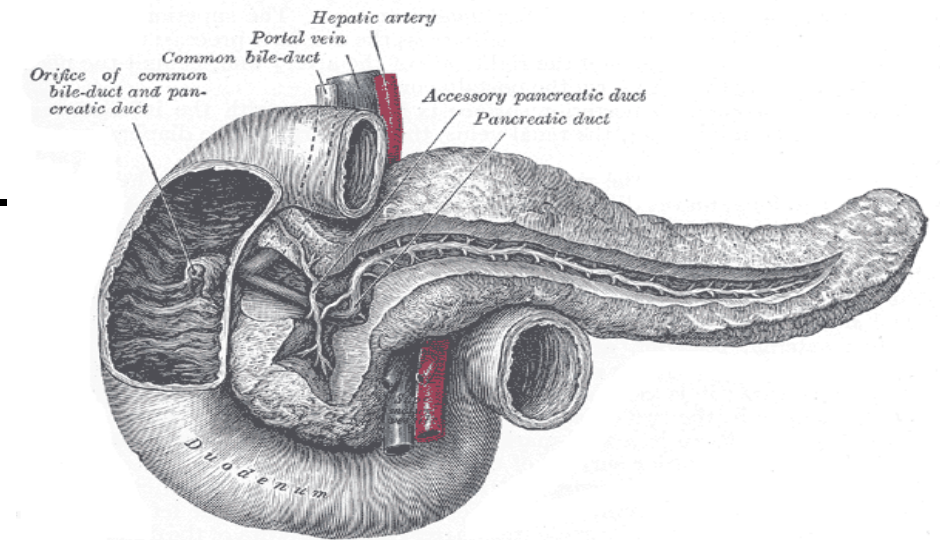
- Begins in tail, Passes from left to right
 - Receives smaller ducts at regular angles (herringbone pattern)
 - At neck- main duct passes downwards, backwards to right
 - Unites with bile duct----Opens in 2nd part of duodenum---at major duodenal papilla



Herringbone Pattern

- B. Accessory duct (Duct of Santorini)

- Receives secretion from uncinata process
 - Passes upwards to right, in front of main duct
 - Opens in 2nd part of duodenum---at minor duodenal papilla



Arterial supply

Supplied by branches from:

- Artery of foregut (celiac trunk)
- Artery of midgut (superior mesenteric artery)

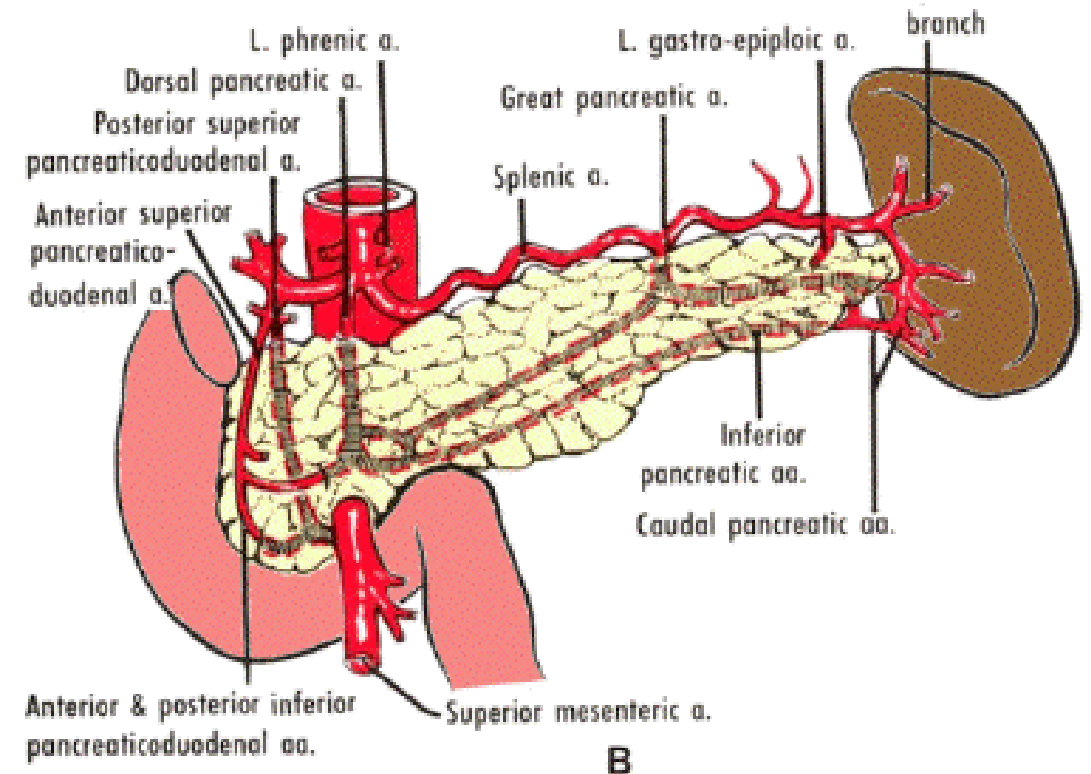
They include:

1. Superior pancreaticoduodenal artery (SPDA)
2. Inferior pancreaticoduodenal artery (IPDA)
3. Pancreatic branches from splenic artery

Head and neck supplied by SPDA & IPDA

Body & Tail supplied by pancreatic branches from splenic artery

one large branch arteria pancreatica magna accompanies duct



Outflow of blood from islets drains into acinar capillary network--- Insular acinar portal system

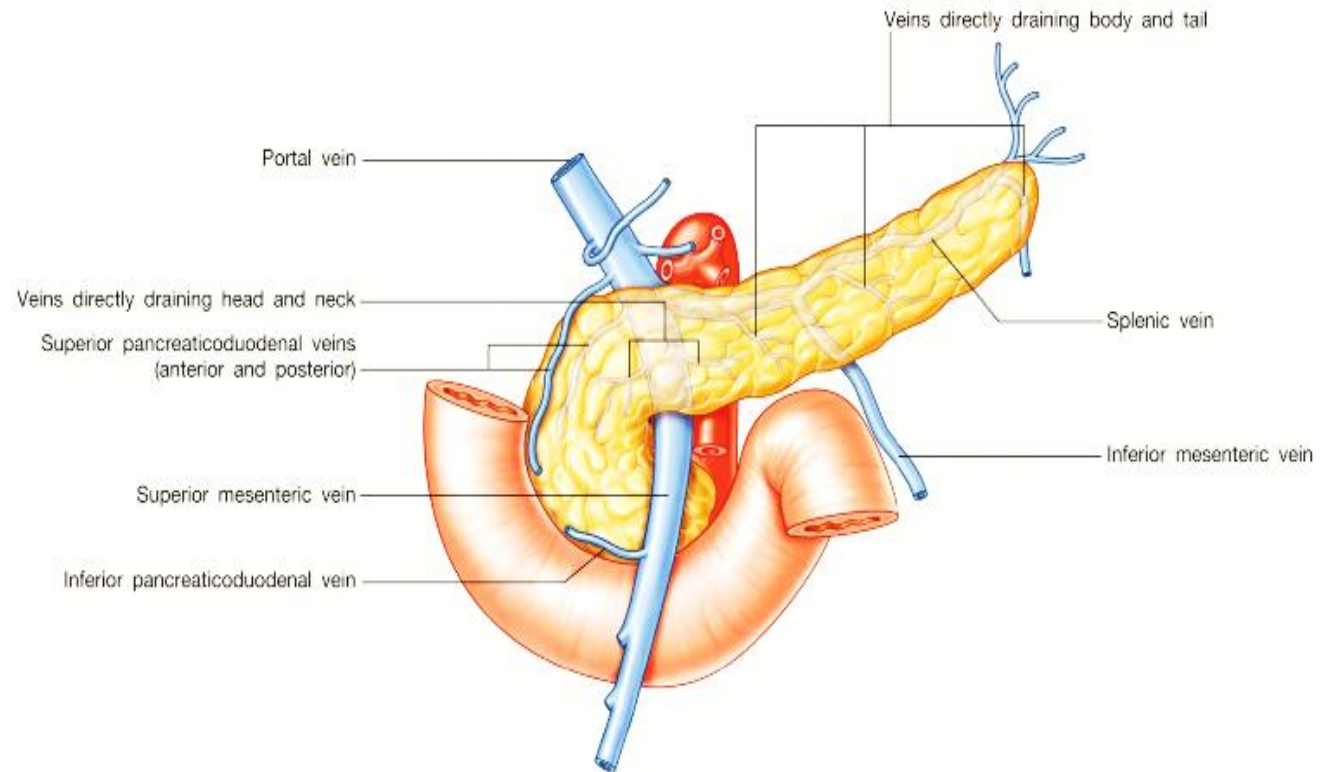
Venous drainage

Veins from Body & Tail:

- Splenic vein
- Superior mesenteric vein

Veins from Head and Neck:

- Trunk of Portal vein



Lymphatics of Pancreas

Head & neck- Anterior and posterior pancreaticoduodenal nodes

Body & Tail – Pancreaticosplenic nodes

Efferents pass to:

Celiac

&

Superior mesenteric nodes

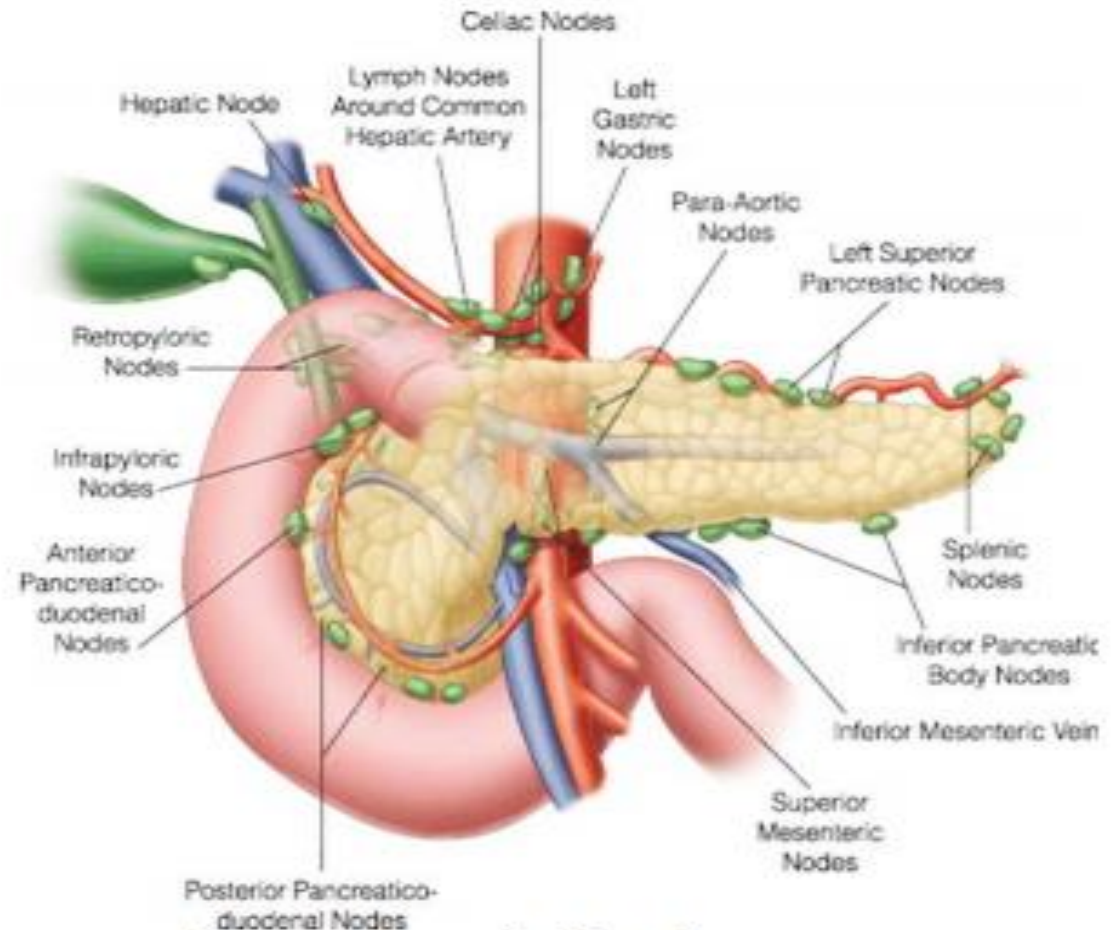


Figure 3: Lymphatics of pancreas.

Applied anatomy of Pancreas

Nerve supply of pancreas

To EXOCRINE PANCREAS:

- Partly Nerves and Partly Hormones

- Nerves

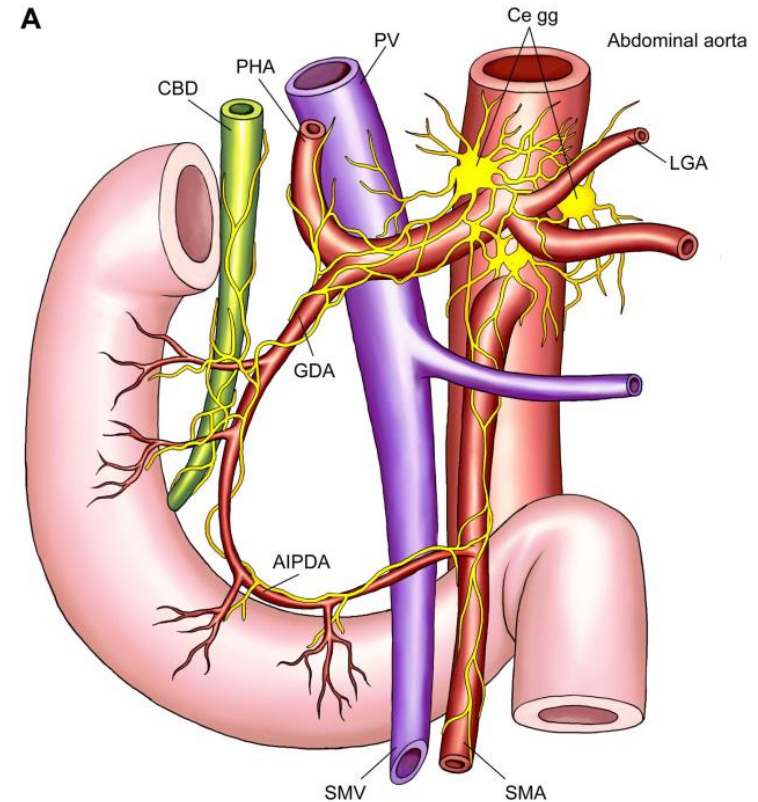
- Sympathetic – Celiac and superior mesenteric plexus

- Parasympathetic – Right & left vagus nerves

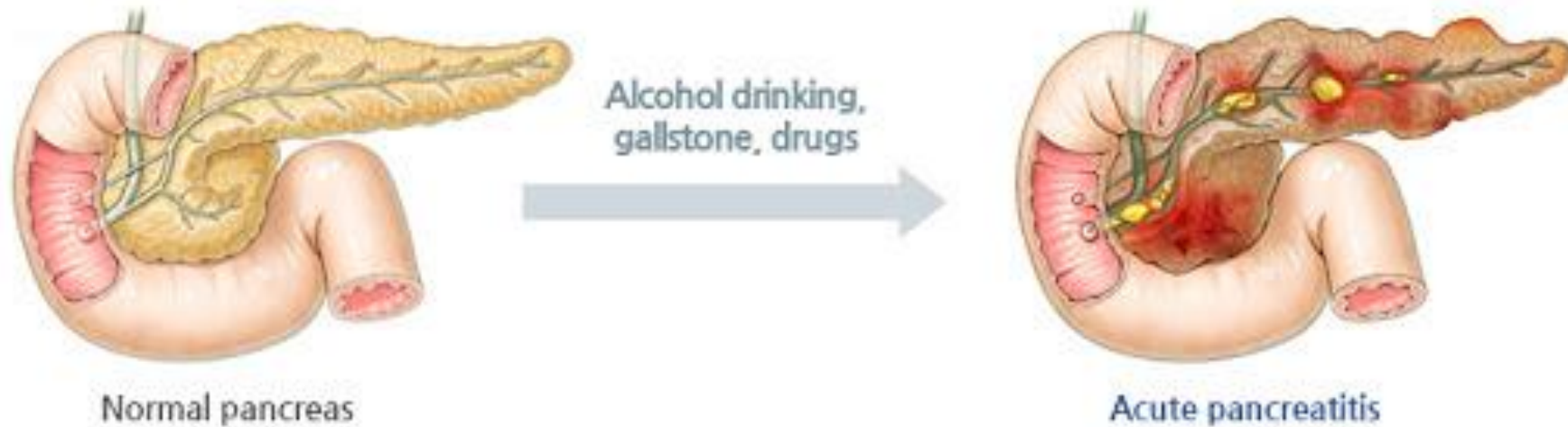
- Hormones (from duodenal mucosa)

- Secretin (bicarbonate secretion) &

- Pancreozymin (digestive enzymes)

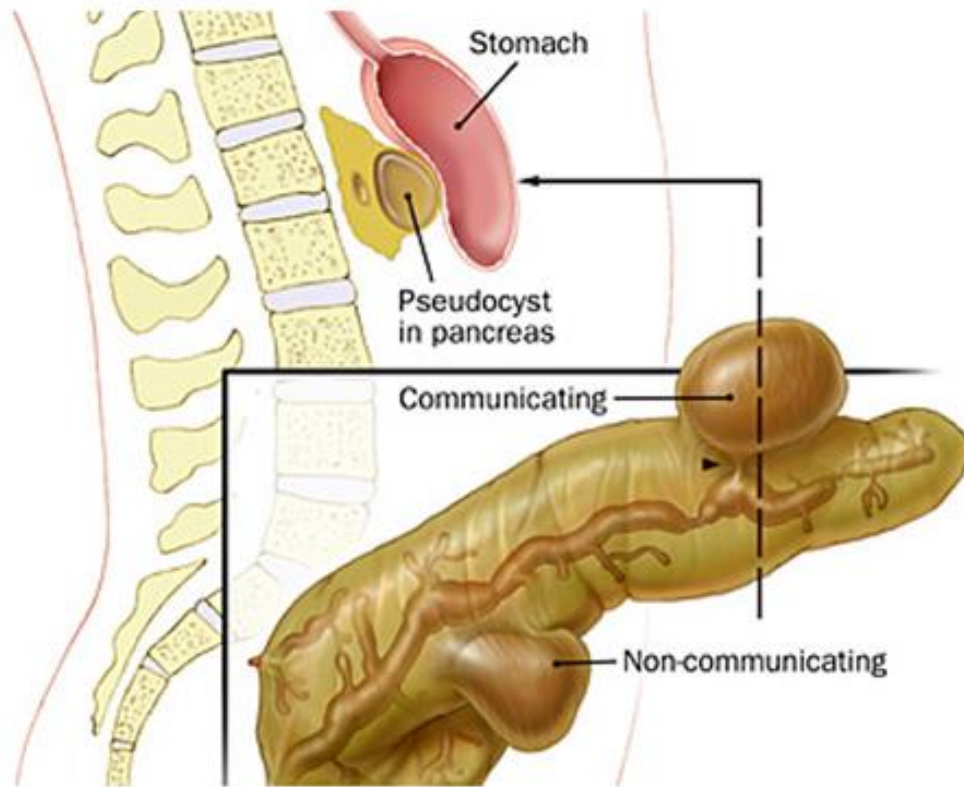


Pancreatitis



- ▶ It occurs due to obstruction of pancreatic duct, ingestion of alcohol, viral infections (mumps), or trauma.
- ▶ It is serious condition because activated pancreatic enzymes leak into the substance of pancreas and initiates the autodigestion of the gland.
- ▶ Clinically, it presents as very severe pain in the epigastric region radiating to the back, fever, nausea, and vomiting.

Pancreatic pseudocyst



When the pancreas gets inflamed, it may leak digestive enzymes.

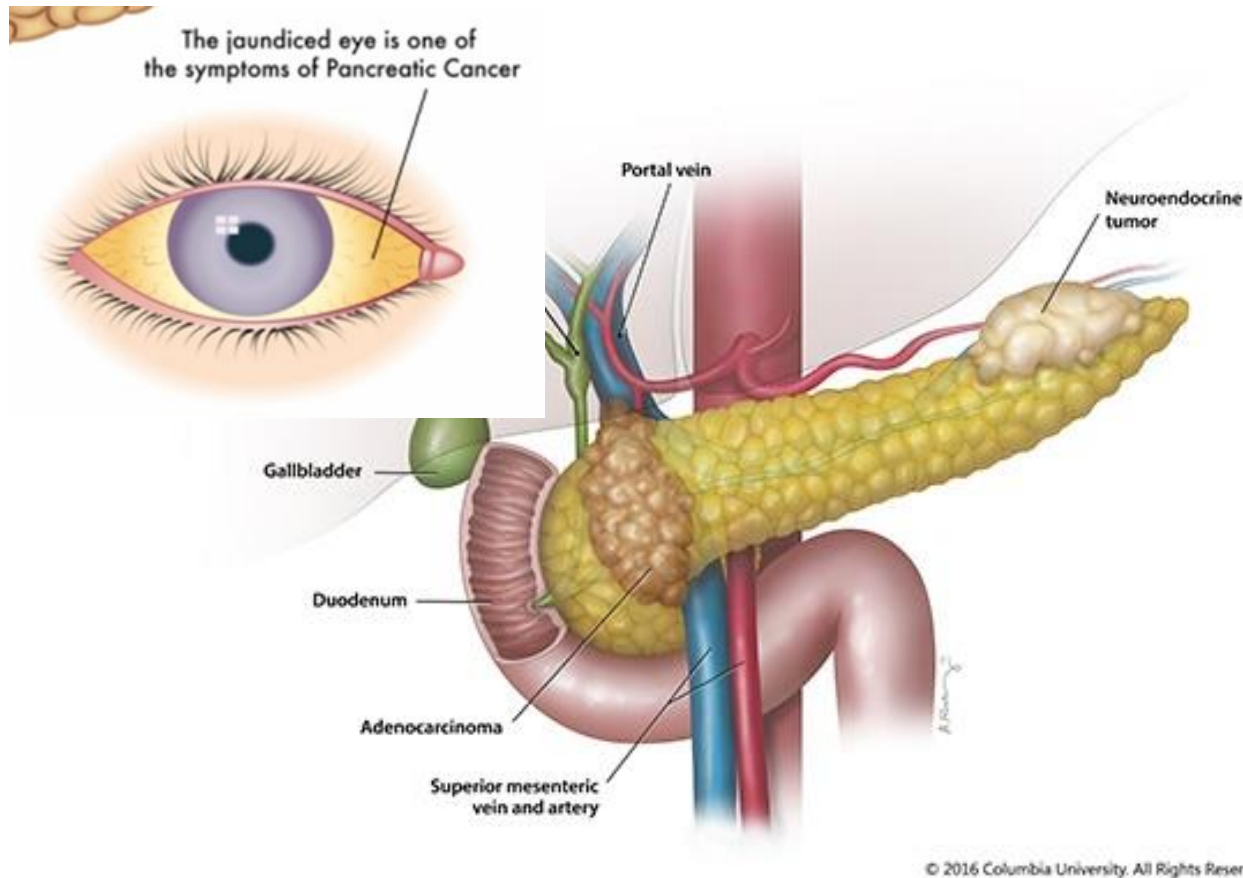
This damages the pancreas and causes collections of fluid to form.

These are called pancreatic pseudocysts.

Pancreatic pseudocysts may start after

- **an episode of sudden (acute) pancreatitis.**
- **In people with chronic pancreatitis**

Carcinoma of Pancreas



- If in and around - Head of pancreas
- May obstruct bile duct ----- jaundice
 - May obstruct portal vein ----- ascites (accumulation of fluid in abdomen)
 - May compress pylorus ----- pyloric obstruction

Diabetes mellitus

What is Diabetes?



When pancreas doesn't
produce insulin
(Type 1)



When pancreas doesn't
produce enough insulin
or the insulin cannot be processed
(Type 2)

Annular Pancreas

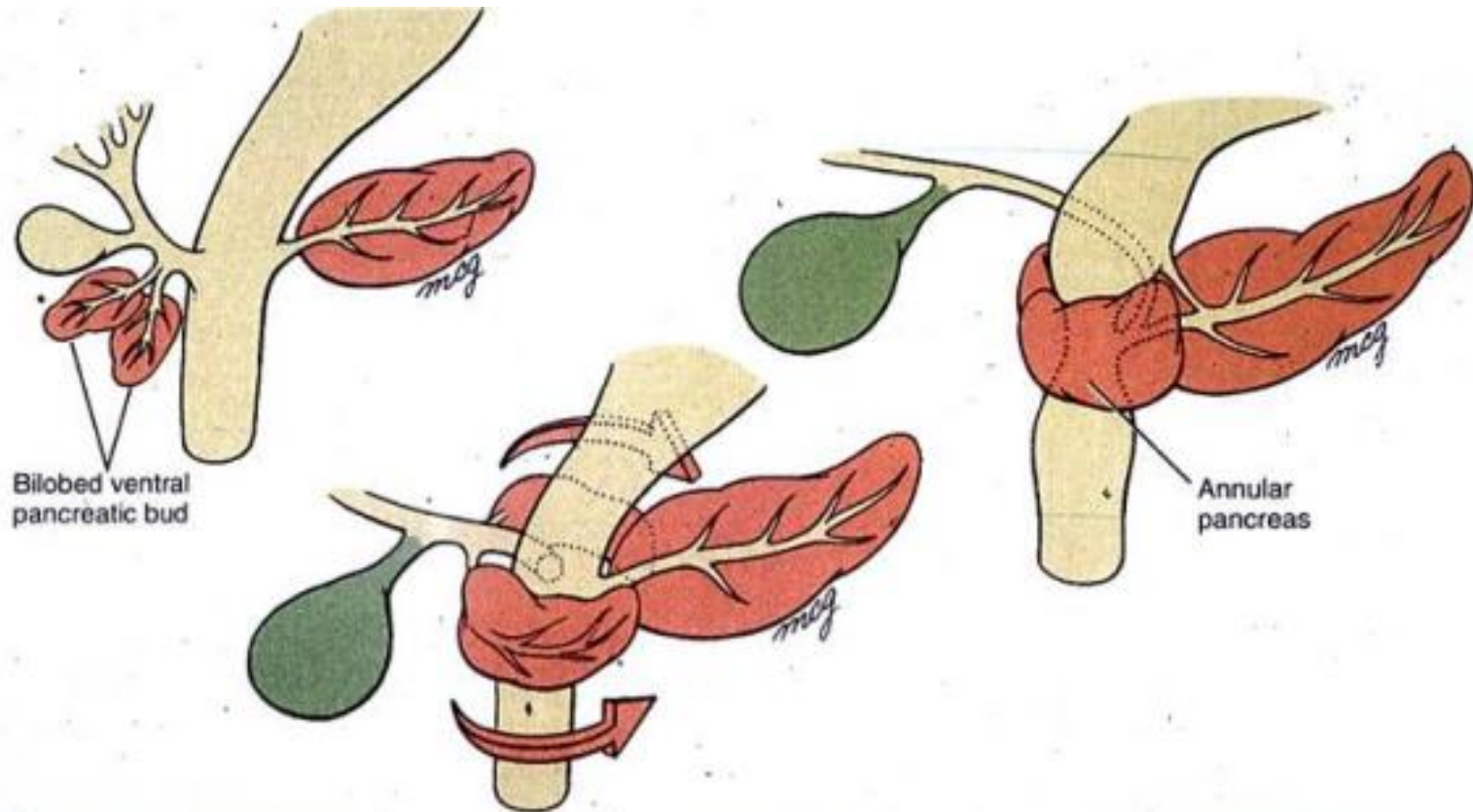


Figure 9-7. The ventral pancreas may consist of two lobes. If the lobes migrate around the duodenum in opposite directions to fuse with the dorsal pancreatic bud, an annular pancreas is formed.

May result in Duodenal obstruction