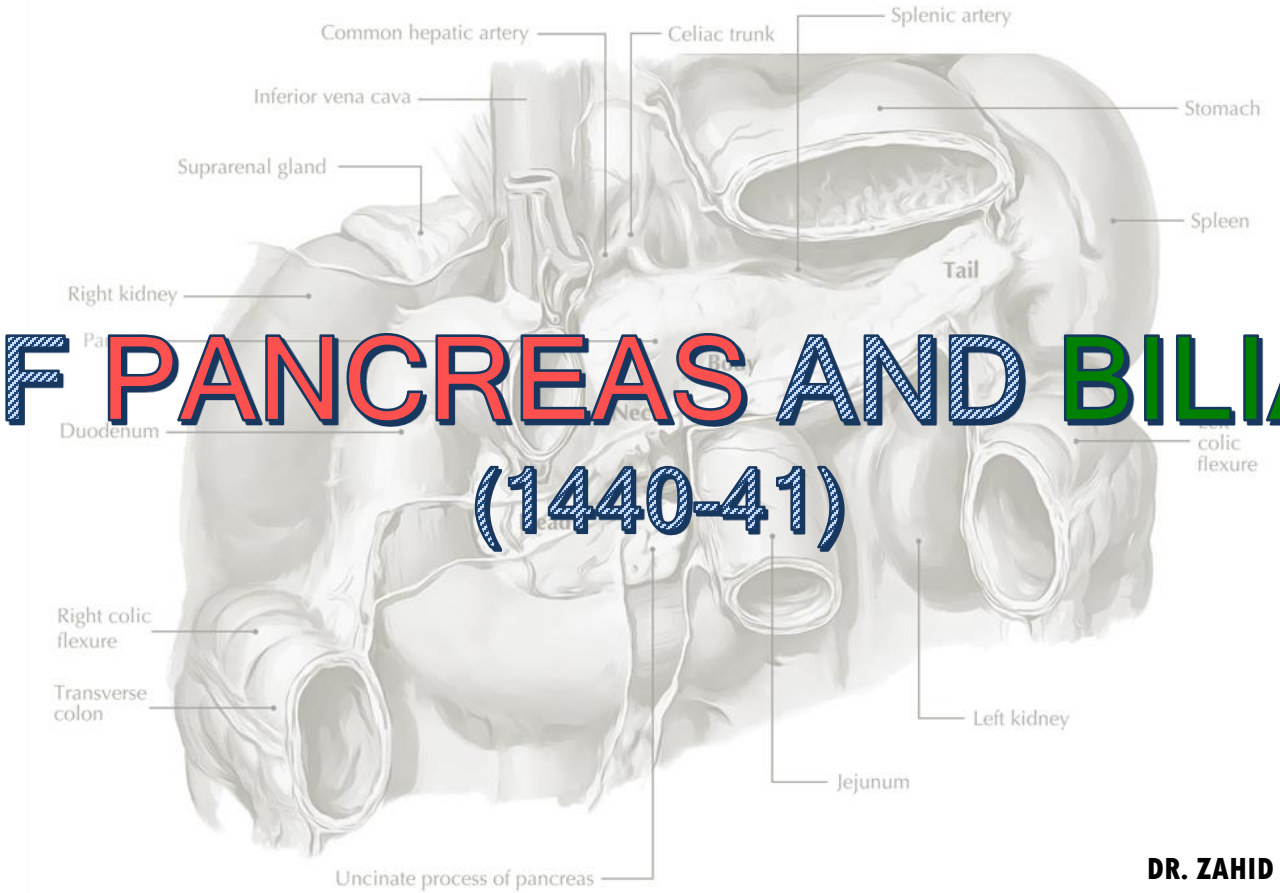
ANATOMY OF PANCREAS AND BILIARY SYSTEM

(1440-41)



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Objectives

At the end of this discussion, we will be able to describe:

- **Topographical anatomy of the pancreas & the biliary system:**
  - **Location, parts, relations & peritoneal reflection**
  - **Blood supply, nerve supply and lymphatic drainage**
  - **Course of each of common hepatic, cystic and common bile duct and pancreatic ducts**
- **Clinical Correlations**

The Pancreases "All Flesh"

Lies in the upper abdomen behind the stomach

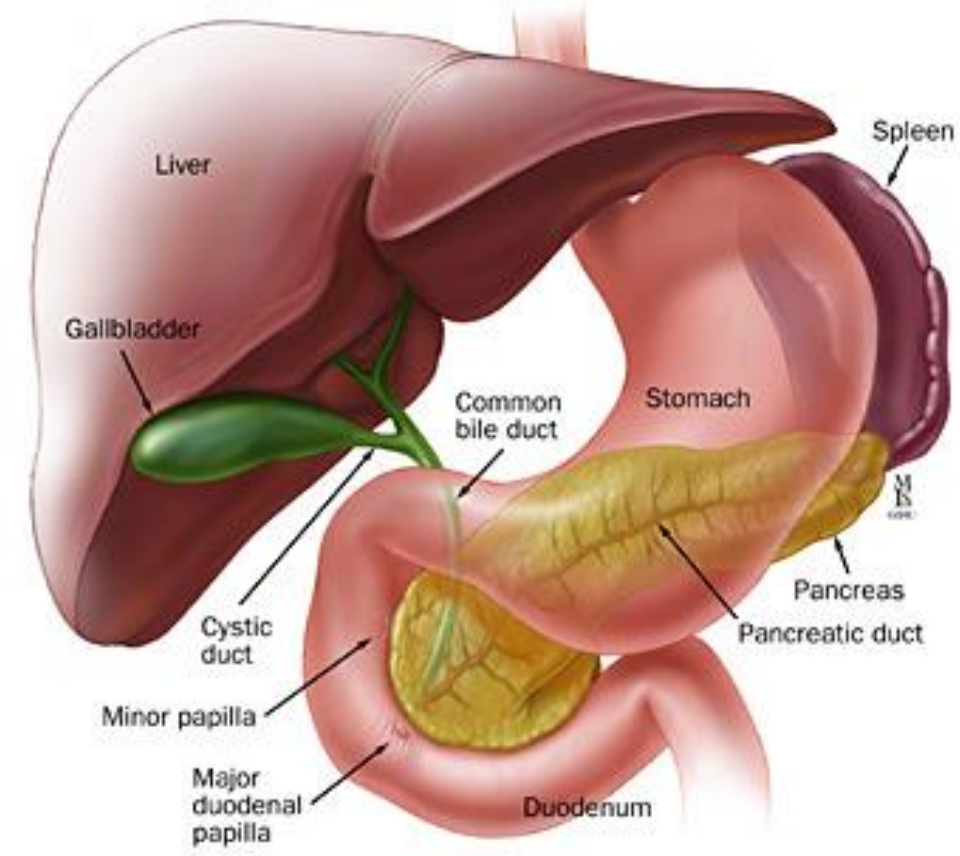
Both exocrine and endocrine functions

Exocrine component

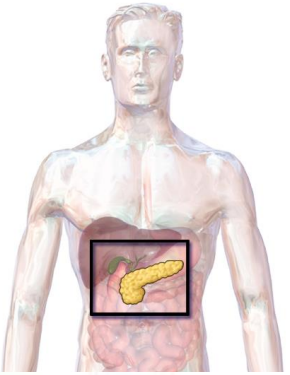
- makes and secretes digestive enzymes into the intestine (Exocrine pancreas)
- comprise more than 95% of the pancreatic mass

Endocrine component

- makes and secretes hormones (insulin, glucagon, somatostatin)
- control energy metabolism and storage throughout the body (Endocrine pancreas Islet's of Langerhans).
- comprise 1-2% of pancreatic mass.



The Pancreases "All Flesh"



LOCATION

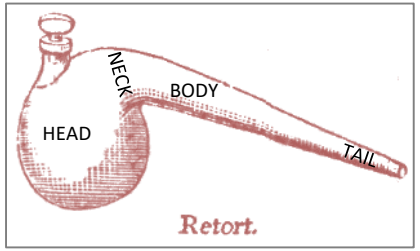
In the epigastric and left hypochondriac regions.
(from concavity of the duodenum to the hilum of spleen opposite the level of T12– L3 vertebrae).

PERITONEUM

The greater part is retroperitoneal behind the lesser sac.

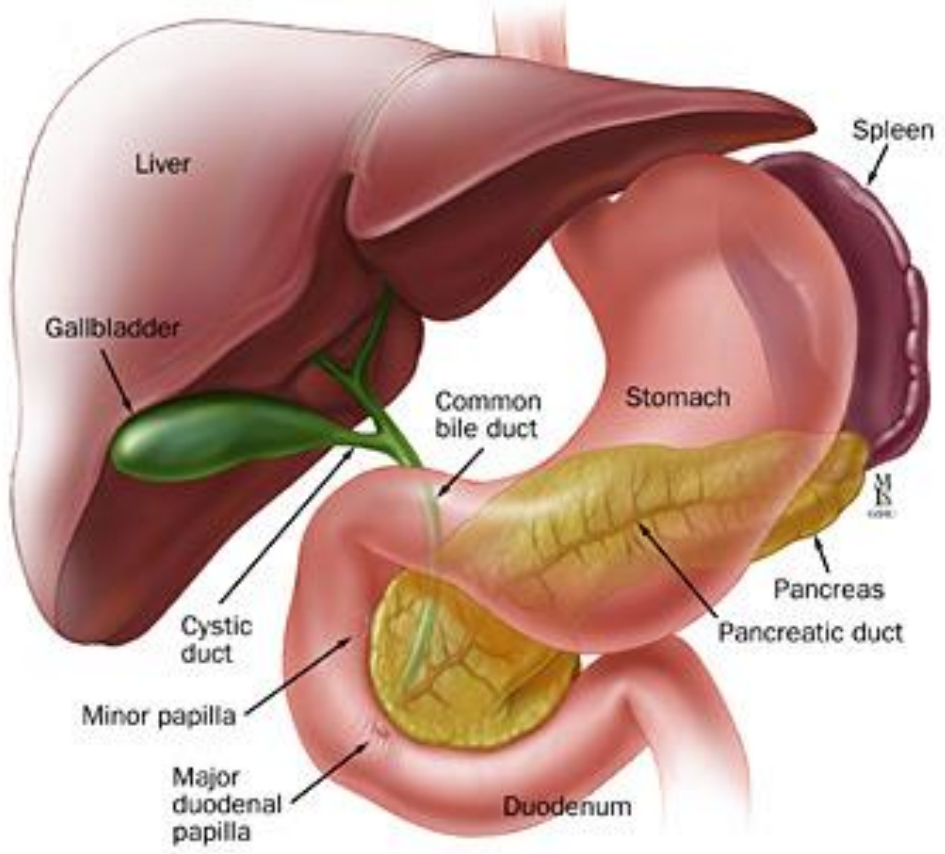
SHAPE

The pancreas is "J"-shaped or **RETORT** shaped being set obliquely.



SIZE

Length: 12–15 cm(6-10 inch).
Weight: 60–100 g.



The Pancreases "All Flesh"

PARTS (SUBDIVISIONS)

1. Head (with one process— uncinate process).
2. Neck.
3. Body (with one process—tuber omentale).
4. Tail.

HEAD OF THE PANCREAS

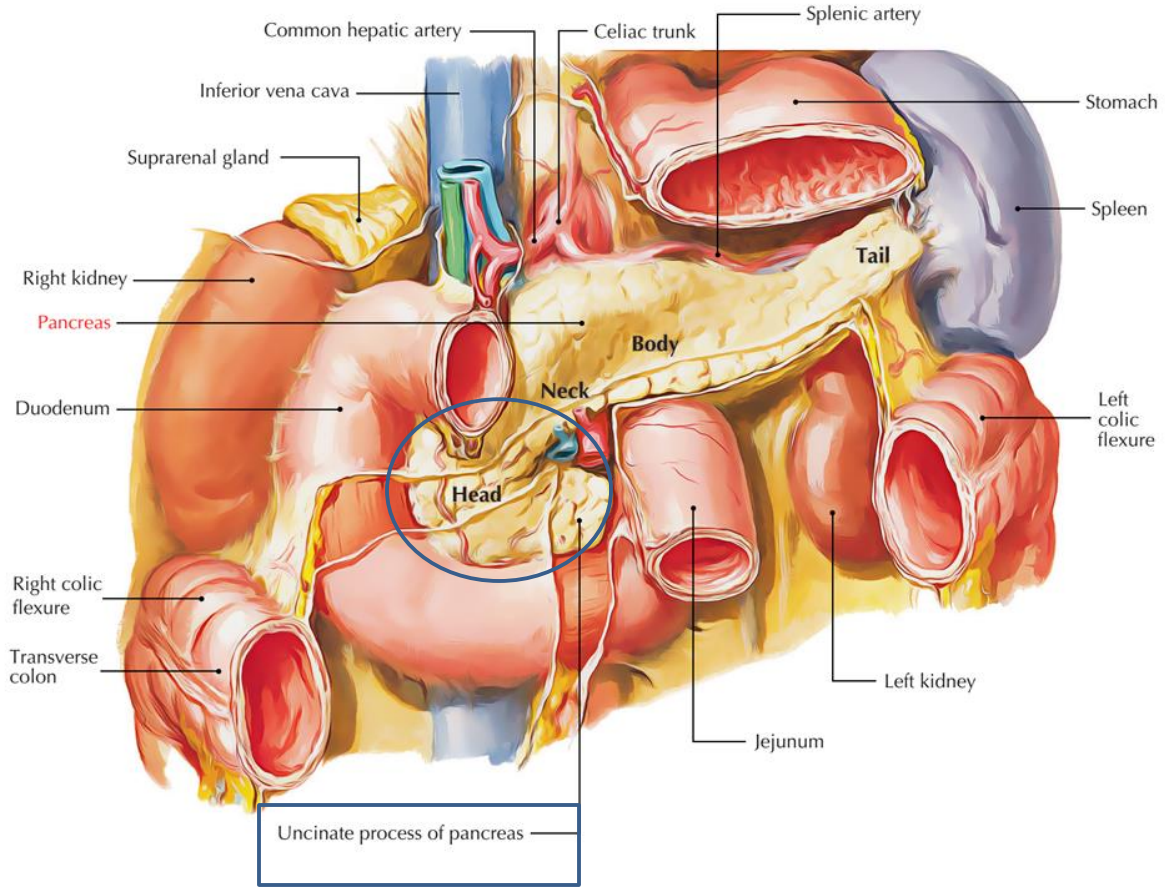
- is the enlarged, disc-shaped right end of the pancreas.
- lies in the concavity of the C-shaped duodenal loop in front of the L2 vertebra

Anterior surface is related from above downward to:

- The gastroduodenal artery,
- transverse colon,
- root of the transverse mesocolon and
- jejunum.

Posterior surface is related to:

- IVC,
- left renal vein,
- bile duct and
- right crus of diaphragm.



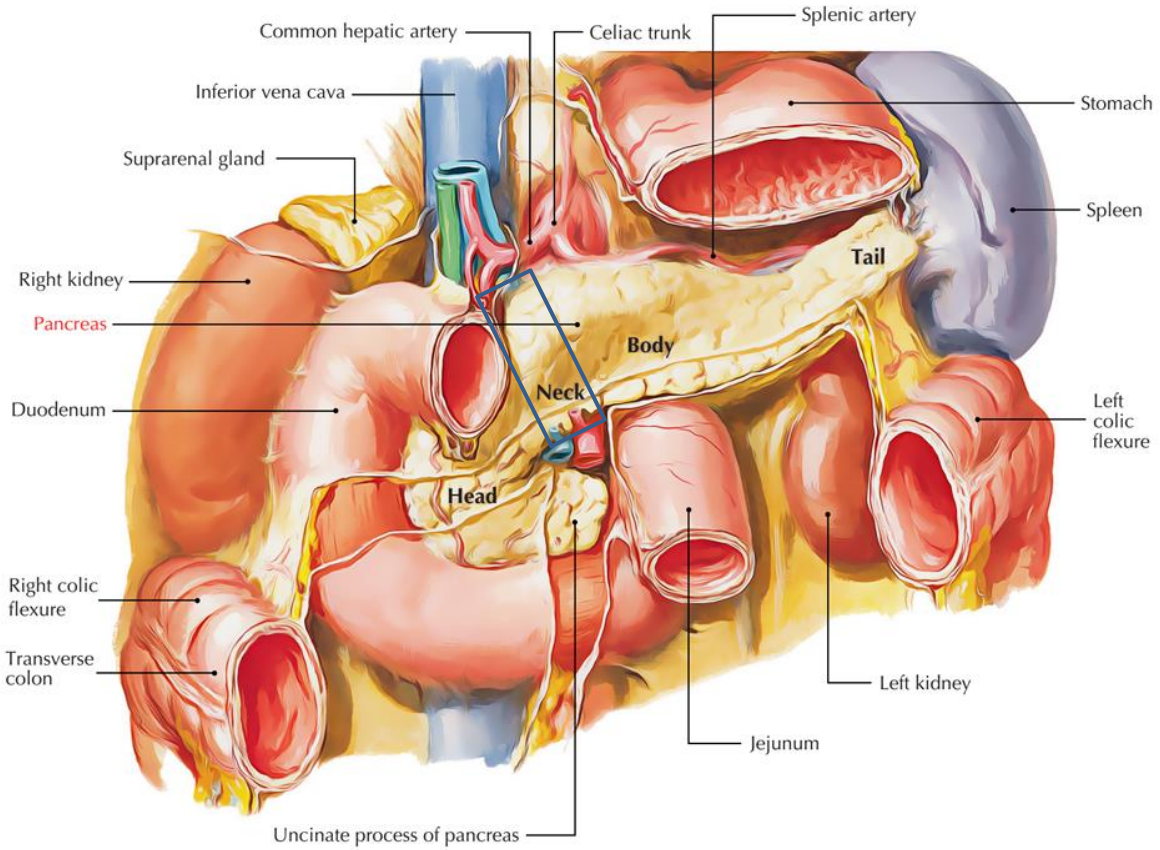
Uncinate process is related to:

- anteriorly to superior mesenteric vessels and
- posteriorly to the abdominal aorta.

The Pancreases "All Flesh"

NECK OF THE PANCREAS

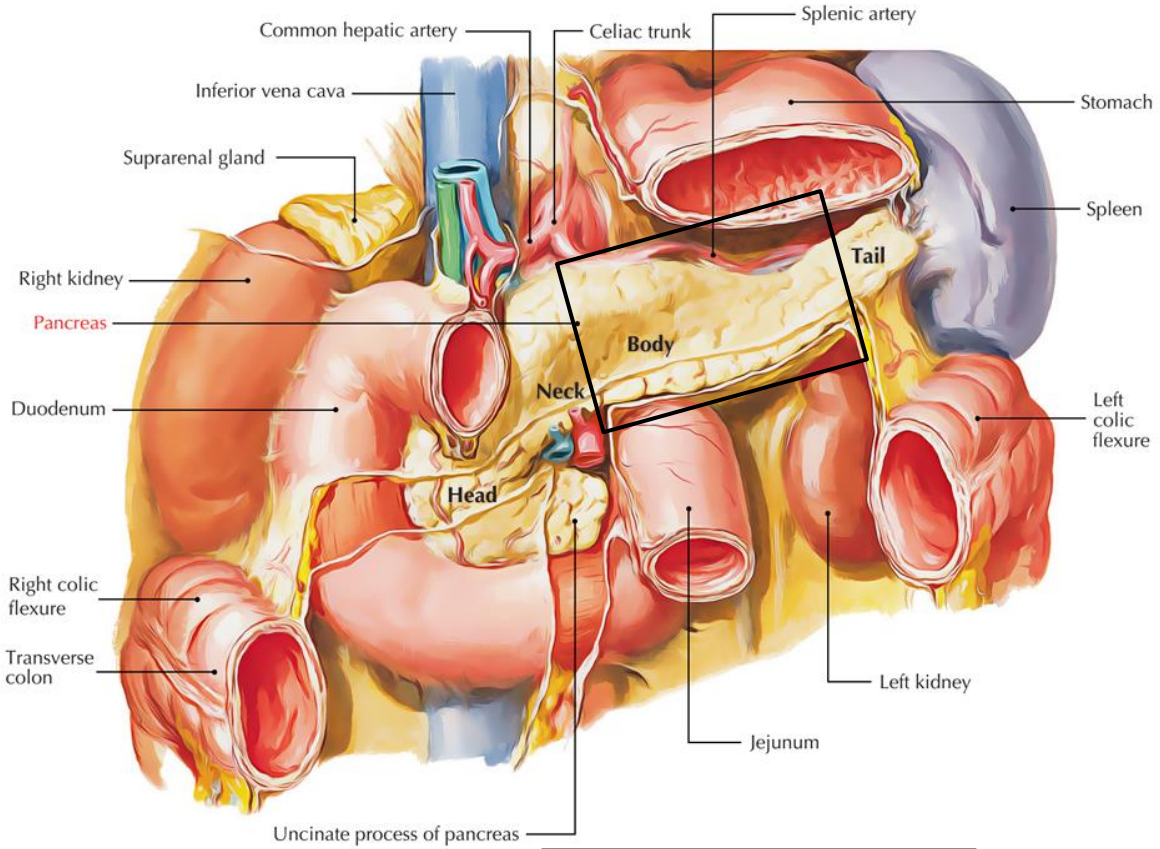
- **Best defined as** "narrow band of pancreatic tissue that Lies in front of superior mesenteric and the portal vein"
- Its antero-superior surface supports/related to the pylorus
- The superior mesenteric vessels emerge from its inferior border

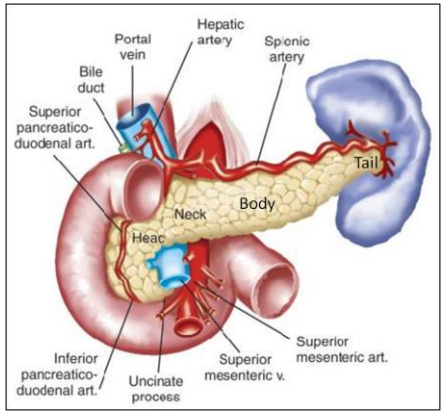


The Pancreases "All Flesh"

BODY OF THE PANCREAS

- It runs upward and to the left.
- lies in front of the vertebral column at or just below the transpyloric plane.
- One process: **Tuber omentale** (a part of the body projects above the lesser curvature of the stomach and comes in contact with the lesser omentum across the lesser sac).
- It is triangular in cross section.
- The splenic vein is embedded in its posterior surface
- The splenic artery runs over its upper border

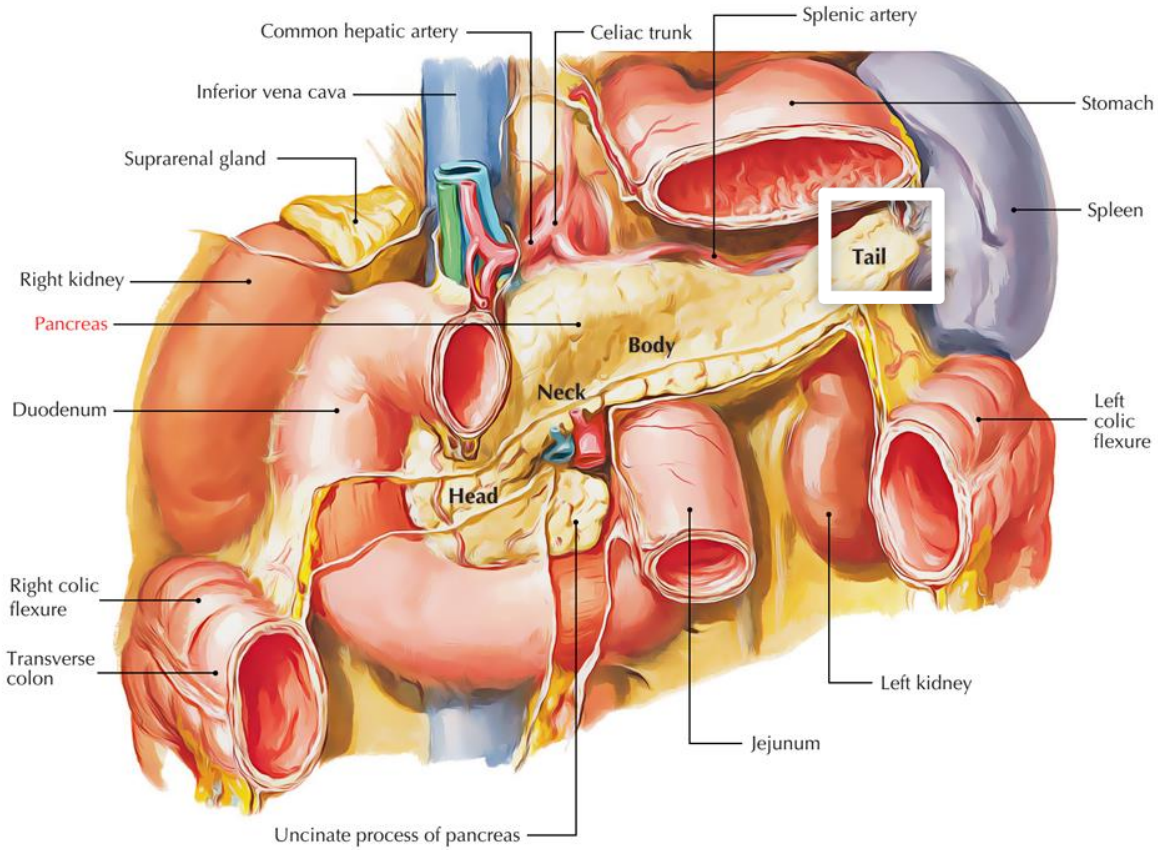




The Pancreases "All Flesh"

TAIL OF THE PANCREAS

- Narrow, short segment, ending at the splenic hilum
- It is mobile unlike the other major retroperitoneal parts of the gland.
- contains the **largest** number of **islets of Langerhans**
- Lies in the splenicorenal (lienorenal) ligament (may get injured during splenectomy) along with splenic vessels, at the level of the T12 vertebra
- Anteriorly, related to splenic flexure of colon

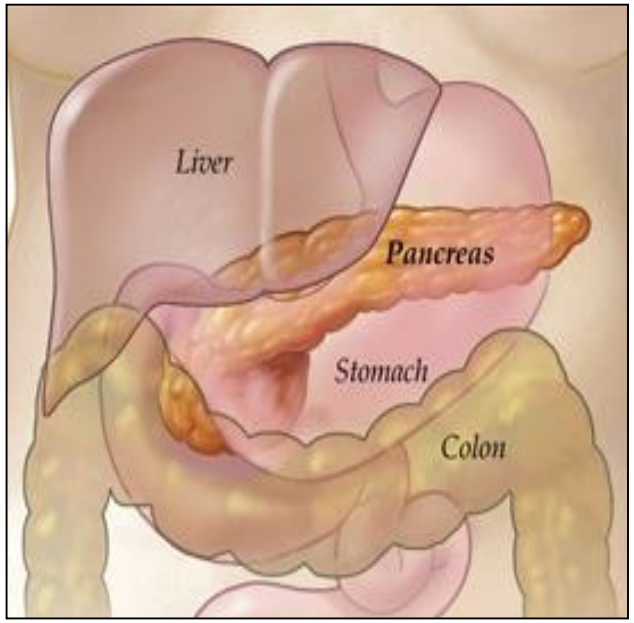


The Pancreases "All Flesh"

RELATIONS OF THE PANCREAS

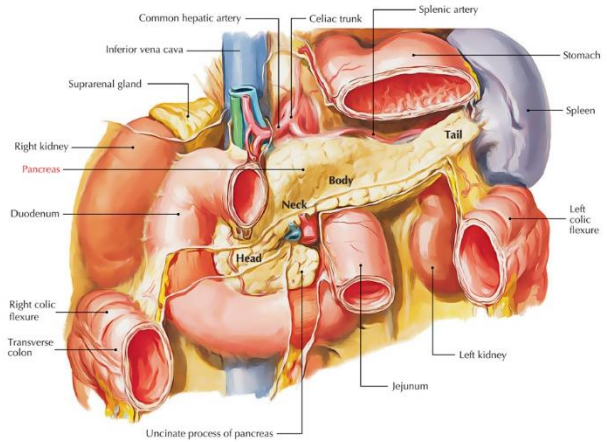
Anterior Relations

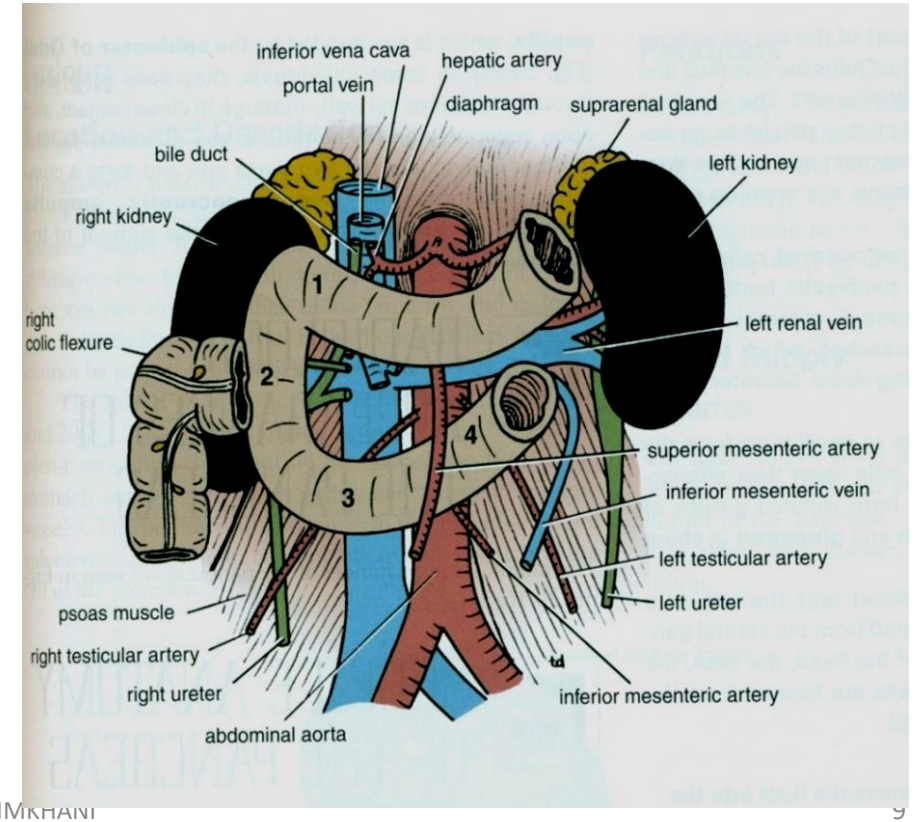
- Stomach separated by lesser sac
- Transverse colon &
- transverse mesocolon



Posterior Relations (from right to left)

- Bile duct, portal & splenic veins,
- inferior vena cava,
- aorta & origin of SMA
- Left psoas muscle,
- Left adrenal gland,
- left renal vessels & upper 1/3rd of left kidney
- Hilum of the spleen.





The Pancreases "All Flesh"

PANCREATIC DUCTS

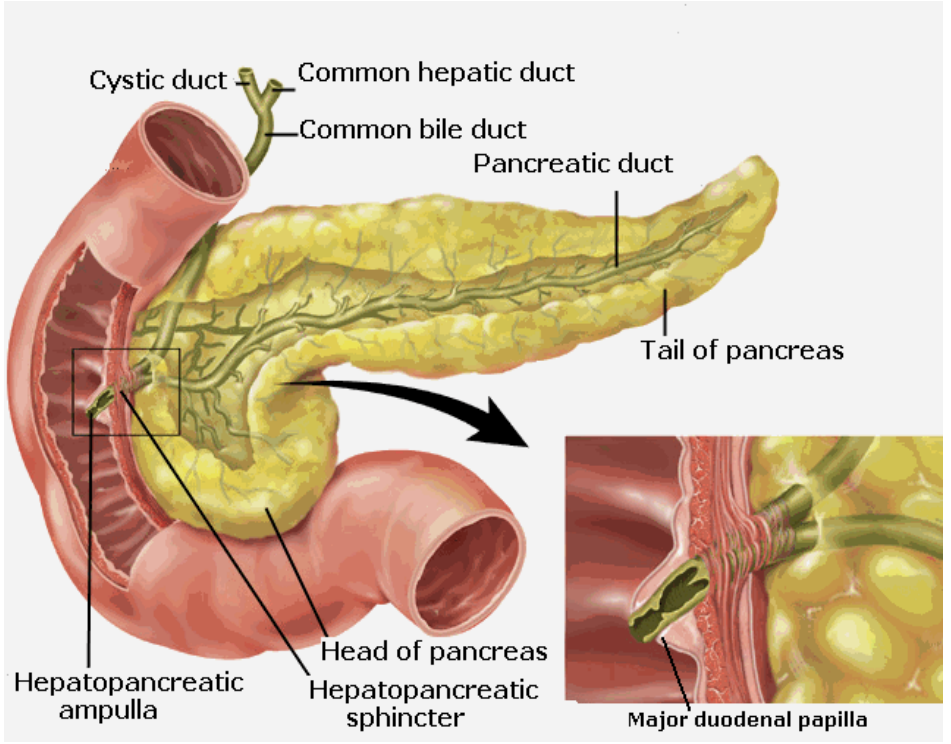
- **Main duct (of Wirsung)**
- **Accessory duct (of Santorini)**

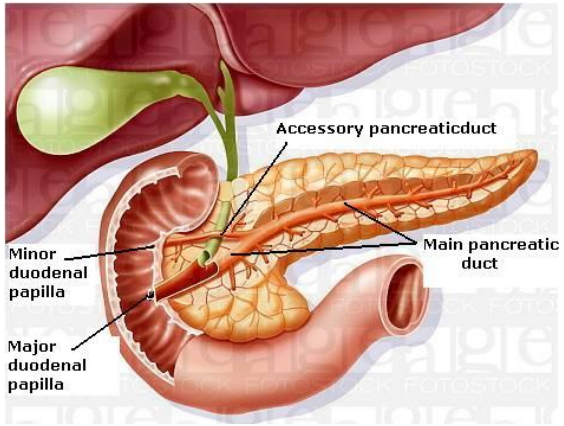
Main duct (of Wirsung)

- runs the entire length of pancreas beginning from the tail.
- It drain whole pancreas **except** upper portion of the head i.e.(tail, body, neck, inferior portion of head & uncinate process.
- Joins common bile duct & together they open into a small hepatopancreatic ampulla (Ampulla of Vater) in the 2nd part of the duodenum.
- The ampulla opens by a narrow mouth on the summit of major duodenal papilla 8–10 cm distal to the pylorus.

Accessory duct (of Santorini)

- drains superior portion of the head
- It empties separately into 2nd part of duodenum at (minor duodenal papilla) about 2–3 cm above the opening of main pancreatic duct (6–8 cm distal to pylorus)





BLOOD SUPPLY OF THE PANCERAS

Arterial Supply

- **Head & Neck**

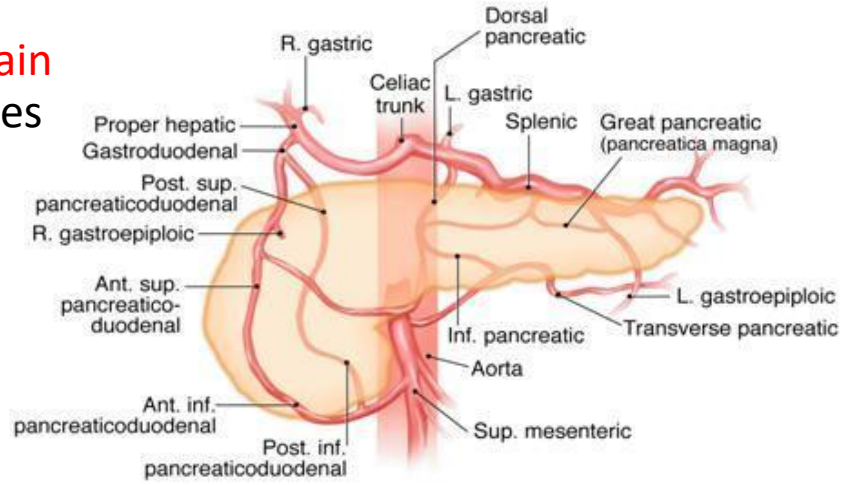
  Supplied by branches from:

  1. Superior pancreatico-duodenal artery br of gastroduodenal artery (GDA), branch of hepatic artery branch of Celiac trunk
  2. Inferior pancreatico-duodenal artery branch of Superior mesenteric artery

- **Body and tail:**

  Supplied by Splenic artery (main artery) through 8- 10 branches

Celiac trunk
↓
Hepatic artery
↓
Gastroduodenal A (GDA)
↓
Superior pancreatico-duodenal A

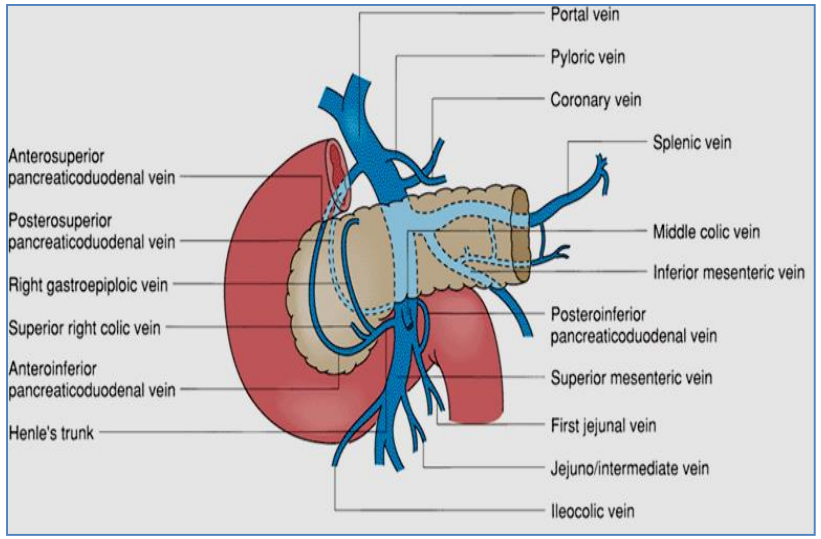


Venous Drainage

- **Head & Neck**
  - Drained by anterior and posterior venous arcades that form **the superior & inferior pancreaticoduodenal veins** which follow the corresponding arteries.

- **Body and tail:**

  Drained by **the splenic vein**, which is a tributary of **the portal vein**



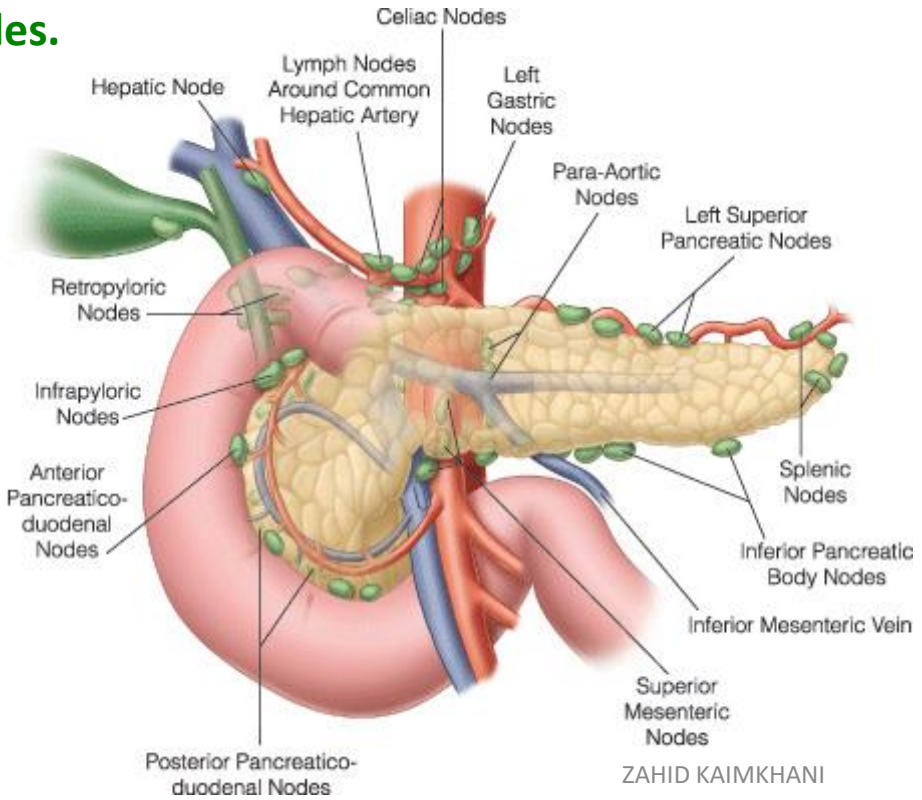
LYMPHATIC DRAINAGE

Rich network that drains into:

- **Pyloric**
- **Hepatic &**
- **Splenic nodes**

Ultimately the **efferent vessels** drain into:

- **the celiac &**
- **superior mesenteric lymph nodes.**



INNERVATION

- **Sympathetic fibers**
  - from the thoracic splanchnic nerves.
  - have a predominantly inhibitory effect
- **Parasympathetic fibers**
  - from the Vagus.
  - stimulate both exocrine and endocrine secretions

CLINICAL ANATOMY

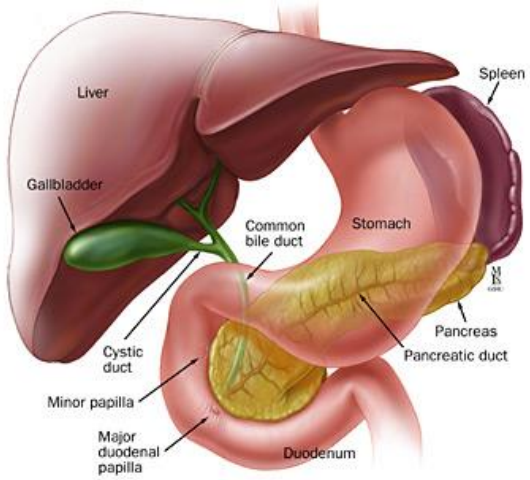
Carcinoma of the head of pancreas

- Is common.
- Compresses the bile duct leading to **persistent obstructive jaundice.**
- May press the portal vein or may involve the stomach due to close vicinity of these structures to the head of pancreas.

Acute pancreatitis

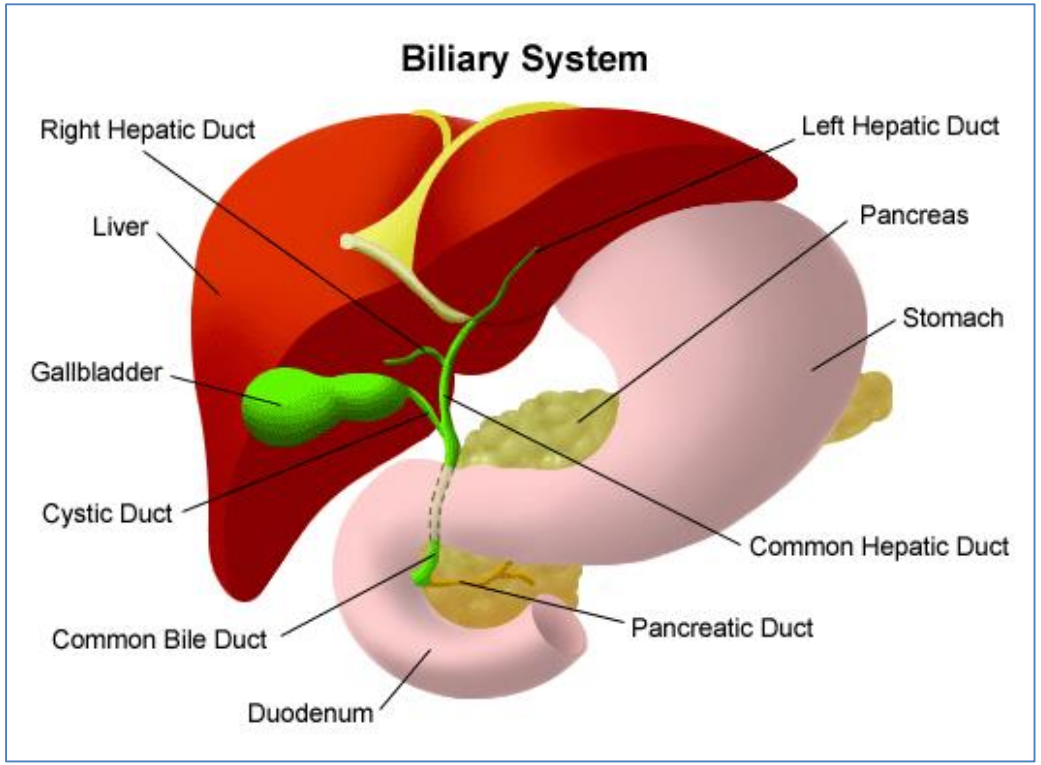
- Is the acute inflammation of the pancreas.
- Occurs due to obstruction of pancreatic duct, ingestion of alcohol, viral infections (mumps), or trauma.
- It is serious condition because activated pancreatic enzymes leak into the substance of pancreas and initiates the autodigestion of the gland.
- Clinically,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

Biliary System



Biliary System

The biliary system consists of **ducts** and **organs** (bile ducts, liver & gallbladder) that are involved in the **production**, **storage** & **transportation** of **bile**.



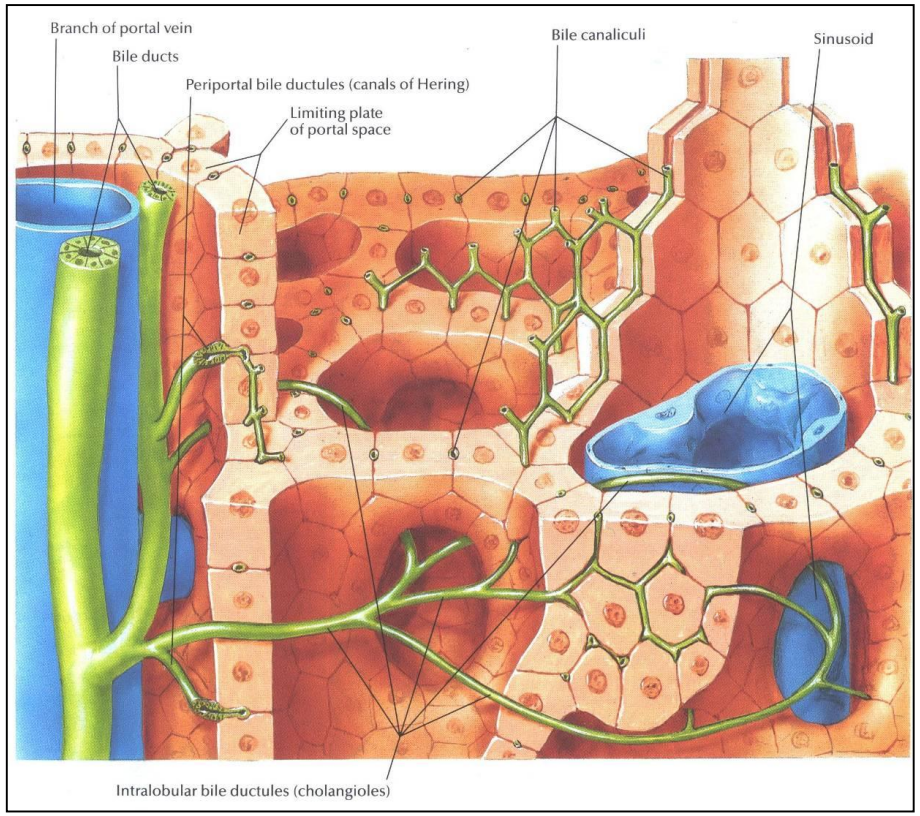
Bile

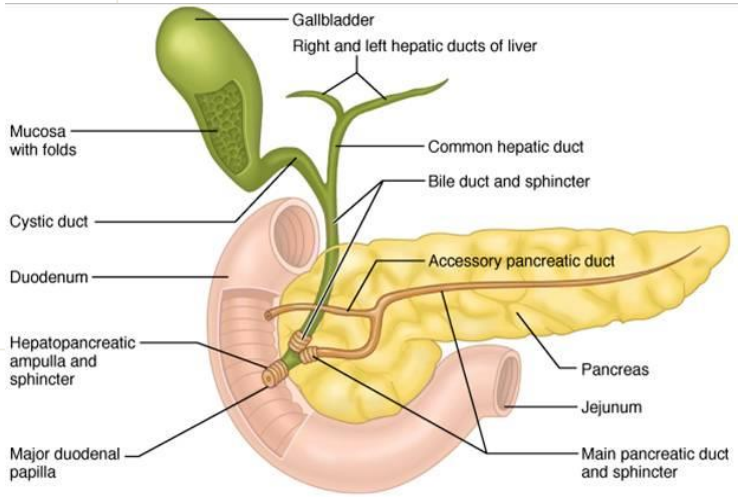
- is secreted by the liver cells
- at a constant rate of about **40 ml per hour**.
- in between digestion, it is **stored and concentrated** in **the gallbladder**;
- later, it is delivered to the duodenum.

The Bile Duct

The Bile Duct consists of

- **Bile canaliculi**
- **Interlobular ducts**
- **Intrahepatic ducts**
- **Right and left hepatic ducts**
- **Common hepatic duct**
- **Cystic duct**
- **Common bile duct (Bile duct)**





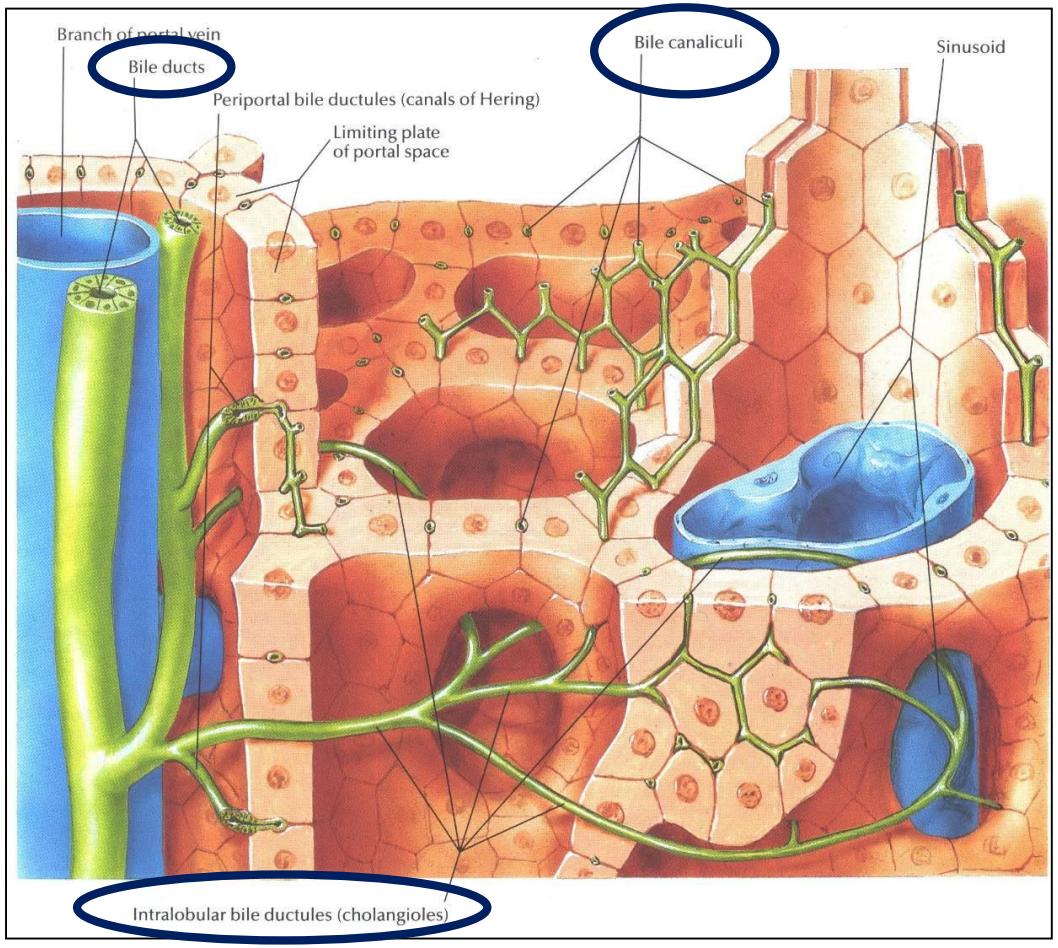
The Bile Duct

The Bile Duct consists of

Bile canaliculi

The **smallest tributaries** of the bile ducts; situated in the **portal canals of the liver**

Receives bile from the hepatocytes



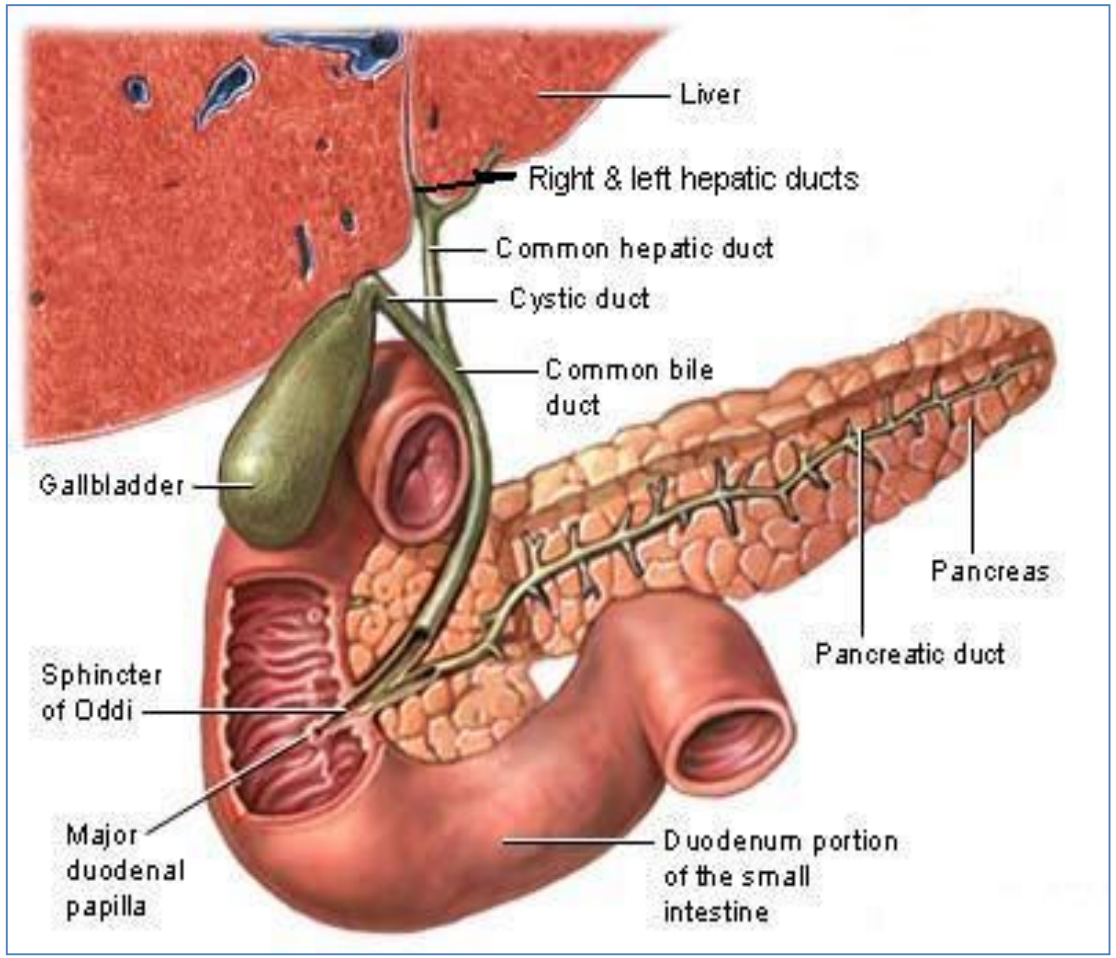
The interlobular ducts join one another to form progressively larger ducts and, eventually, at the porta hepatis, form the **right and left hepatic ducts.**

The Bile Duct

- **The right hepatic duct** drains the right lobe of the liver
- **the left hepatic duct** drains the left lobe, the caudate lobe, & quadrate lobe.
- After a short course, the hepatic ducts unite to form **the common hepatic duct**

the common hepatic duct

- is about 1.5 in. (4 cm) long
- descends within the free margin of the lesser omentum.
- is joined on the right side by the **cystic duct** from the gallbladder to form the **common bile duct**

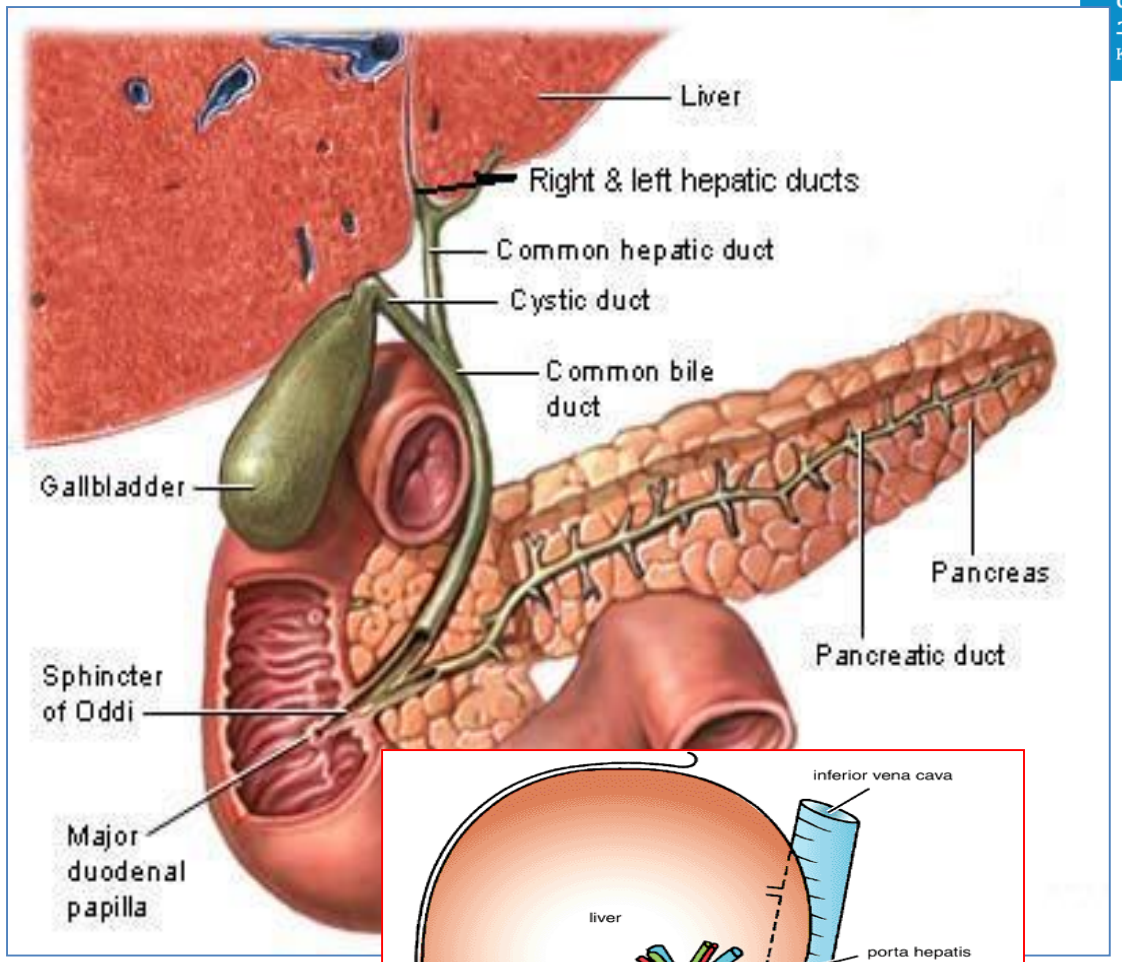


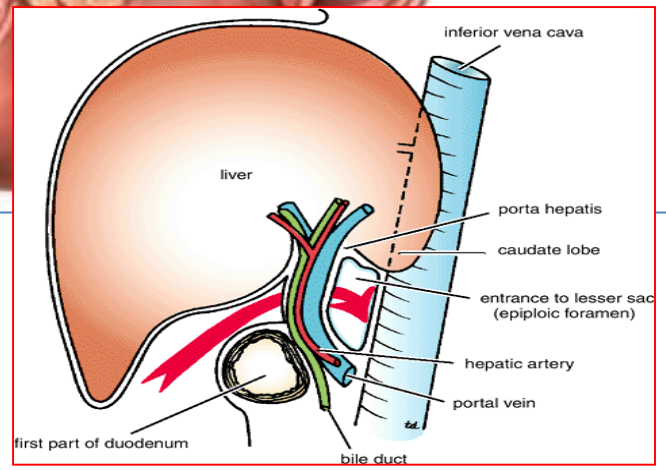
The Bile Duct

The common bile duct

is about 3 inches (8 cm) long.

- **Course**:
  - First it lies in the right free margin of the lesser omentum.
  - Then it runs behind the first part of the duodenum.
  - Lastly it lies in a groove on the posterior surface of the head of the pancreas. Here, the bile duct comes into contact with the main pancreatic duct

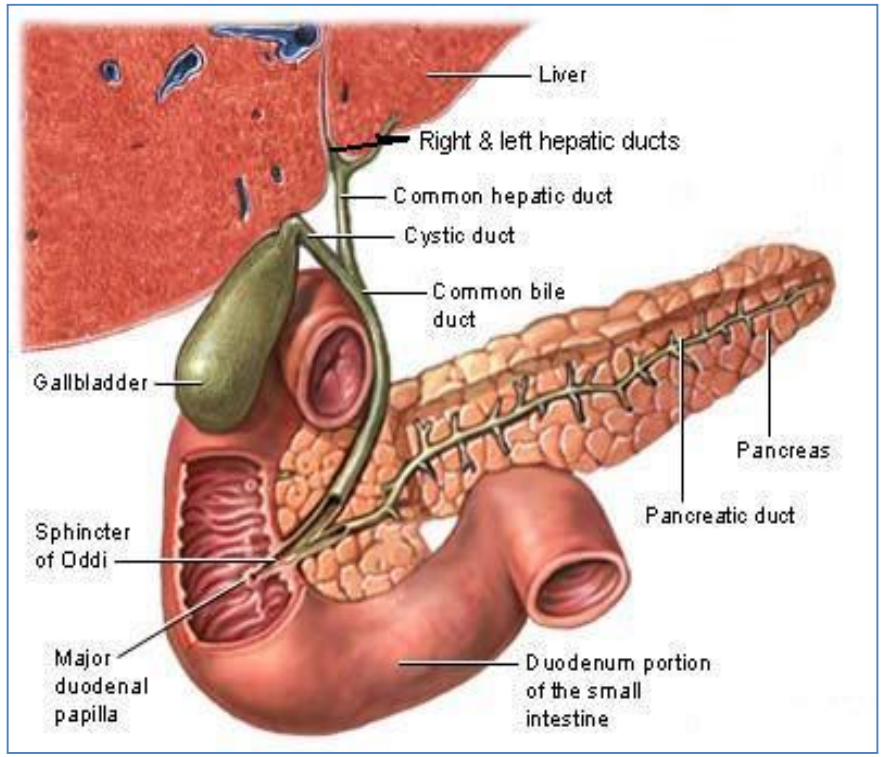


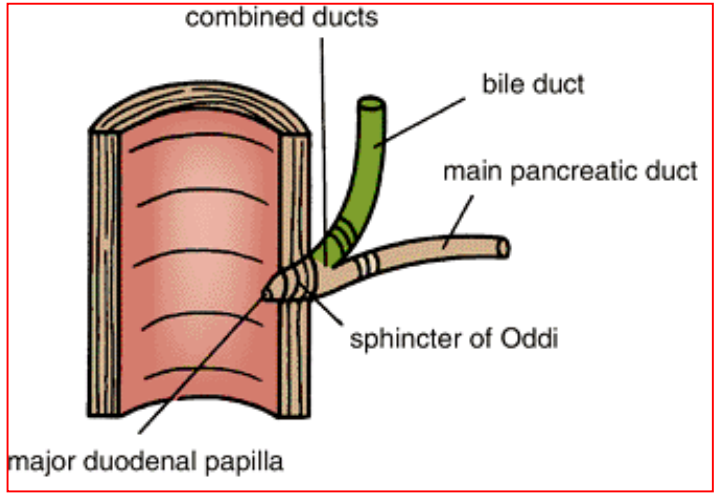


The Bile Duct

The common bile duct

- **ends below** by **piercing the medial wall of the second part of the duodenum** about halfway down its length.
- is usually joined by the main pancreatic duct, and together they open into a small ampulla in the duodenal wall, called the **hepatopancreatic ampulla (ampulla of Vater).**
- The ampulla opens into the lumen of the duodenum by means of a small papilla, **the major duodenal papilla.**
- The terminal parts of both ducts and the ampulla are surrounded by circular muscle, known as **the sphincter of the hepatopancreatic ampulla (sphincter of Oddi).**
- **Occasionally, the bile and pancreatic ducts open separately into the duodenum.**





The Gall Bladder

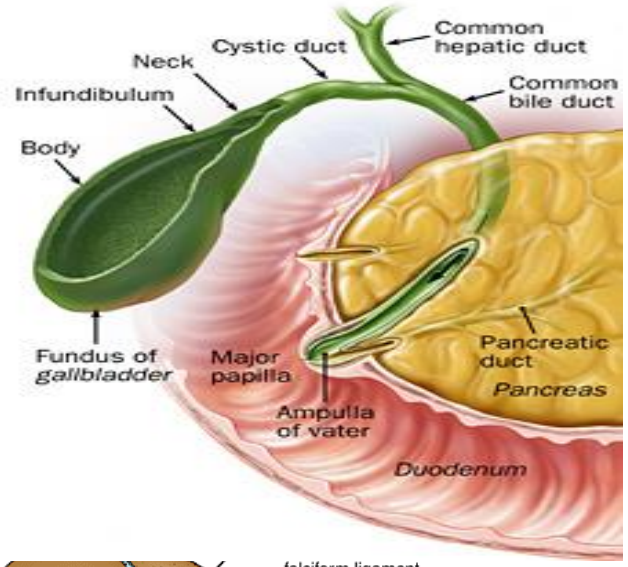
The Gall Bladder

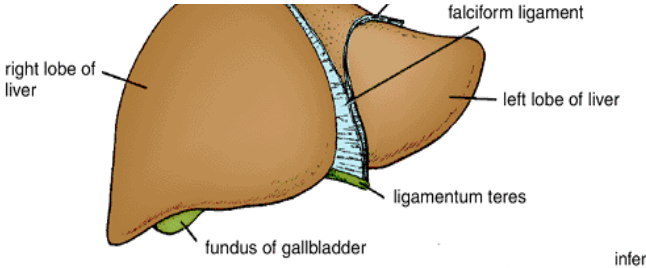
• is a pear-shaped sac lying on the undersurface of the liver.
• has a capacity of 30 to 50 ml
•stores and concentrate the bile
•The gallbladder is divided into:
- Fundus
- •Body, and
- •Neck.

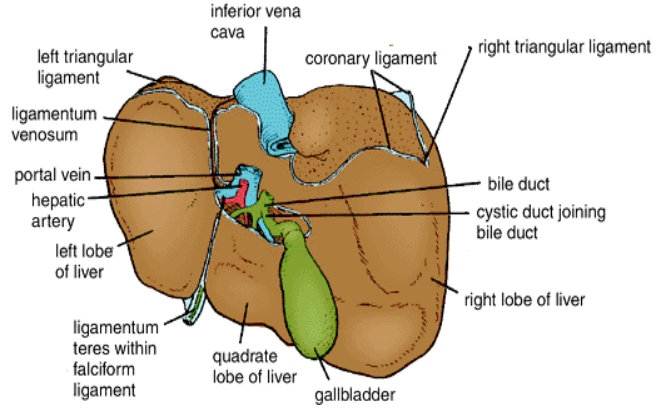
The fundus is rounded and projects below the inferior margin of the liver, where it comes in contact with the anterior abdominal wall at the level of the tip of the ninth right costal cartilage.

The body lies in contact with the visceral surface of the liver and is directed upward, backward, and to the left.

The neck becomes continuous with the cystic duct, which turns into the lesser omentum, joins the common hepatic duct, to form the bile duct







The Gall Bladder

The **peritoneum completely surrounds the fundus** of the gallbladder and binds the body and neck to the visceral surface of the liver.

Relations of the Gall Bladder

Anterior Relations

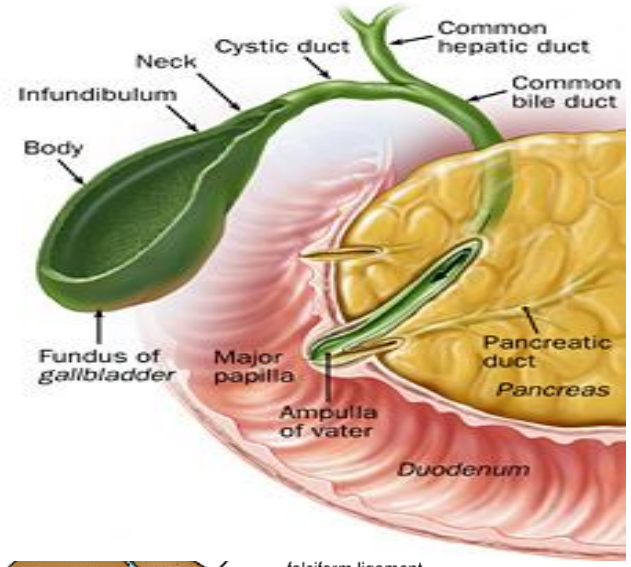
The anterior abdominal wall and the inferior surface of the liver

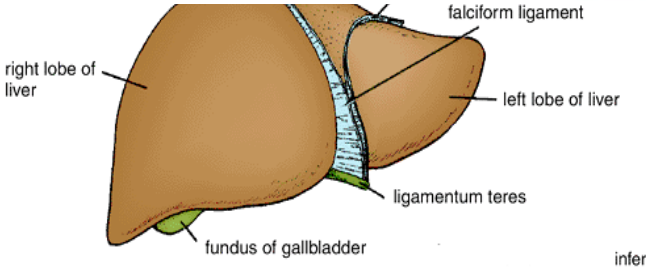
Posterior Relations

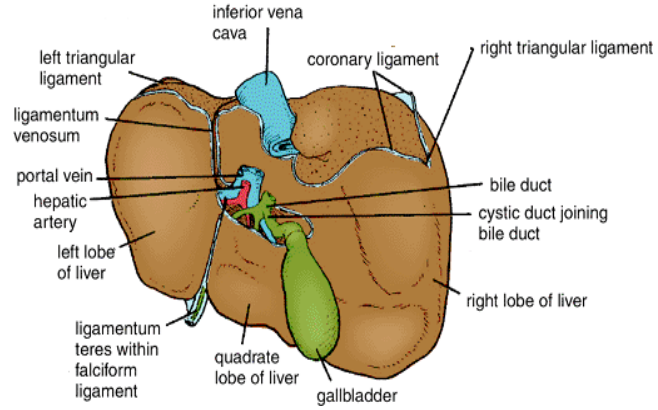
The transverse colon and the first and second parts of the duodenum

Function of the Gallbladder

- **concentrates** & **stores bile**
- selectively **absorbs bile salts**
- **keeps the bile acid**
- **excretes cholesterol**
- **secretes mucus.**
- To aid in these functions, the mucous membrane is thrown into permanent folds that unite with each other, giving the surface a honeycombed appearance.



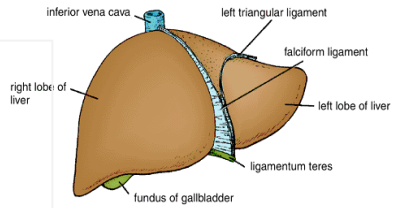


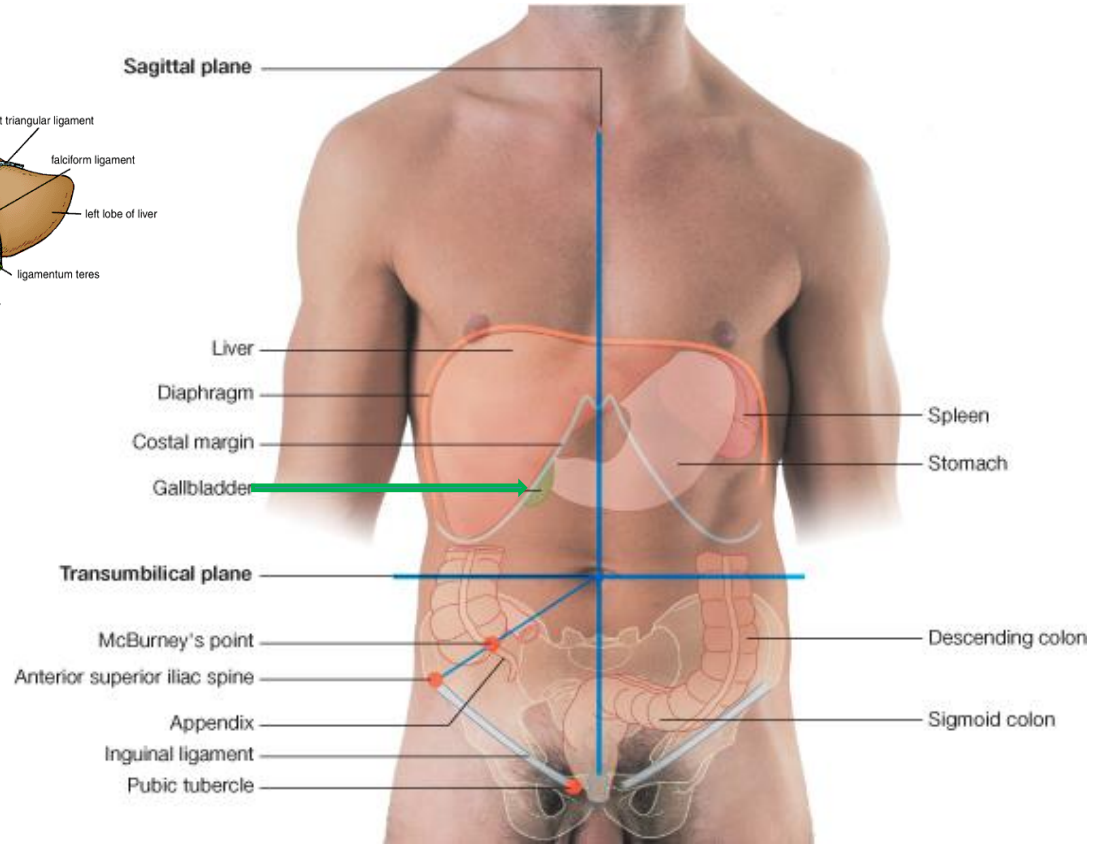


The Gall Bladder

Surface Anatomy of the Gall Bladder

The Fundus comes in contact with the anterior abdominal wall at the level of the Tip of the Right Ninth costal cartilage.



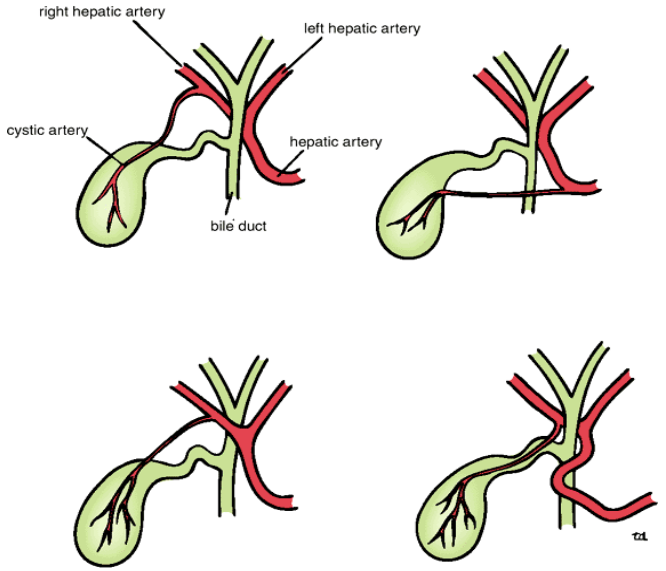


The Gall Bladder

Blood Supply of the Gall Bladder

- **The cystic artery**, a branch of the **right hepatic artery**.
- **The cystic vein** drains directly into **the portal vein**.

Note:
Several very small arteries and veins also run between the liver and gallbladder.



Lymph Drainage

- The lymph drains into a **cystic lymph node** situated near the neck of the gallbladder. From here, the lymph vessels pass to **the hepatic nodes** **along the course of the hepatic artery and then to the celiac nodes**.

Nerve Supply

- Sympathetic and parasympathetic vagal fibers form the celiac plexus.
- **Note:**

  The gallbladder contracts in response to the **hormone cholecystokinin**, which is produced by the mucous membrane of the duodenum on the arrival of fatty food from the stomach

The Gall Bladder

Cystic Duct

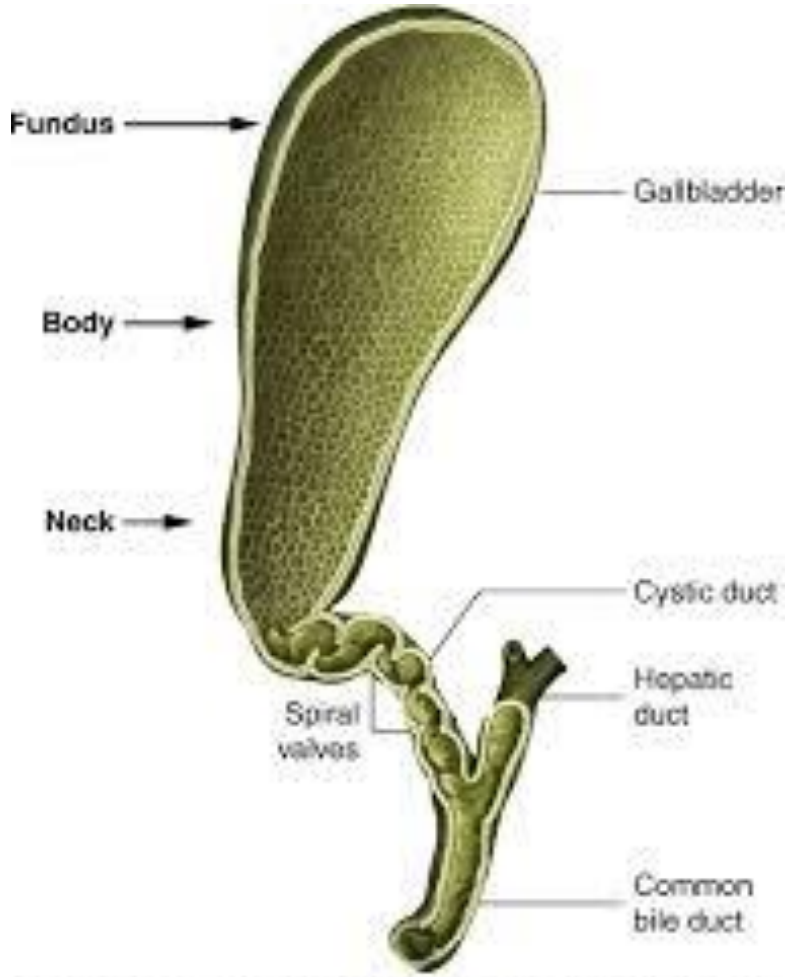
- is about 1.5 in. (3.8 cm) long
- connects the neck of the gallbladder to the common hepatic duct to form the bile duct.

- is usually somewhat S-shaped and descends for a variable distance in the right free margin of the lesser omentum.

- mucous membrane of the cystic duct is raised to form a spiral fold that is continuous with a similar fold in the neck of the gallbladder.

- The fold is commonly known as the “spiral valve.”

- The function of the spiral valve is to keep the lumen constantly open.




ngiyabonga
شكراً جزيلاً
danke
謝謝
teşekkür ederim
спасибо
dank je
thank you
gracias
tapadh leat
mauruuru
hvala
bedankt
mochchakkeram
dziękuję
go raibh maith agat
sukriya
kop khun krap
obrigado
sagolun
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