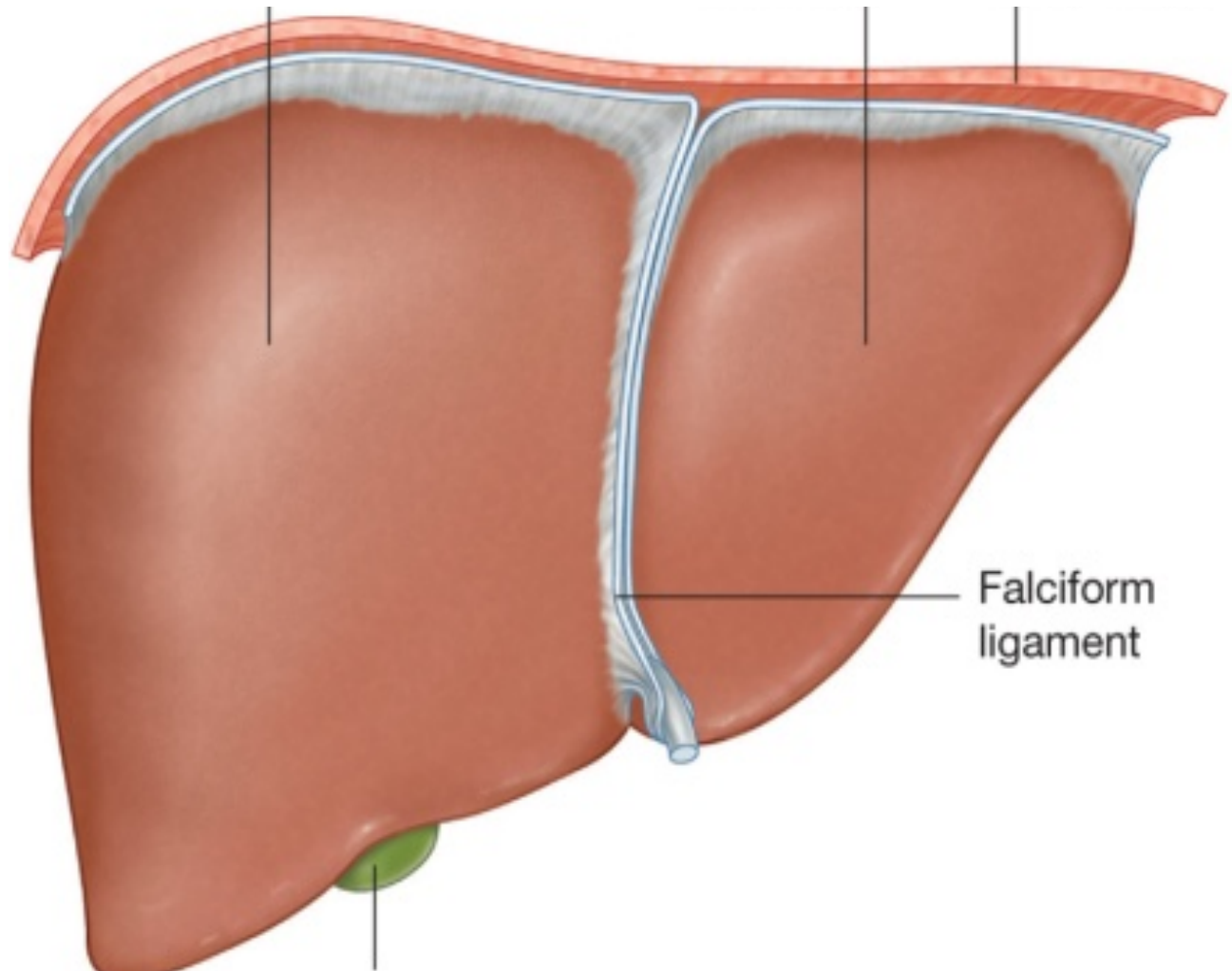


Liver & Spleen



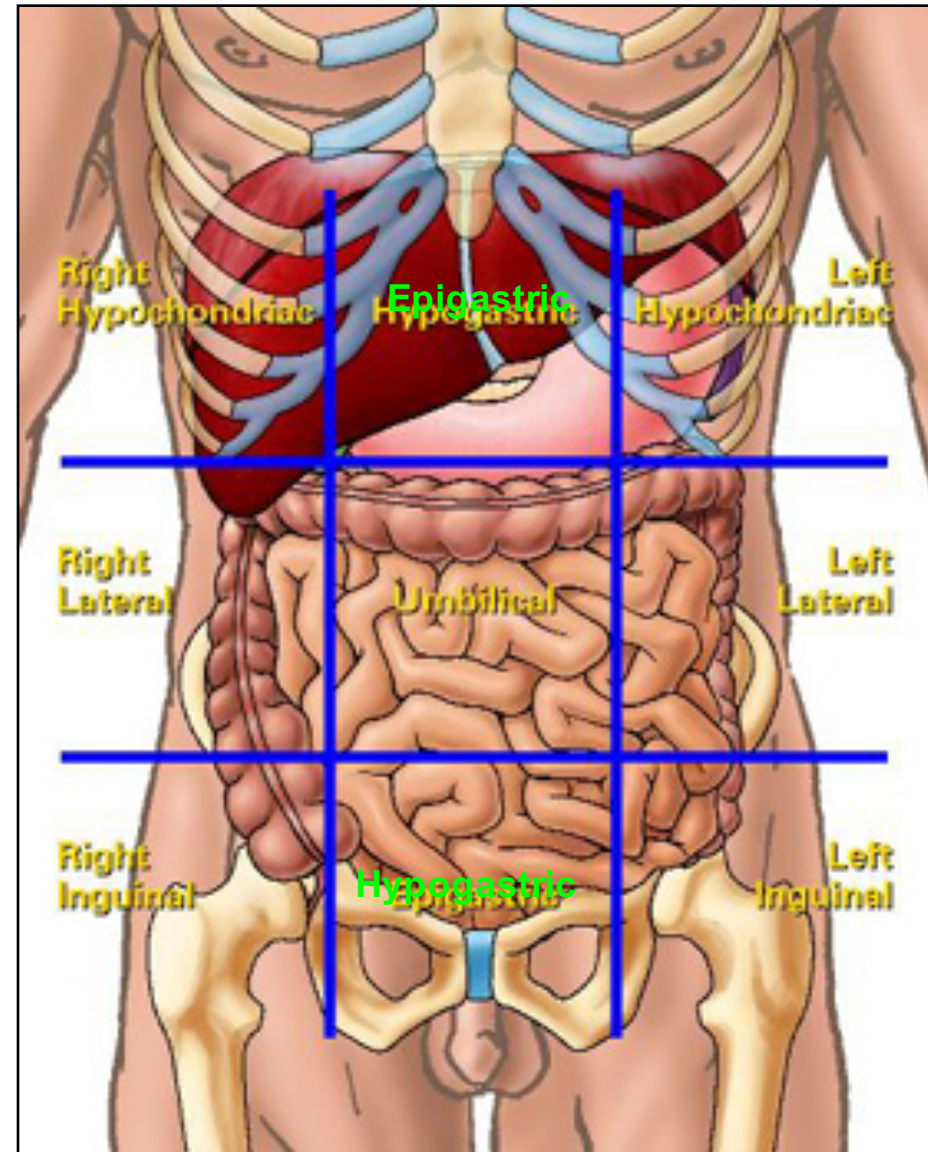
Objectives

By the end of the lecture, you should be able to describe the:

- Location, subdivisions and relations and peritoneal reflection of liver.
- Blood supply, nerve supply and lymphatic drainage of liver.
- Location, subdivisions and relations and peritoneal reflection of spleen.
- Blood supply, nerve supply and lymphatic drainage of spleen.

- **The largest gland in the body.**
- Weighs approximately 1500 g. (2.5% of adult body weight).
- **Lies mainly in:**
 - **Right hypochondrium,**
 - **Epigastrium and**
 - **Left hypochondrium.**
- **Protected by** the thoracic cage and diaphragm, lies **deep to ribs 7-11 on the right side** and crosses the midline toward the left nipple.
- **Moves with the diaphragm** and is **located more inferiorly in erect posture** because of gravity.

Liver



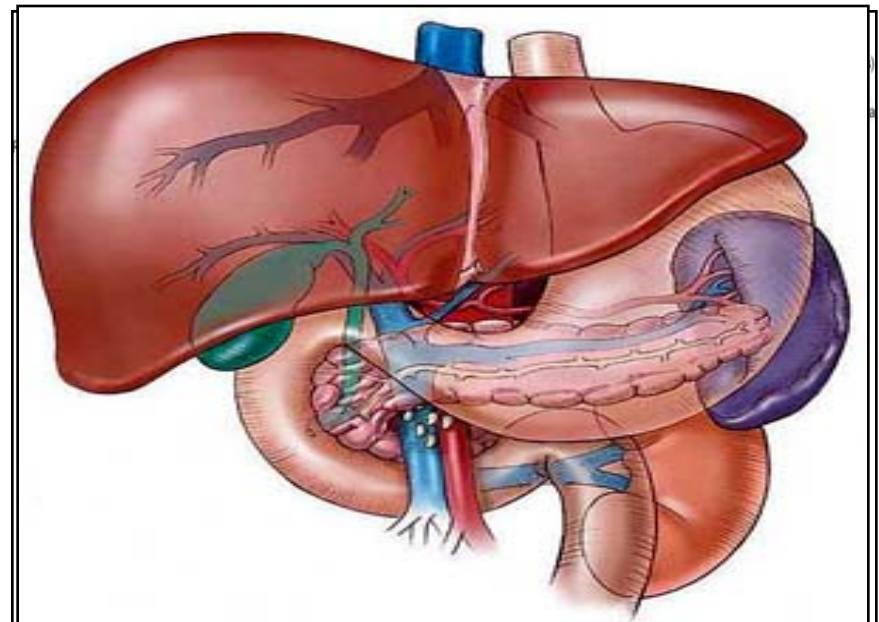
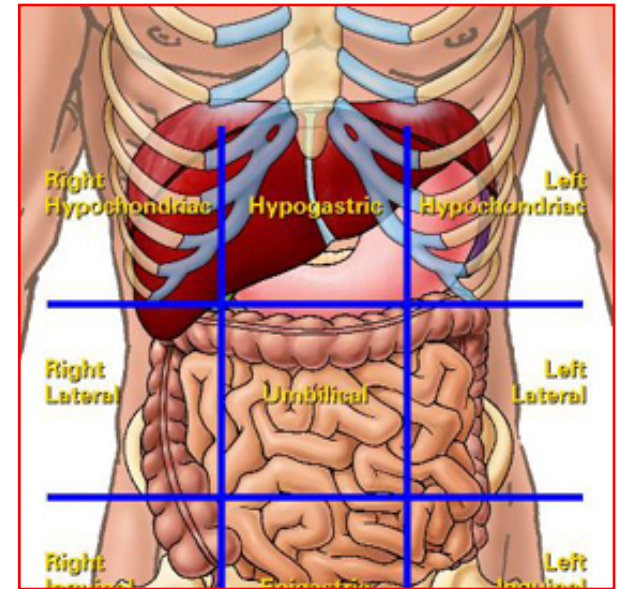
Relations of Liver

- **Anterior:**

1. Diaphragm,
2. Right and left costal margins,
3. Right and left pleura,
4. Right and left lungs,
5. Xiphoid process,
6. Anterior abdominal wall.

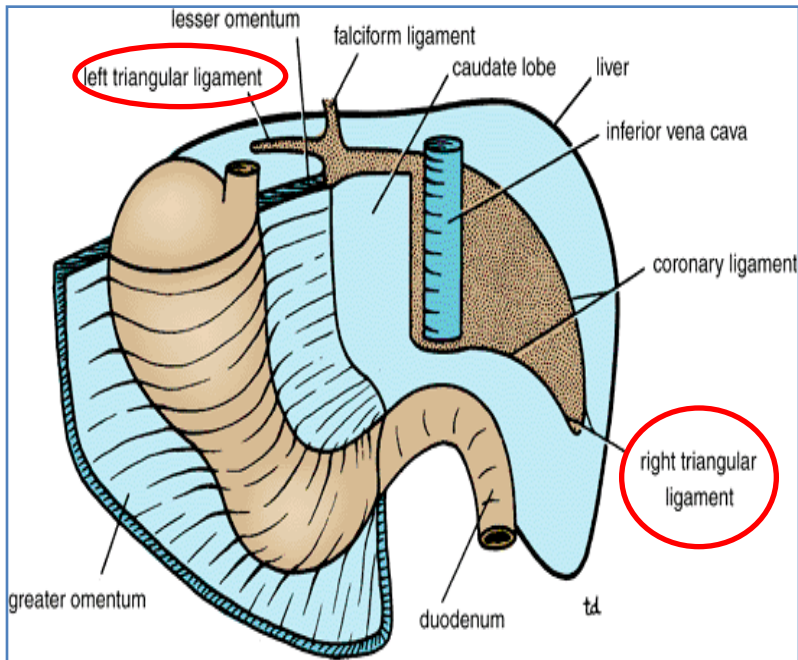
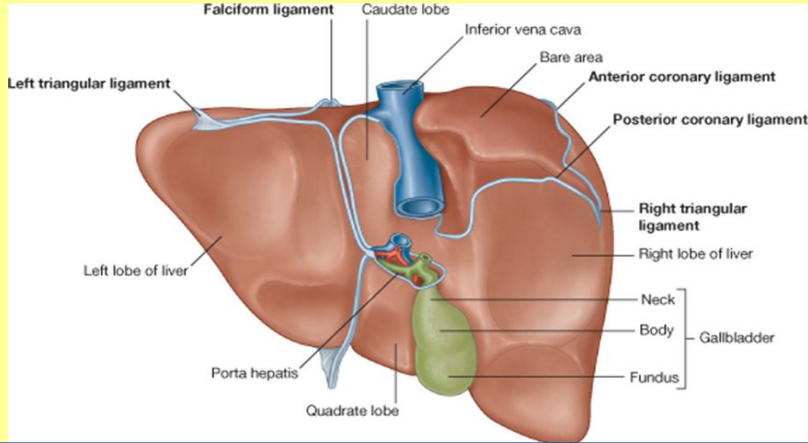
- **Posterior:**

1. Diaphragm,
2. Right kidney,
3. Right suprarenal gland,
4. Right colic (hepatic) flexure,
5. Duodenum,
6. Gallbladder,
7. Inferior vena cava,
8. Esophagus and
9. Fundus of the stomach.



Peritoneal Reflection

POSTERIOR SURFACE OF LIVER



- The liver is completely surrounded by a fibrous capsule.
- It is partially covered by peritoneum.
- The **bare area of the liver** is an area lying on the diaphragmatic surface (on posterior surface of right lobe) where there is **no peritoneum** between the liver and the diaphragm.

➤ Boundaries of Bare area:

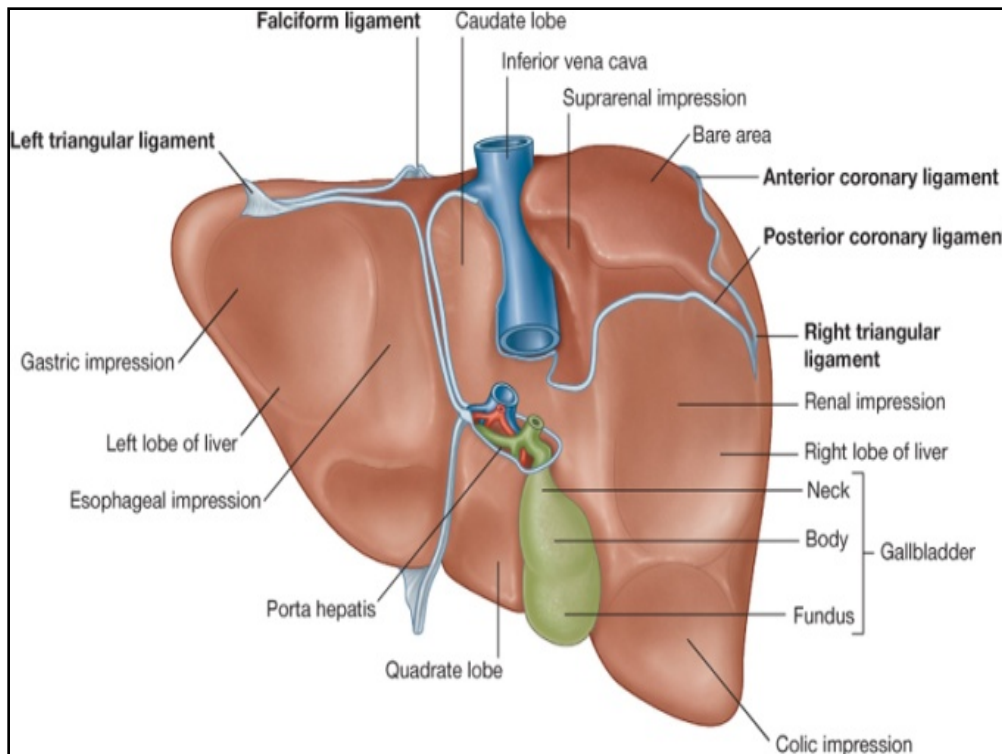
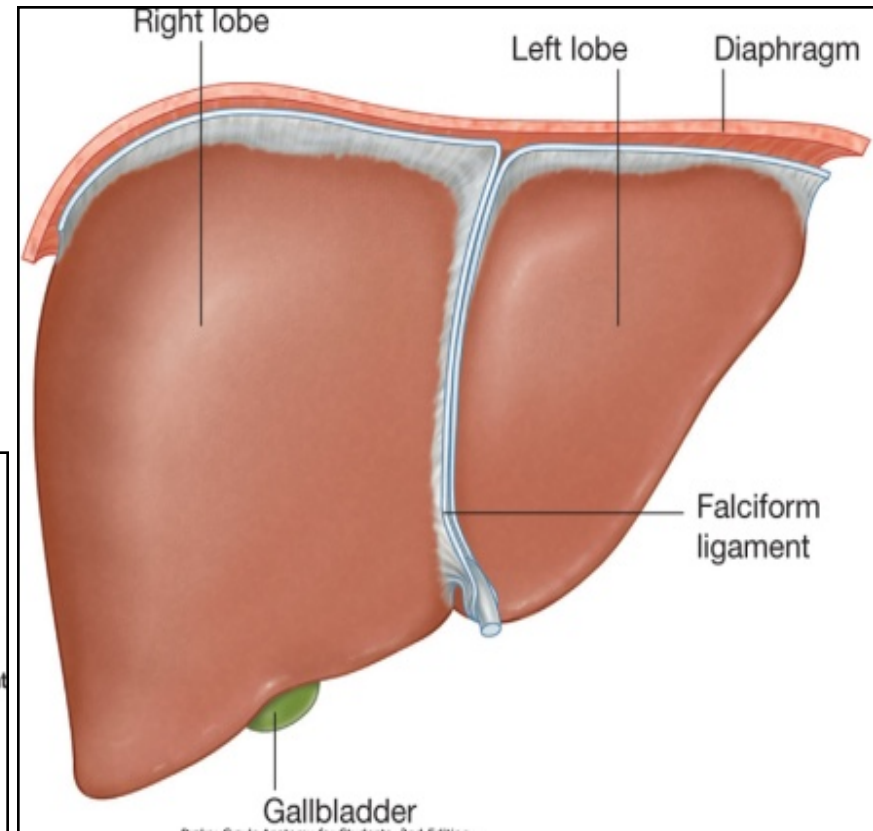
- **Anterior:** Superior layer of coronary ligament.
- **Posterior:** Inferior layer of coronary ligament.
- **Right:** Right triangular ligaments.
- **Left:** Groove for inferior vena cava.

Other bare areas of the liver include:

1. Porta hepatis,
2. Gall bladder fossa.&
3. Grooves for IVC.

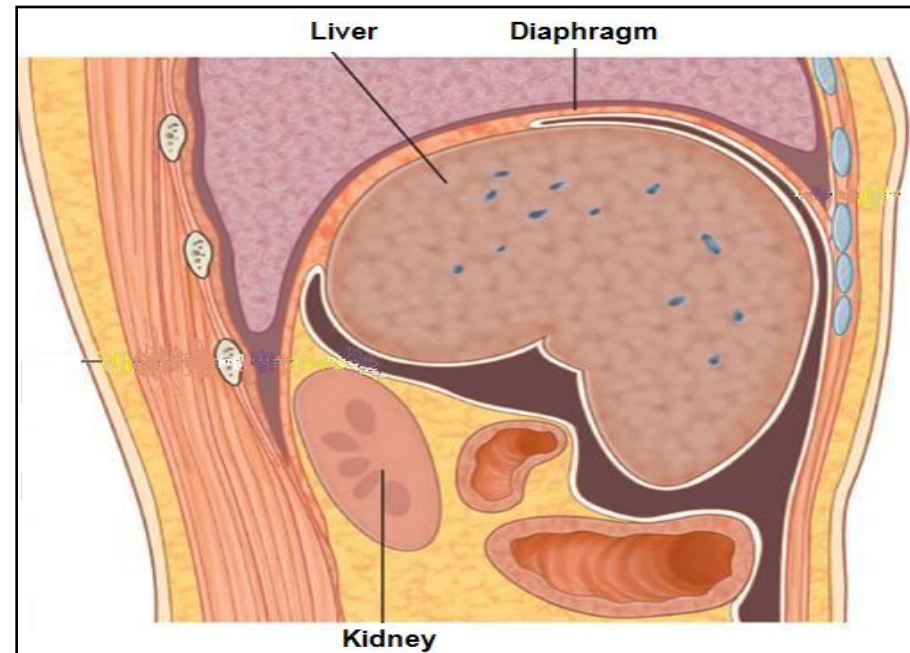
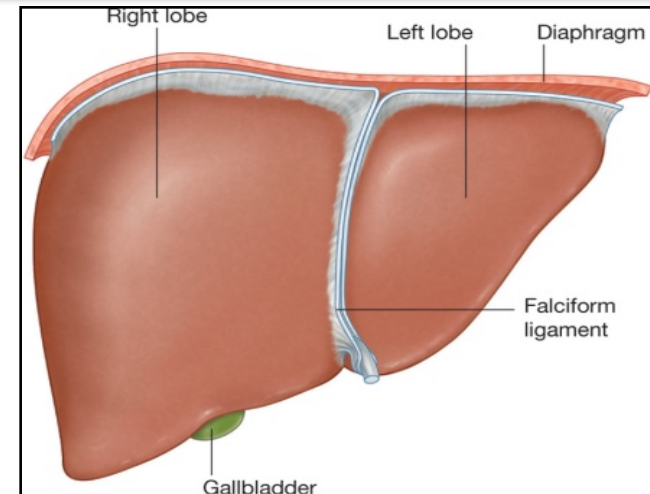
Surfaces of Liver

- The liver has **two surfaces**:
 - A convex **diaphragmatic** surface, (superior, anterior and right lateral surface).
 - A relatively flat or even concave **visceral** surface. (posteroinferior).



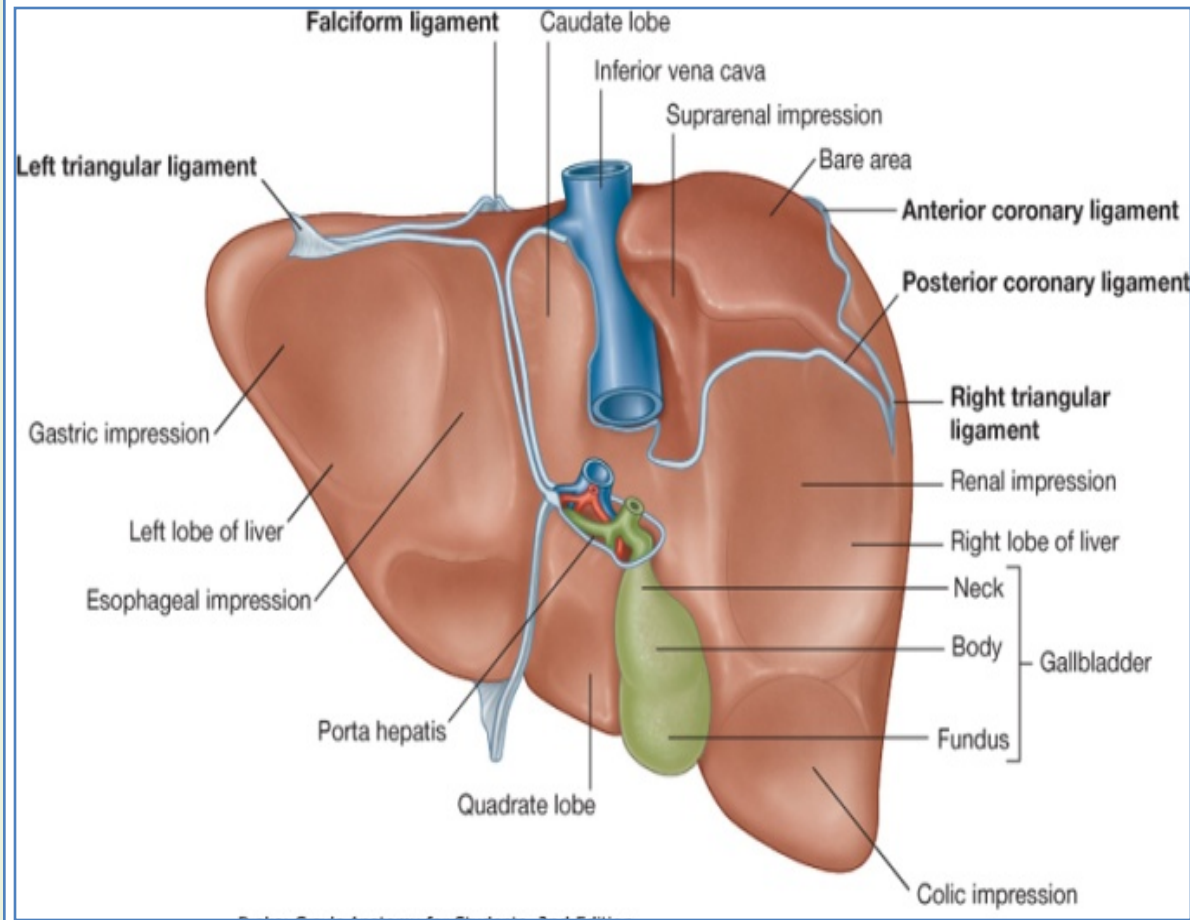
Diaphragmatic Surface

- The **convex** upper, anterior and right lateral surface is **smooth** and **molded to the undersurface of the domes** of the **diaphragm**.
- The **diaphragm** separates the liver from pleurae, base of both lungs, pericardium, and heart.
- It is **covered** with **visceral peritoneum**, **except posteriorly** in the **bare area of the liver**, where it lies in direct contact with the diaphragm.



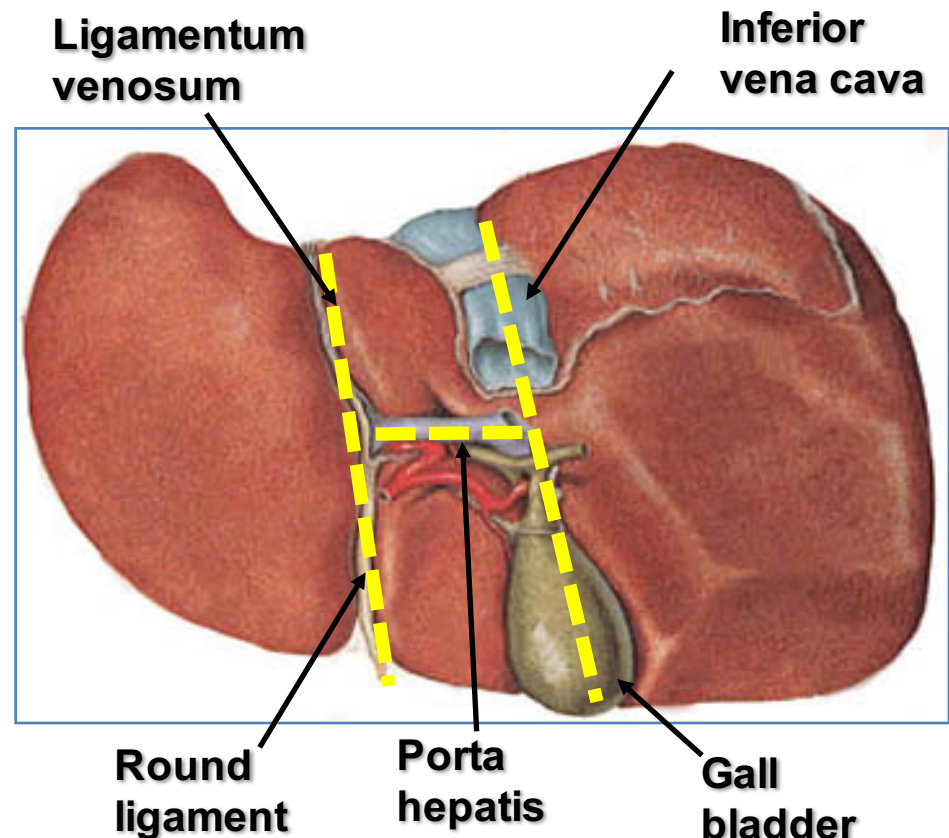
Visceral Surface

- The **visceral** or the **posteroinferior surface**, is related to the abdominal viscera.
- **It is covered** with peritoneum, except 3 areas:
- **Gallbladder fossa,**
- **Porta hepatis.**
- **I.V.C groove.**
- **It bears** multiple **fissures** and **impressions** due to contact with other **organs.**



Fissures

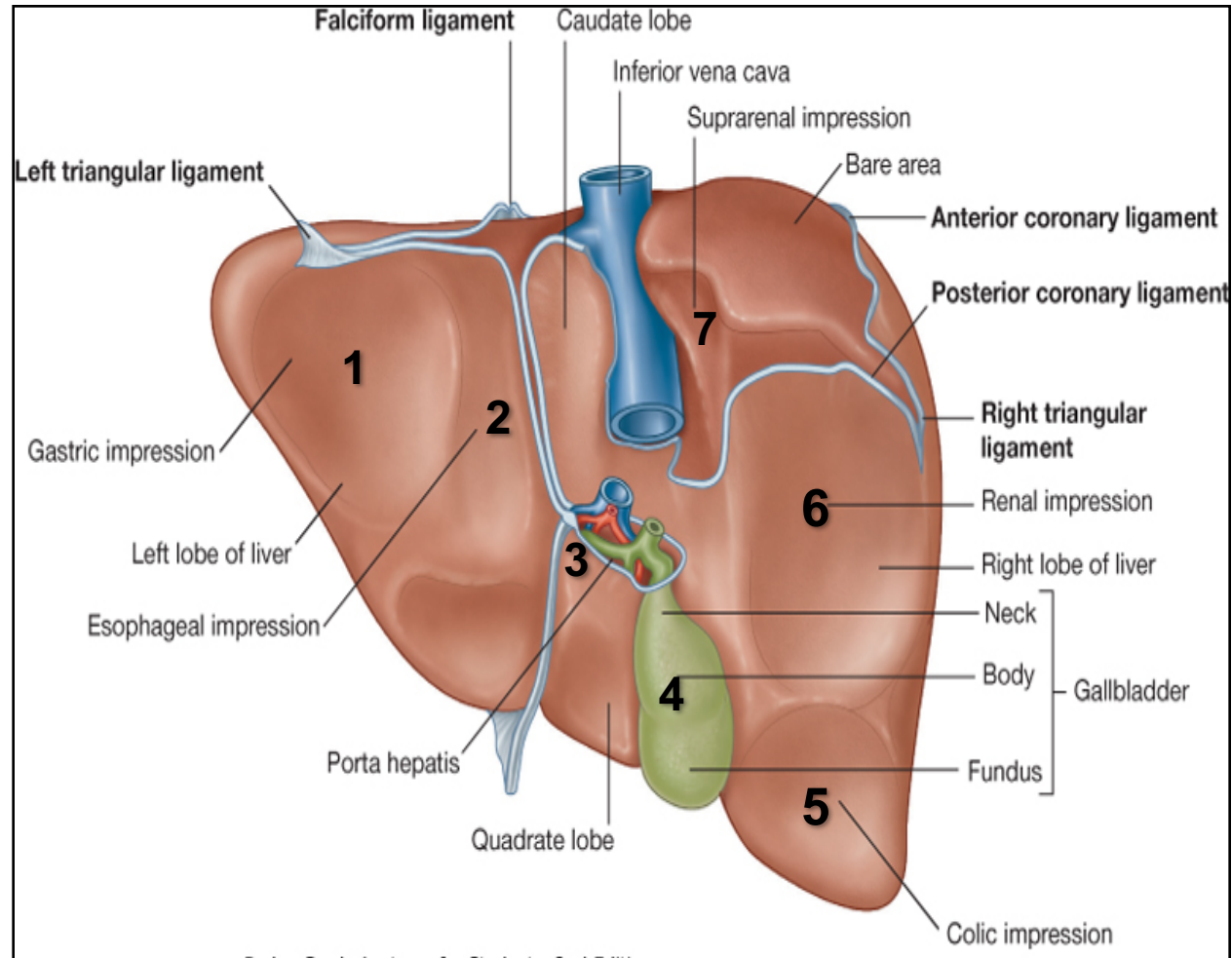
- Two sagittally oriented fissures, **linked centrally** by **transverse porta hepatis**, form the letter **H** on the **visceral surface**.
- The **left fissure** is the continuous groove formed:
 - **Anteriorly** by the **fissure for the round ligament**, (**teres**).
 - **Posteriorly** by the **fissure for the ligamentum venosum**.
- The **right fissure** is the continuous groove formed:
 - **Anteriorly** by **gallbladder fossa**.
 - **Posteriorly** by the groove for the **inferior vena cava**.



Relations of Visceral Surface of the Liver

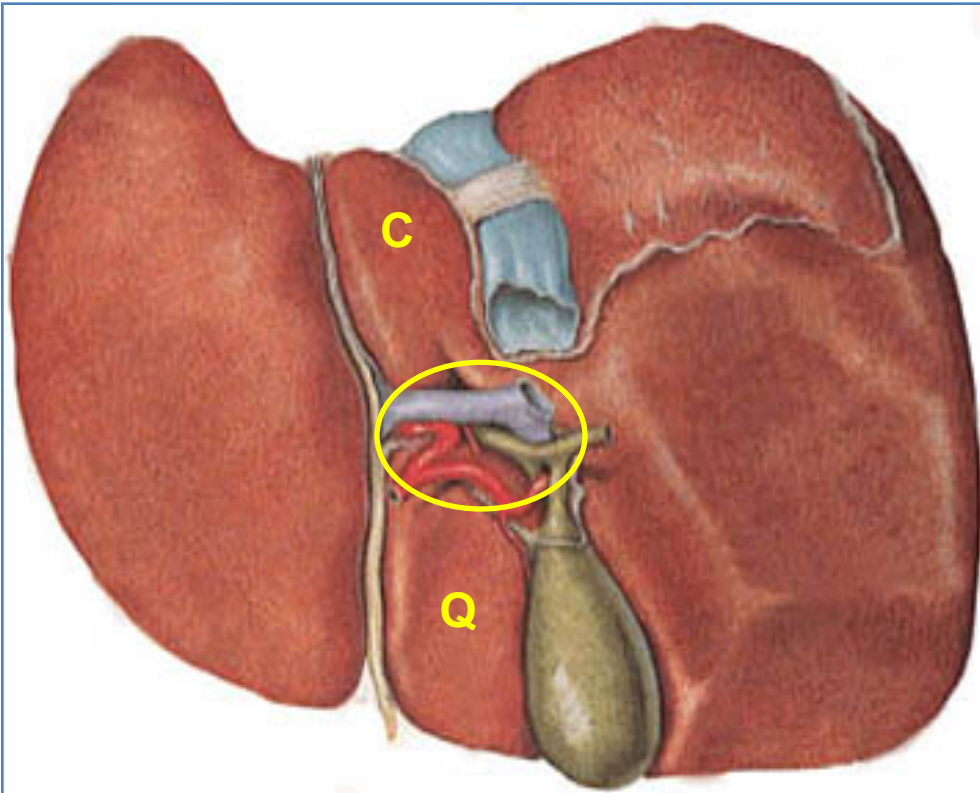
The visceral surface is related to:

1. Stomach.
2. Esophagus.
3. Lesser omentum.
4. Gallbladder.
5. Right colic flexure
6. Right kidney.
7. Right suprarenal gland.



Porta Hepatis (Hilum of the Liver)

- A transverse fissure on the **visceral surface** which lies between **caudate** and **quadrate** lobes.
- Its margins is attached to the upper part of **lesser omentum**



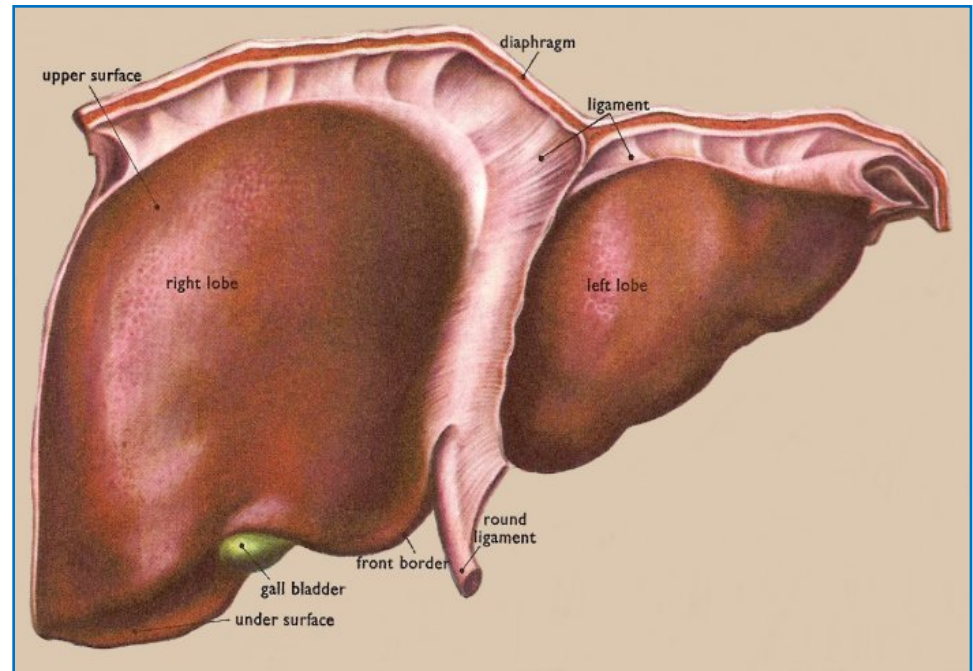
Structures passing through the porta hepatis include:

- Right and left **hepatic ducts**.
- Right and left branches of the **hepatic artery**.
- Right and left branches of the **portal vein**.
- Sympathetic and **parasympathetic fibers**.
- A few **hepatic lymph nodes** lie here; they drain the liver and gallbladder and **send their efferent vessels** to the **celiac lymph nodes**.
- NB. The 2 hepatic veins open in the posterior surface on the groove for IVC.

Ligaments of the Liver

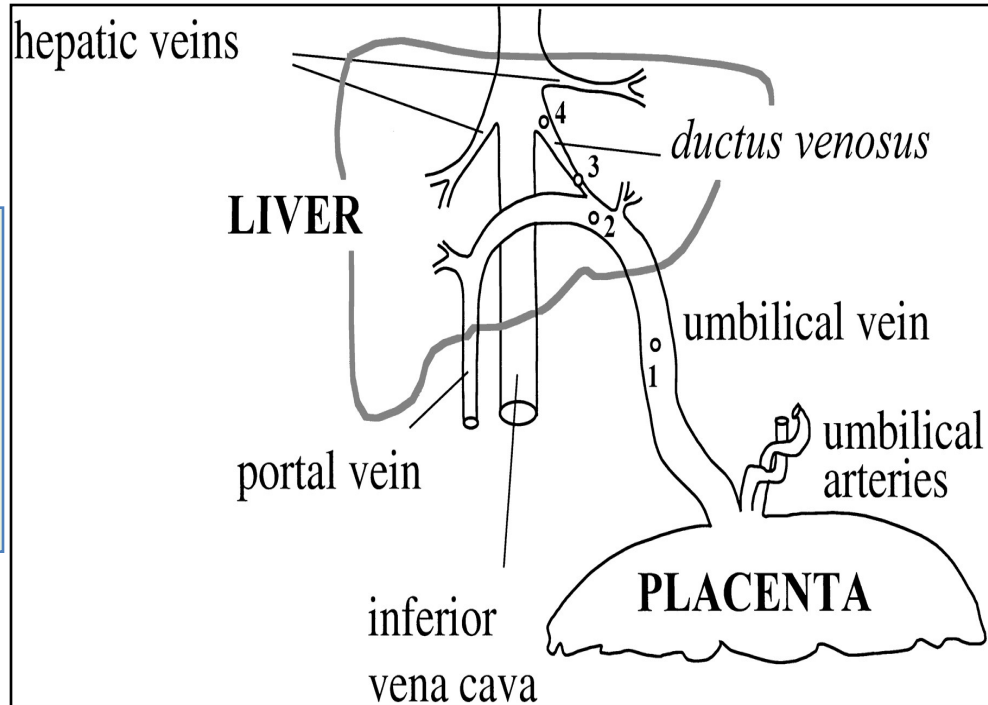
Falciform ligament

- It is a **two-layered fold of the peritoneum**, connects the liver to the diaphragm; anterior abdominal wall & umbilicus.
- Its sickle-shaped **free margin contains the ligamentum teres (round Ligament) of liver.**
- It is **obliterated umbilical vein**, which carried **oxygenated** blood from the **placenta** to the **fetus**.



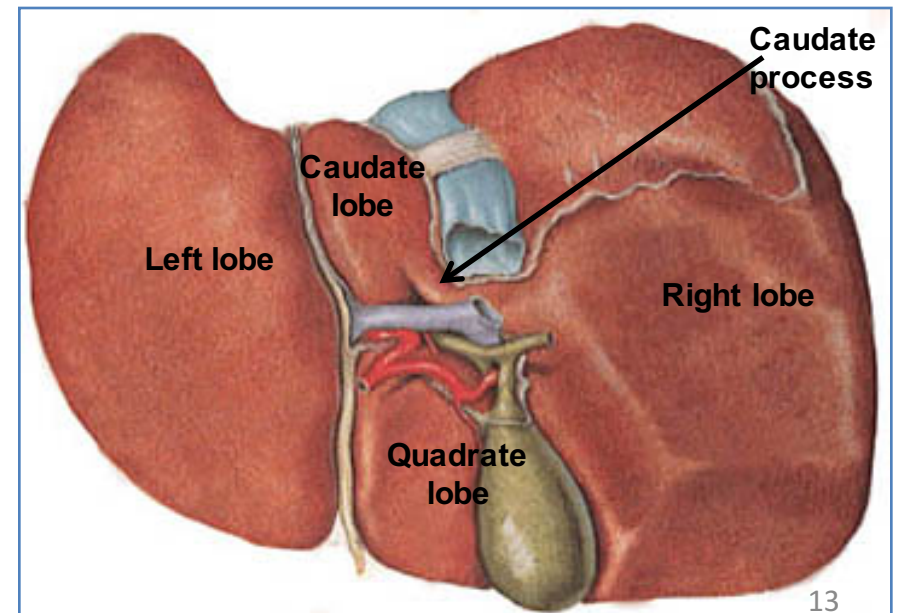
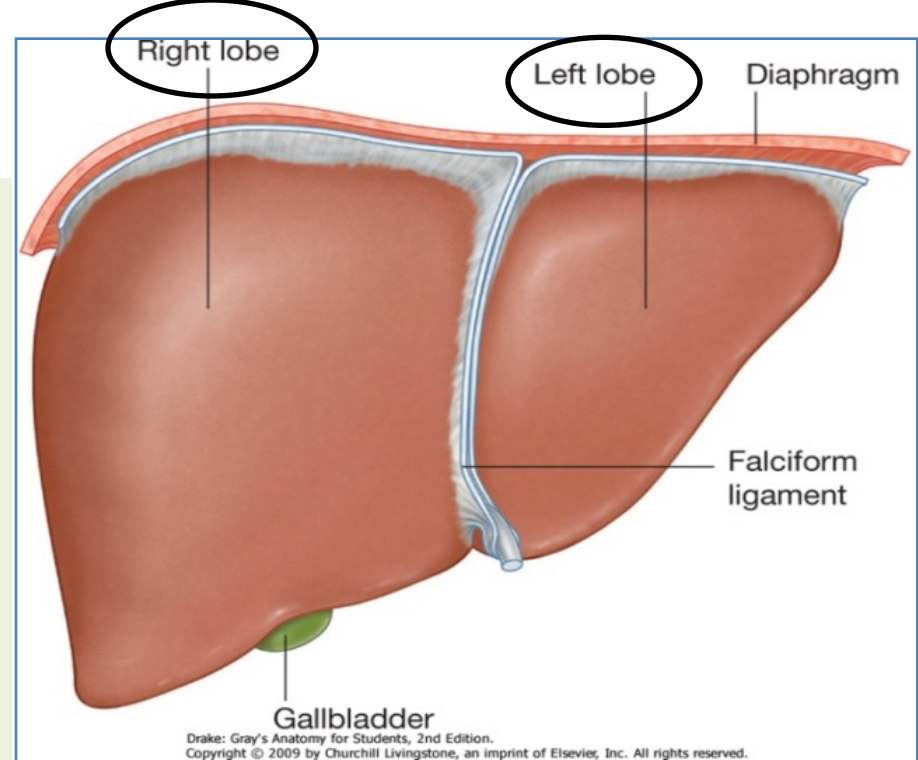
Ligamentum venosum

It is the **fibrous remnant of fetal ductus venosus**, which shunted blood from the **umbilical vein** to the **IVC** in **intrauterine fetal life**.



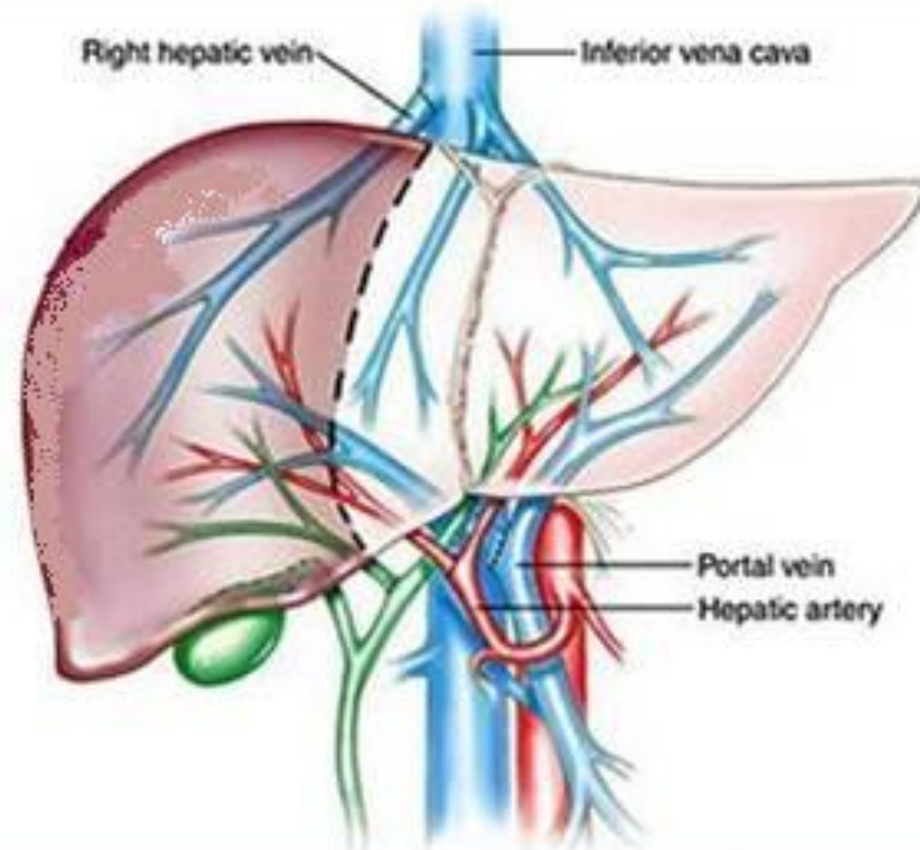
Lobes of The Liver

- The liver is divided into a large **right lobe** and a small **left lobe** by the attachment of the **falciform ligament**.
- The right lobe is further divided into a **quadrate lobe** and a **caudate lobe** by :
 - Gallbladder,
 - Fissure for the ligamentum teres,
 - Groove for inferior vena cava,
 - Fissure for ligamentum venosum.
- The caudate lobe is connected to the right lobe by the **caudate process**.
- The quadrate and caudate lobes are a functional part of the **left lobe** of the liver. (because of its supplying with left branches of C.H.Duct; Portal v.& Hepatic Ar.).



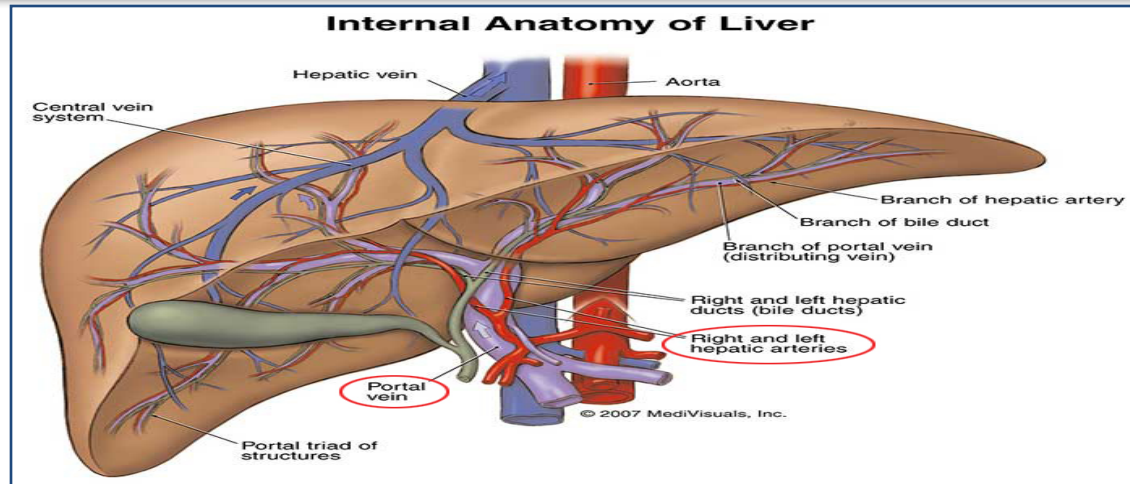
Blood Circulation through the Liver

- The blood vessels **conveying** blood to the liver are:
 - **Hepatic artery** (30%)
 - **Portal vein** (70%).
- The **hepatic artery** brings **oxygenated blood** to the liver.
- The **portal vein** brings **venous blood** rich in the **end products of digestion**, which have been absorbed from the gastrointestinal tract.



The **venous blood** is drained by **2 hepatic veins** which drain into the **inferior vena cava**.

Blood Circulation through the Liver



- At or close to the porta hepatis, the **hepatic artery** and **portal vein** terminate by dividing into **right** and **left primary branches** to the **corresponding lobe of the liver**.
- **Within the liver**, the primary branches divide to give **secondary** and **tertiary** branches to supply the **hepatic segments** independently.

- The **hepatic veins**, are **intersegmental** in their **distribution and function**, draining parts of adjacent segments.
- The **attachment of these veins to the IVC** helps to hold the liver in **position**. (The **peritoneal ligaments** and the tone of the **abdominal muscles** play a **minor role** in liver support.

Lymph Drainage

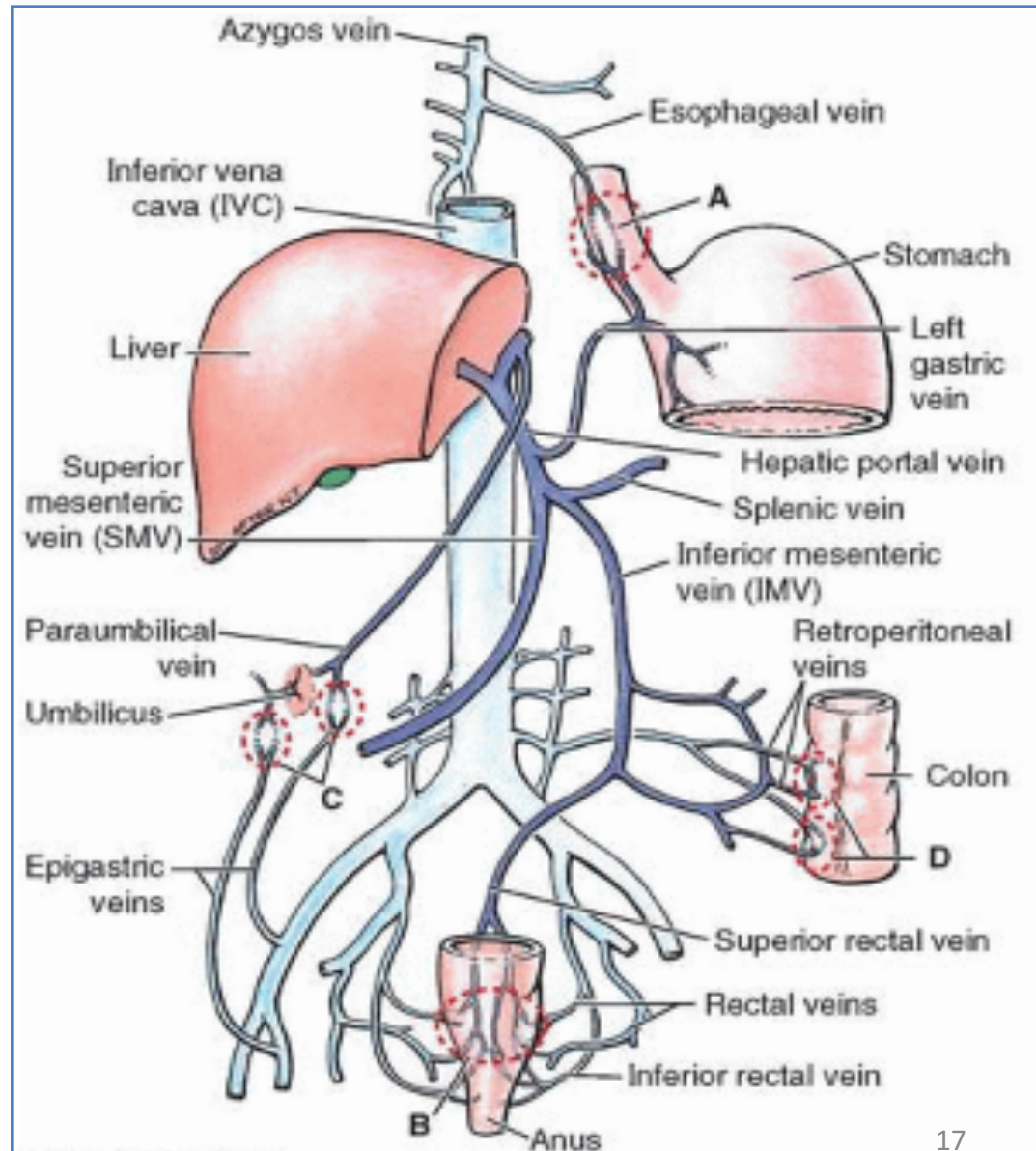
- The liver produces a large amount of lymph—about one third to one half of all body lymph.
- The **lymph vessels** leave the liver **to** enter several **lymph nodes** in the **porta hepatis**.
- The **efferent vessels** pass to the **celiac lymph nodes**.
- A **few vessels** pass from the **bare area** of the liver through the diaphragm **to** the **posterior mediastinal lymph nodes**.

Nerve Supply

- **Sympathetic** and **parasympathetic** nerves from :
- The **celiac plexus and**
- The **anterior vagal trunk** gives rise to a **large hepatic branch**, which passes **directly to the liver**.

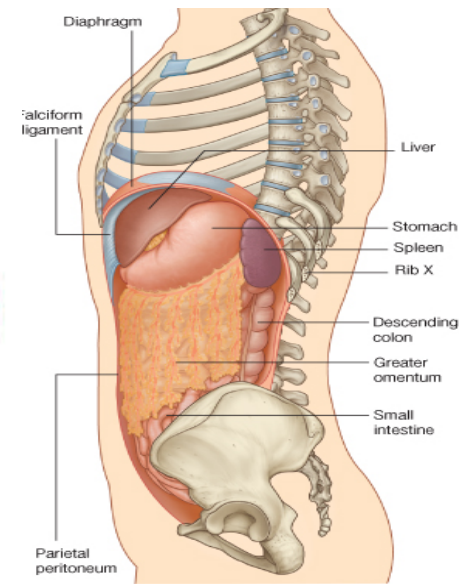
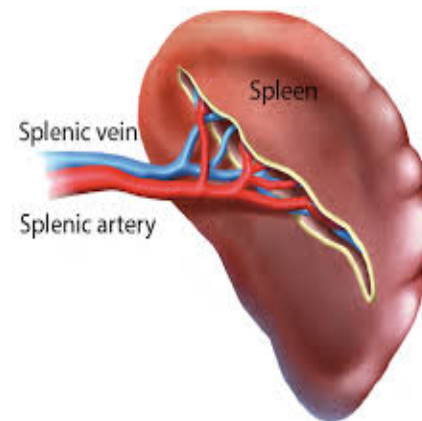
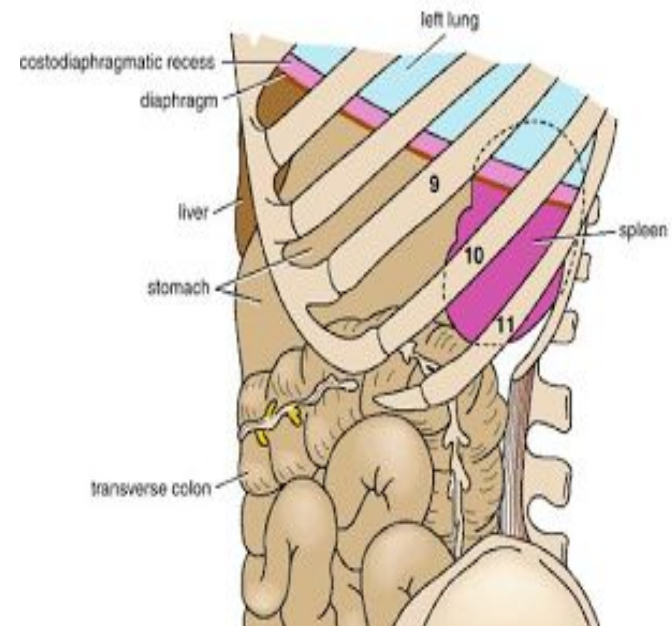
Portal-Systemic (Portocaval) Anastomosis

- It is a specific type of **anastomosis** that occurs **between** the **veins of portal circulation** and those of **systemic circulation**.
- In **portal hypertension**, these anastomosis open and form venous dilatation called **varices**.
- **Sites:**
 - A. Esophagus (lower end).
 - B. Anal canal (upper end).
 - C. Paraumbilical region.
 - D. Retroperitoneal.
 - E. Intrahepatic (Patent ductus venosus).

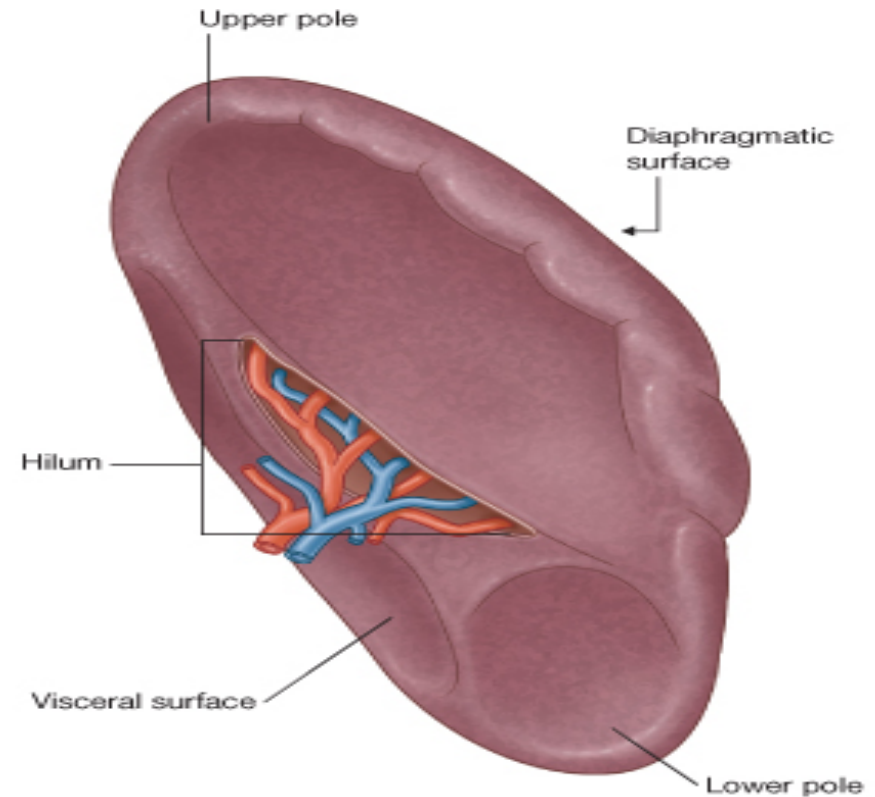
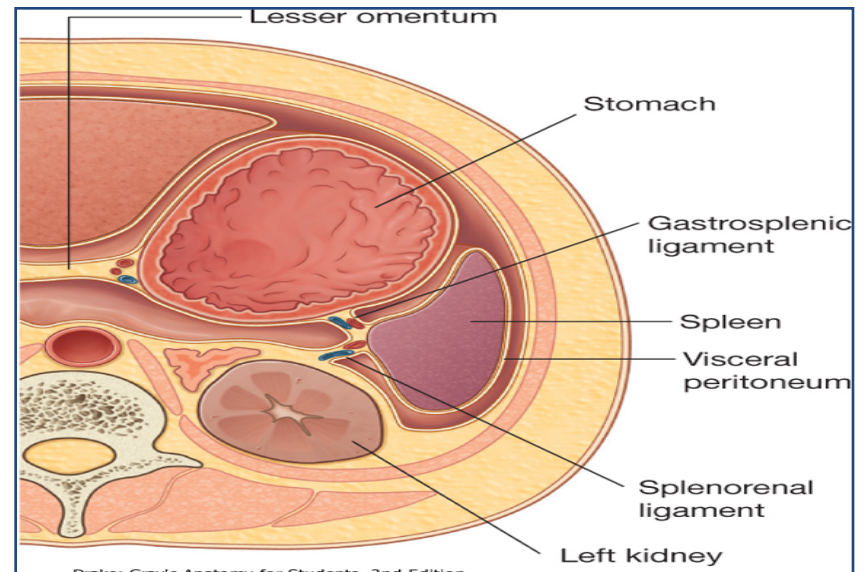


Spleen

- Largest single mass of **lymphoid tissue**.
- Located in the **left hypochondrium**, deep to the ribs 9, 10 & 11.
- Long axis lies along the shaft of the **10th rib**.
- **It is** separated from the ribs by the **diaphragm** and the **costodiaphragmatic pleural recess** (space in pleural cavity).
- It is **ovoid** in shape with a **notched anterior border**.
- **Lower pole** extends forward as far as the **midaxillary line**.
- **Normal size spleen can not be palpated on clinical examination**.



- **Surfaces:**
- **Diaphragmatic surface:**
- It is **convexly curved** to fit the **concavity of the diaphragm** and **curved bodies of the adjacent ribs.**
- **Visceral surface:**
- Related to viscera.

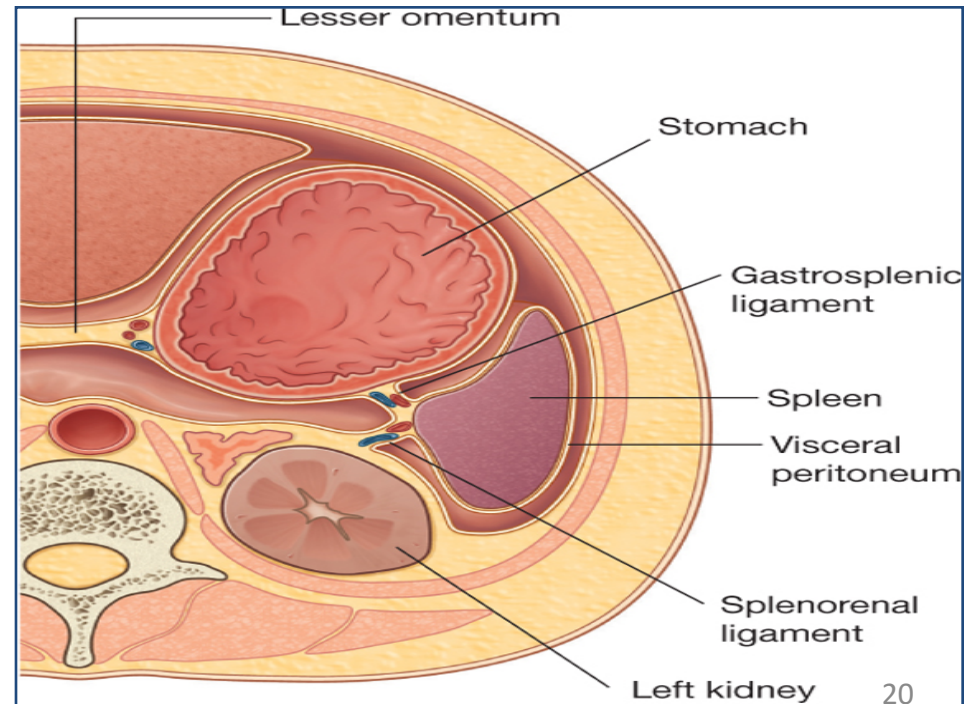
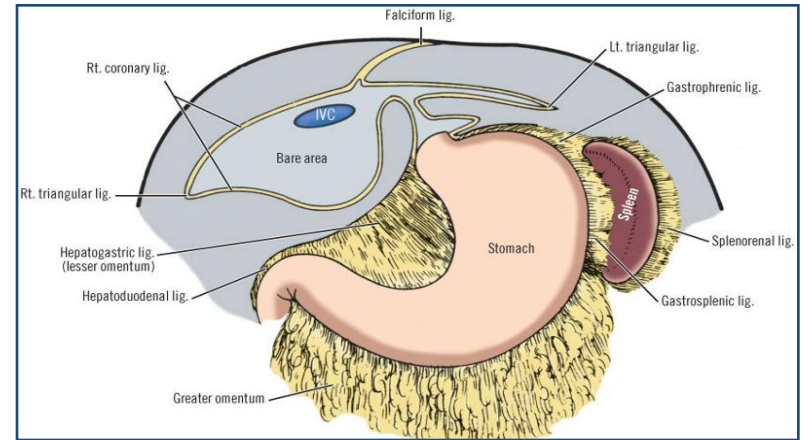


- **Borders:**
- The **anterior and superior** borders are **sharp.**
- **Anterior border** is **notched.**
- The **posterior** (medial) and **inferior** borders are **rounded.**

Peritoneal Reflections/Ligaments

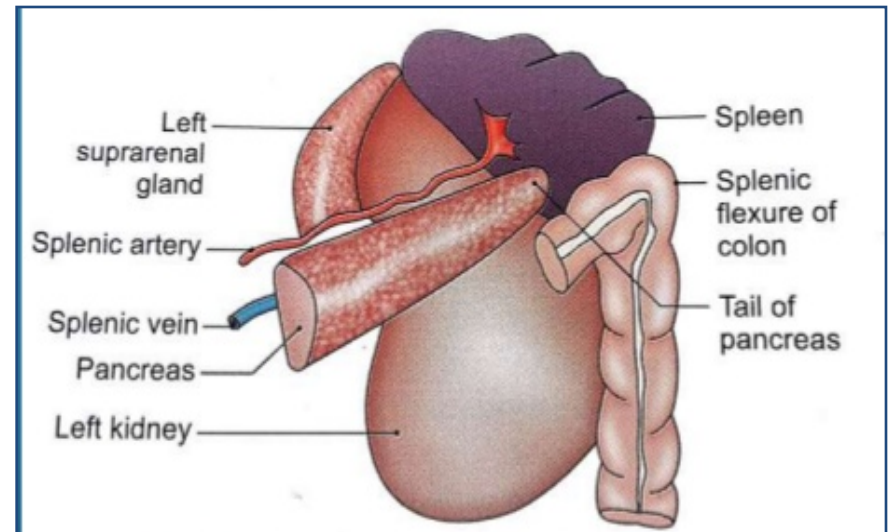
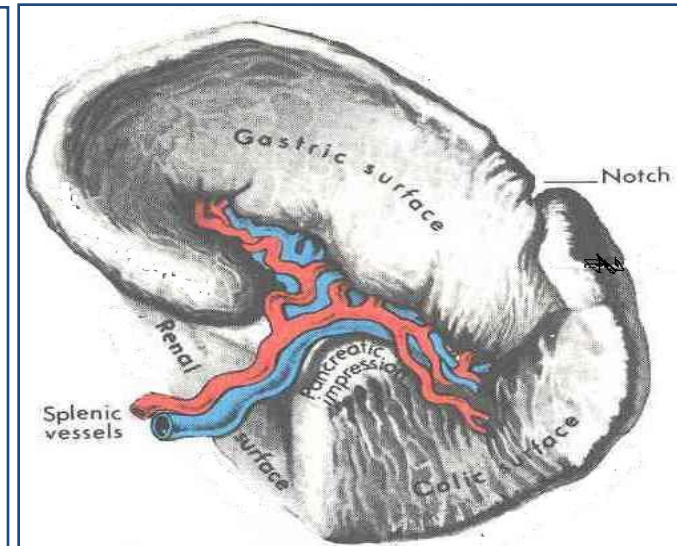
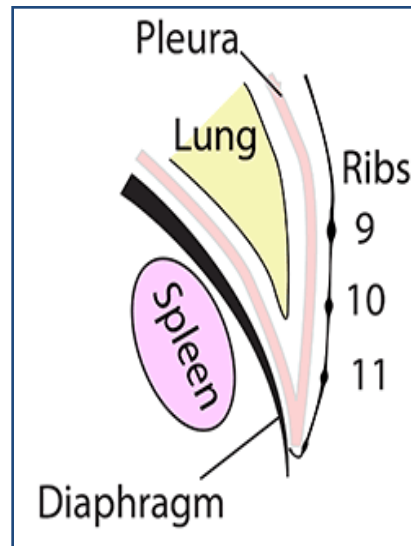
- Spleen is **completely surrounded by peritoneum** which passes from its hilus as:

- **Gastrosplenic ligament** to the **greater curvature of stomach**, carrying:
 - **Short gastric vessels**,
 - **Left gastroepiploic vessels**.
- **Lienorenal ligament** to the front of **left kidney** carrying:
 - **Splenic vessels** and
 - **Tail of pancreas**.



Relations

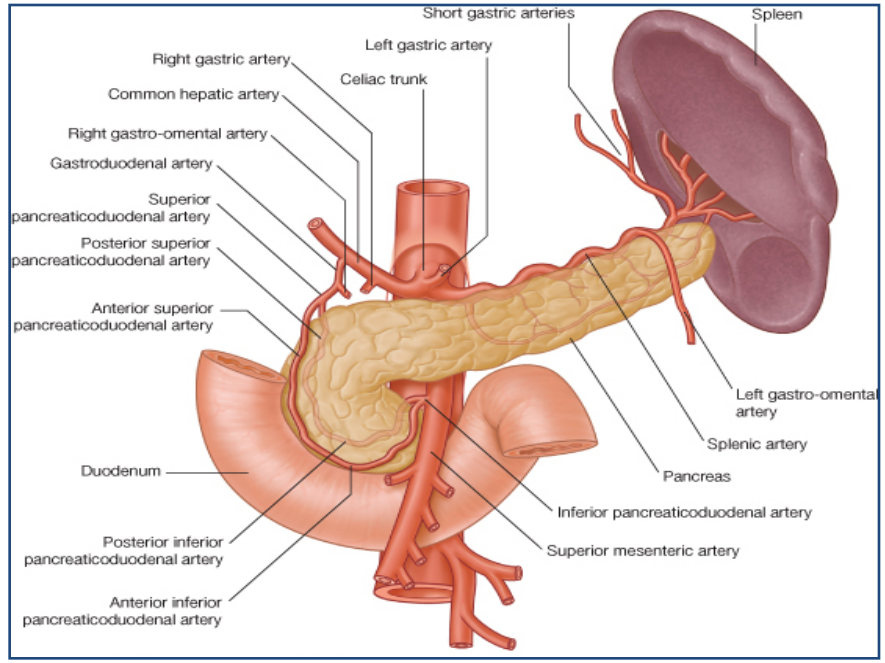
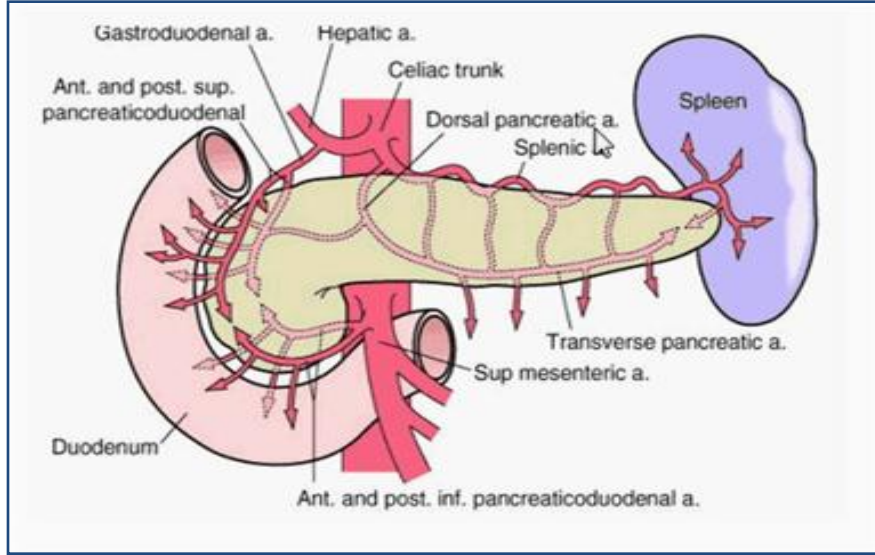
- **Anteriorly:** (visceral surface):
- Stomach,
- Tail of pancreas,
- Left colic flexure &
- Left kidney.
- **Posteriorly:**
Diaphragm, that separates it from,
- Left pleura (left costo-diaphragmatic recess)
- Left lung &
- 9, 10 & 11 ribs.
- **Inferiorly:**
- Left colic flexure.
- **Medially:** Left kidney.



Arterial Supply

Splenic artery

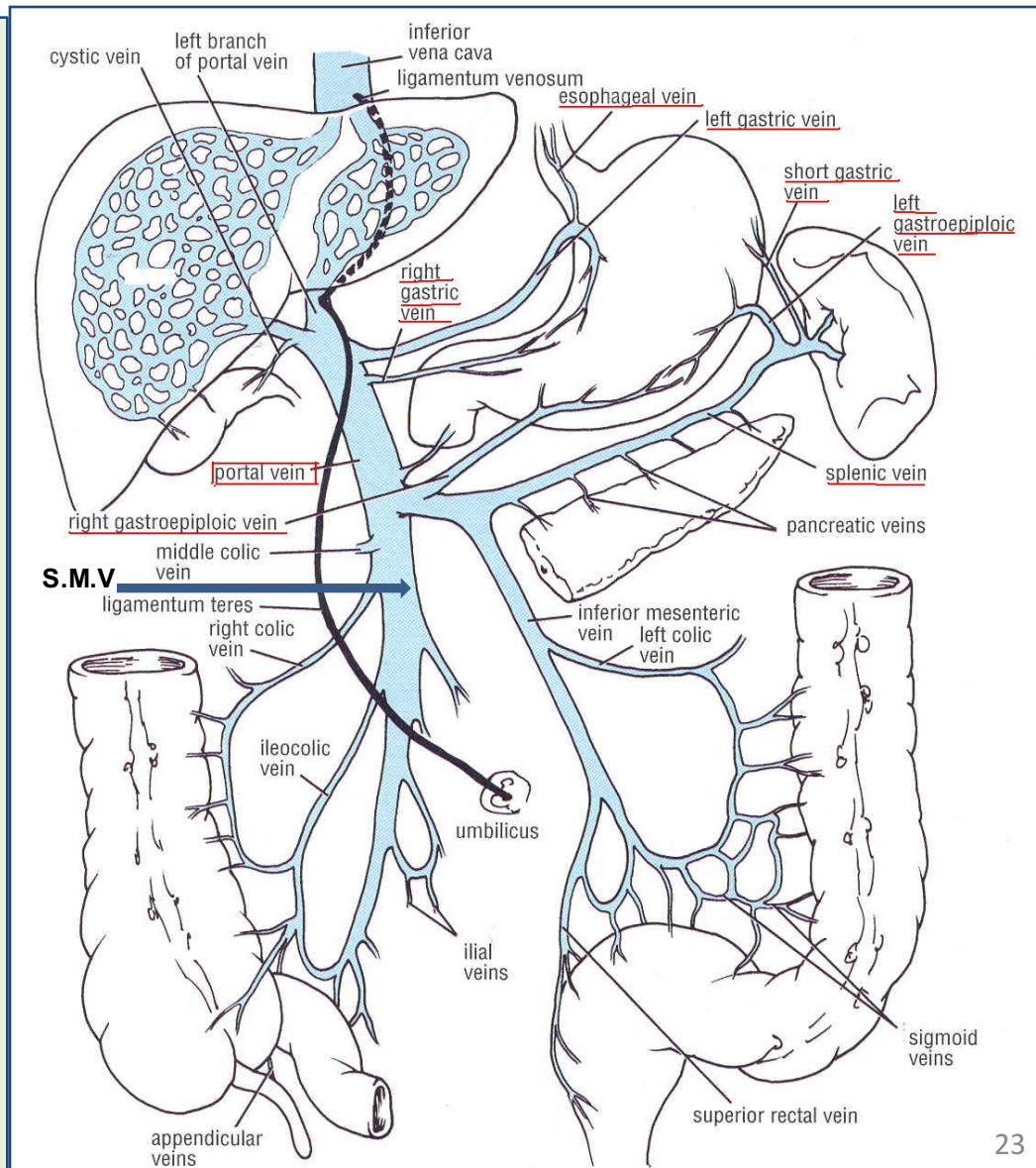
- Largest branch of the **celiac artery**.
- Runs a **tortuous course** along the upper border of the **pancreas**.
- Passes within the **lienorenal ligament**.
- Divides into 4-5 branches, which enter the spleen at its **hilus**.



Venous Drainage

Splenic vein

- Leaves the hilus.
- Runs **behind the tail & body** of the pancreas.
- Reaches **behind the neck** of pancreas, where it **joins** the **superior mesenteric vein** to form the **portal vein**.
- Tributaries:
 - Short gastric vein.
 - left gastroepiploic vein.
 - Pancreatic veins.
 - Inferior mesenteric vein.



Lymph Drainage

- **Lymphatics** emerge from the hilus and **drain into** several **nodes** lying **at the hilum**.
- **Efferents** from the **hilar nodes** pass along the course of splenic artery, and drain **into** the **celiac lymph nodes**.

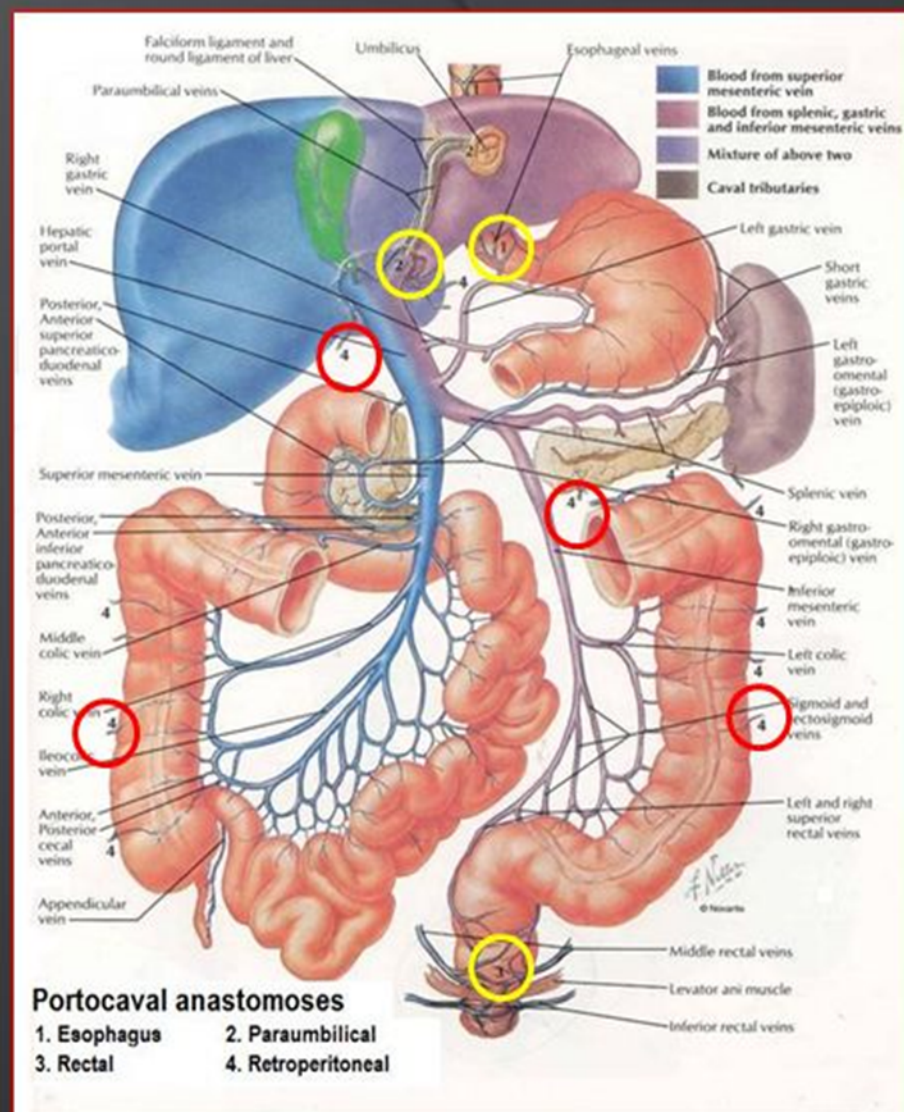
Nerve Supply

- Derived from the **celiac plexus**.
- Are **distributed mainly along branches of splenic artery**, and are **vasomotor in function**.

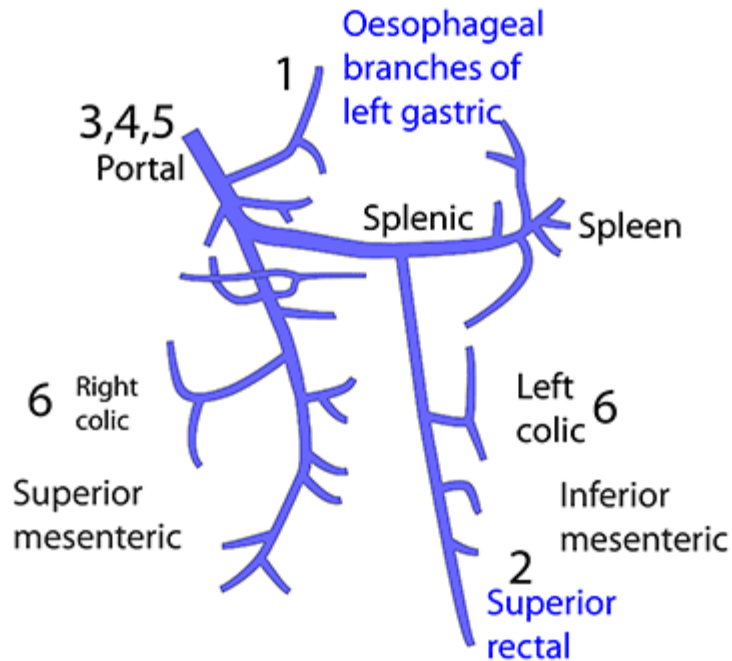
**Thank You And Good
luck**

SITES OF PORTOCAVAL ANASTOMOSIS

- ❖ Lower end of esophagus: left gastric vein & azygos vein
- ❖ Lower part of rectum: (Hemorrhoids) superior and middle rectal veins & inferior rectal vein
- ❖ Paraumbilical region: (Caput medusae) Paraumbilical veins & superficial epigastric vein
- ❖ Retroperitoneal: Veins draining colon & veins of the posterior abdominal wall
- ❖ Patent ductus venosus: Left branch of portal vein & inferior vena cava



PORTOSYSTEMIC ANASTOMOSES



1 Lower oesophagus

Portal: Oesophageal branches of left gastric veins
Systemic: Azygos veins

2 Upper anal canal

Portal: Superior rectal vein
Systemic: Middle/inferior rectal veins

3 Umbilical

Portal: Veins of ligamentum teres
Systemic: Superior/inferior epigastric veins

4 Bare area of liver

Portal: Hepatic/portal veins
Systemic: Inferior phrenic veins

5 Patent ductus venosus (rare)

Portal: Left branch of portal vein
Systemic: Inferior vena cava

6 Retroperitoneal

Portal: Colonic veins
Systemic: Body wall veins

Portal Hypertension

Obstruction of portal system near (e.g., clot) or in liver (e.g., cirrhosis) causes portal hypertension (i.e., increased venous pressure in portal vein & its tributaries). Consequences:

- ✓ Ascites (pathologic fluid collection in peritoneal cavity)
- ✓ Splenomegaly
- ✓ Portocaval anastomoses = enlargement of collateral venous pathways between tributaries of portal vein and inferior vena cava

