

# **GASTROINTESTINEAL SYSTEM**

## **THE BLOOD SUPPLY & VENOUS DRAINAGE OF GIT**

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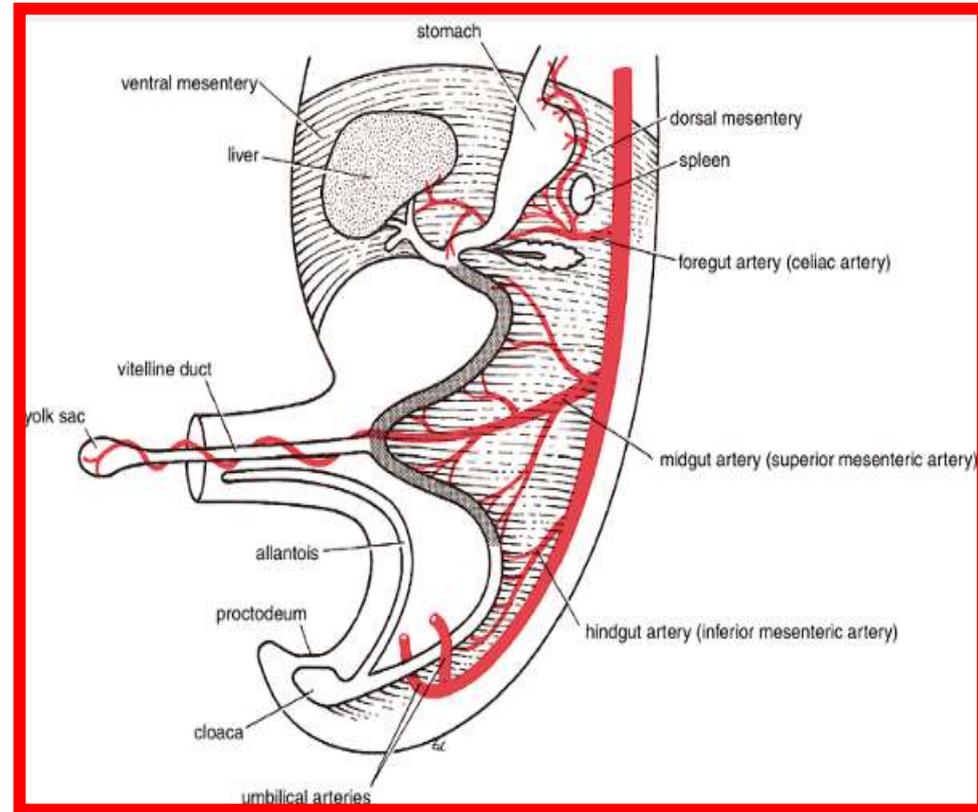
**College of Medicine / University of Mutah**  
**2021-2022**

**Thursday 14 April 2022**

# Blood Supply of the Gastrointestinal Tract

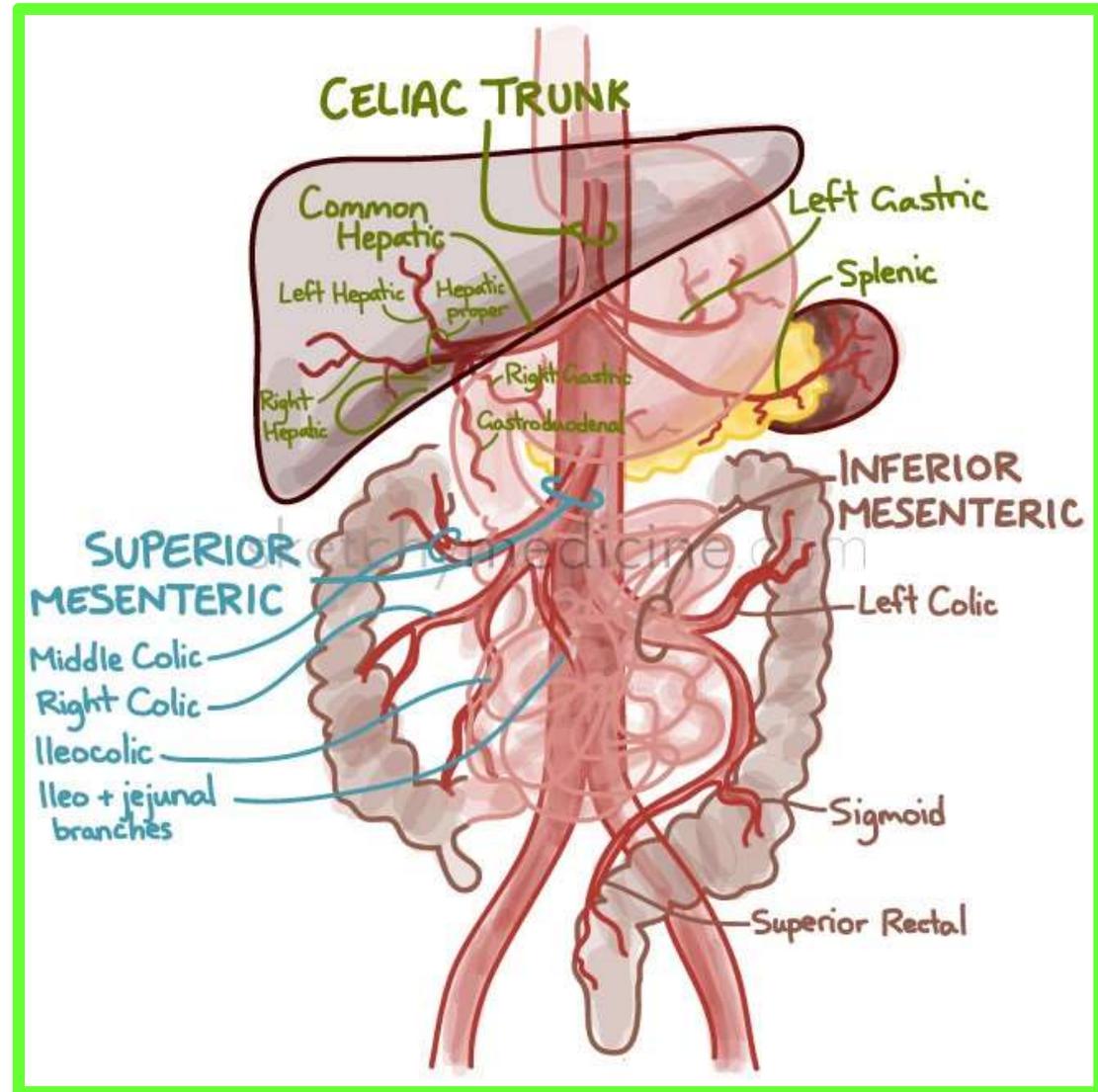
The **celiac artery** is the artery of **the foregut** and supplies the gastrointestinal tract from **the lower one third of the esophagus** down as far as **the middle of the second part of the duodenum**

The **superior mesenteric artery** is the artery of **the midgut** and supplies the gastrointestinal tract from **the middle of the second part of the duodenum** as far as **the distal one third of the transverse colon**.



# Blood Supply of the Gastrointestinal Tract

The inferior mesenteric artery is the artery of the hindgut and supplies the large intestine from the distal one third of the transverse colon to halfway down the anal canal



# Blood Supply of the Gastrointestinal Tract

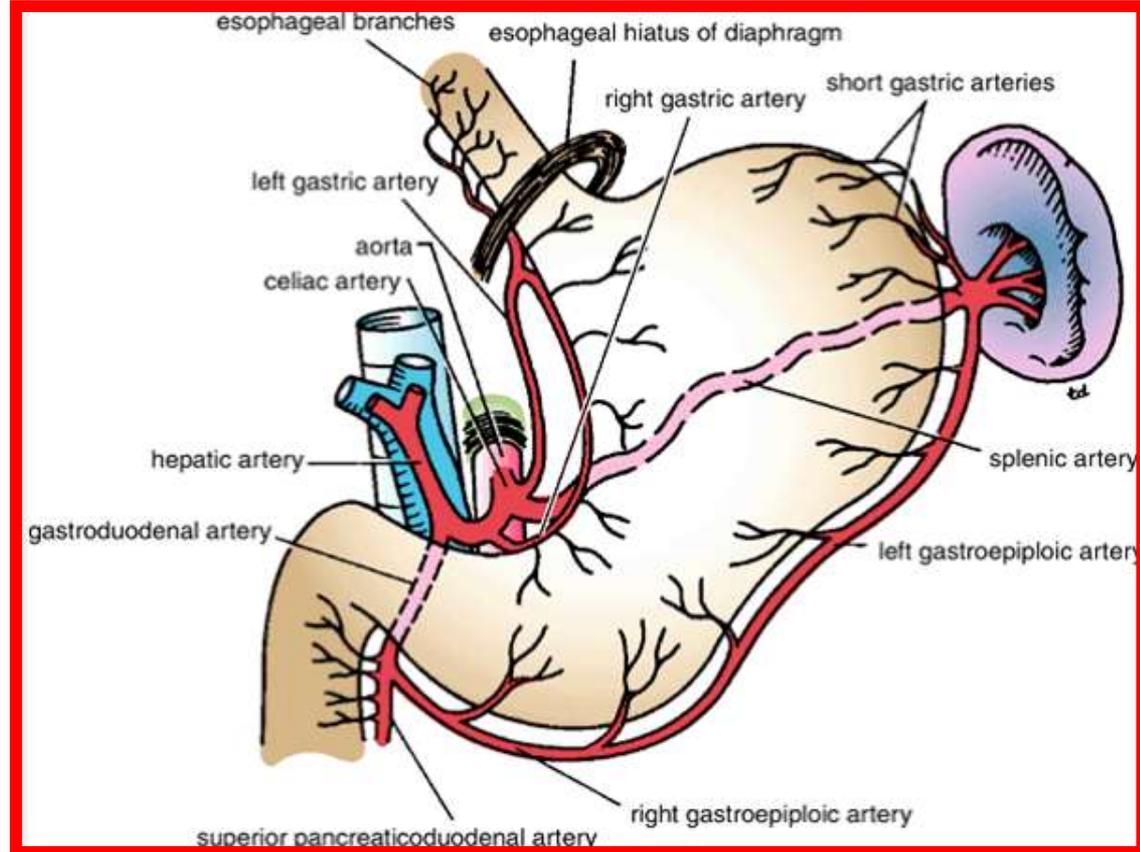
## Celiac Artery

✓ Arises from the commencement of the abdominal aorta at the level of the 12th thoracic vertebra

✓ It lies behind the lesser sac of peritoneum.

✓ It has three terminal branches:

- The left gastric
- Splenic
- Hepatic arteries



# Celiac Artery

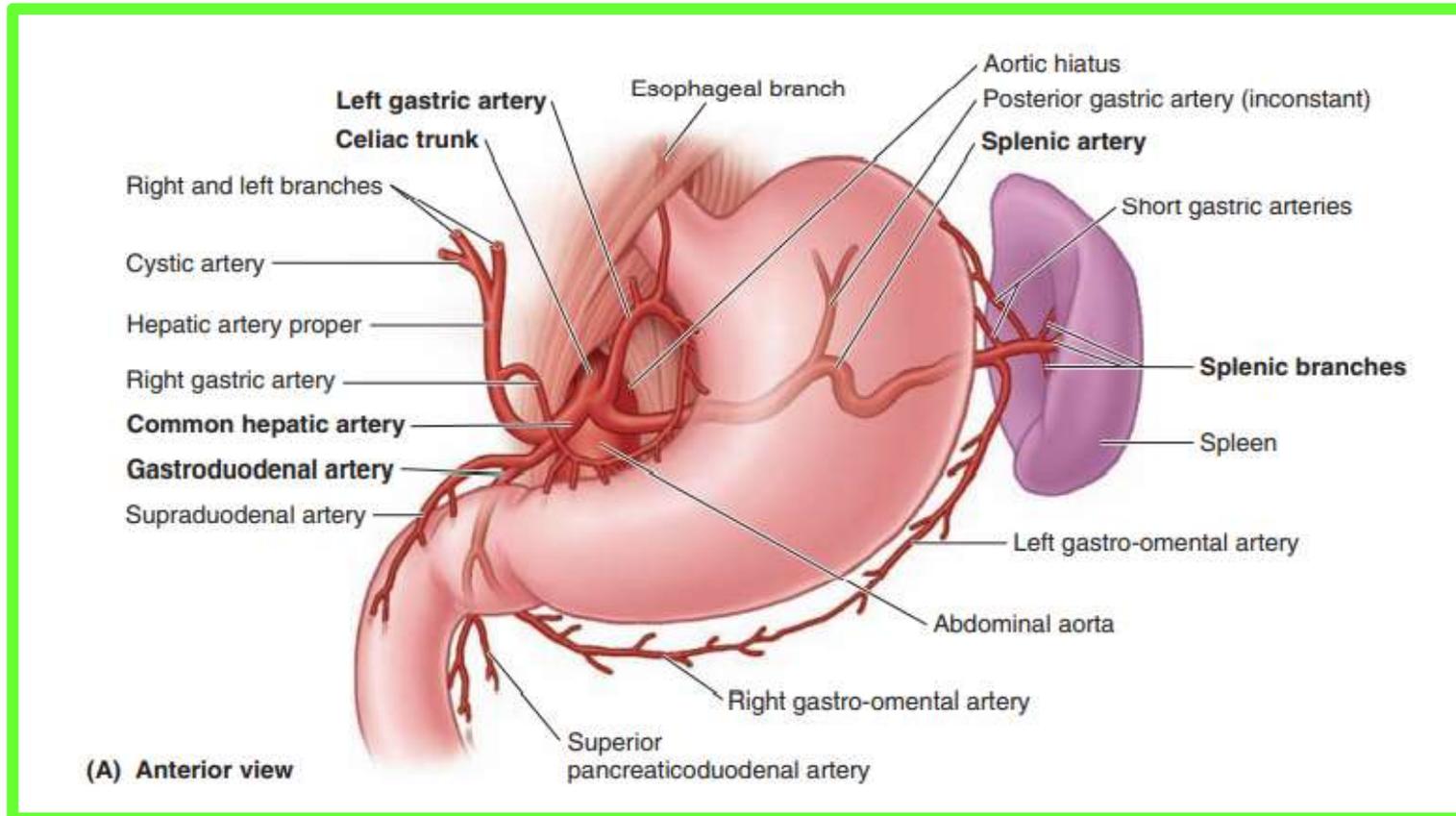
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## Left Gastric Artery

Runs to the cardiac end of the stomach, gives off a few esophageal branches, then turns to the right along the lesser curvature of the stomach.

It anastomoses with the right gastric artery.



# Celiac Artery

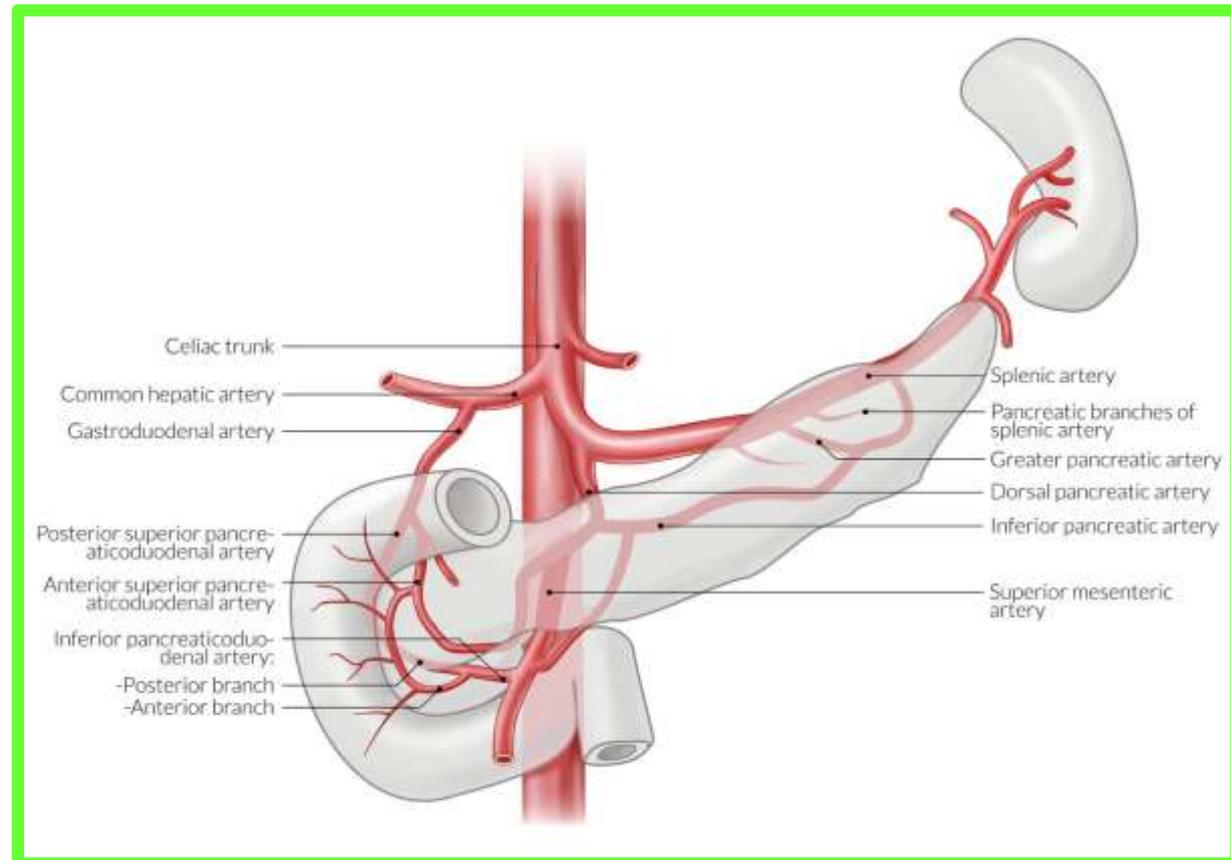
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## Splenic Artery

Runs to the left in a wavy course along **the upper border of the pancreas** and behind the stomach.

The artery enters **the splenicorenal ligament** and runs to the hilum of **the spleen**

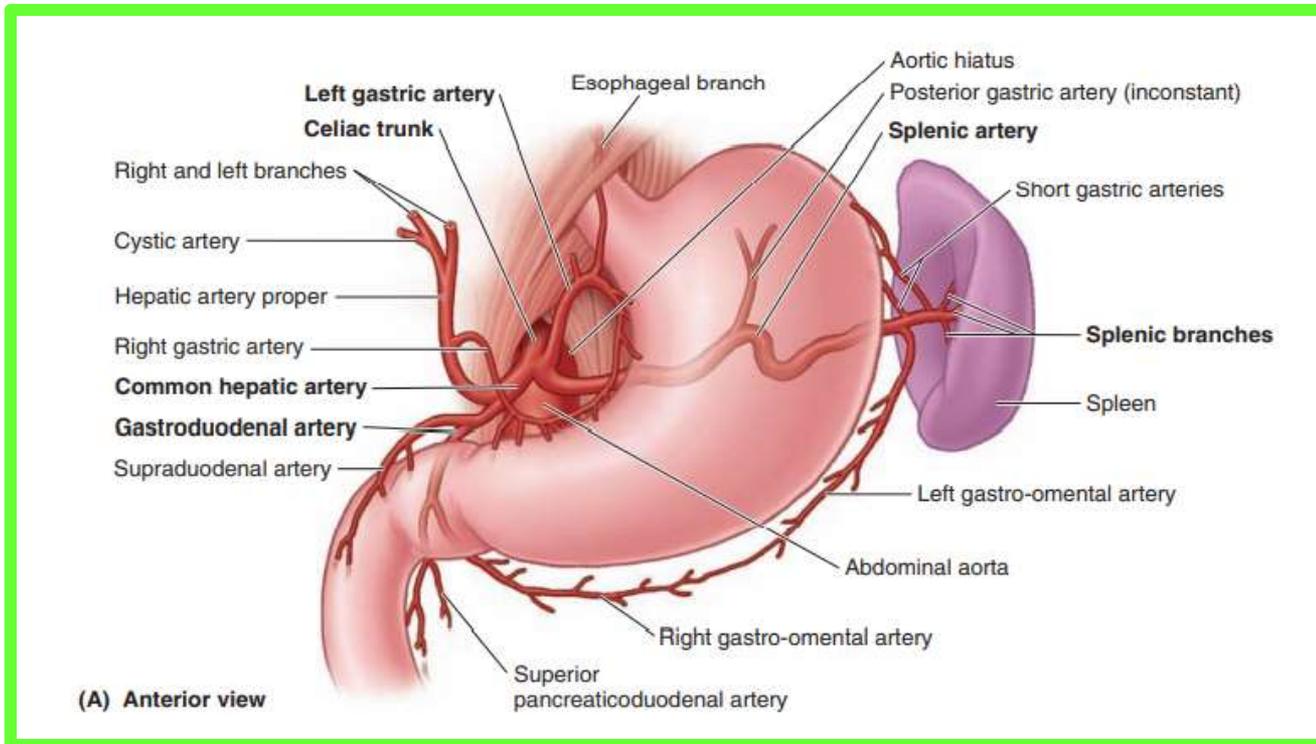


## Branches of splenic Artery

❖ Pancreatic branches

❖ The left gastroepiploic artery reaches the greater curvature of the stomach in the gastrosplenic omentum.

❖ The short gastric arteries, five or six in number, arise from the end of the splenic artery and reach the fundus of the stomach in the gastrosplenic omentum



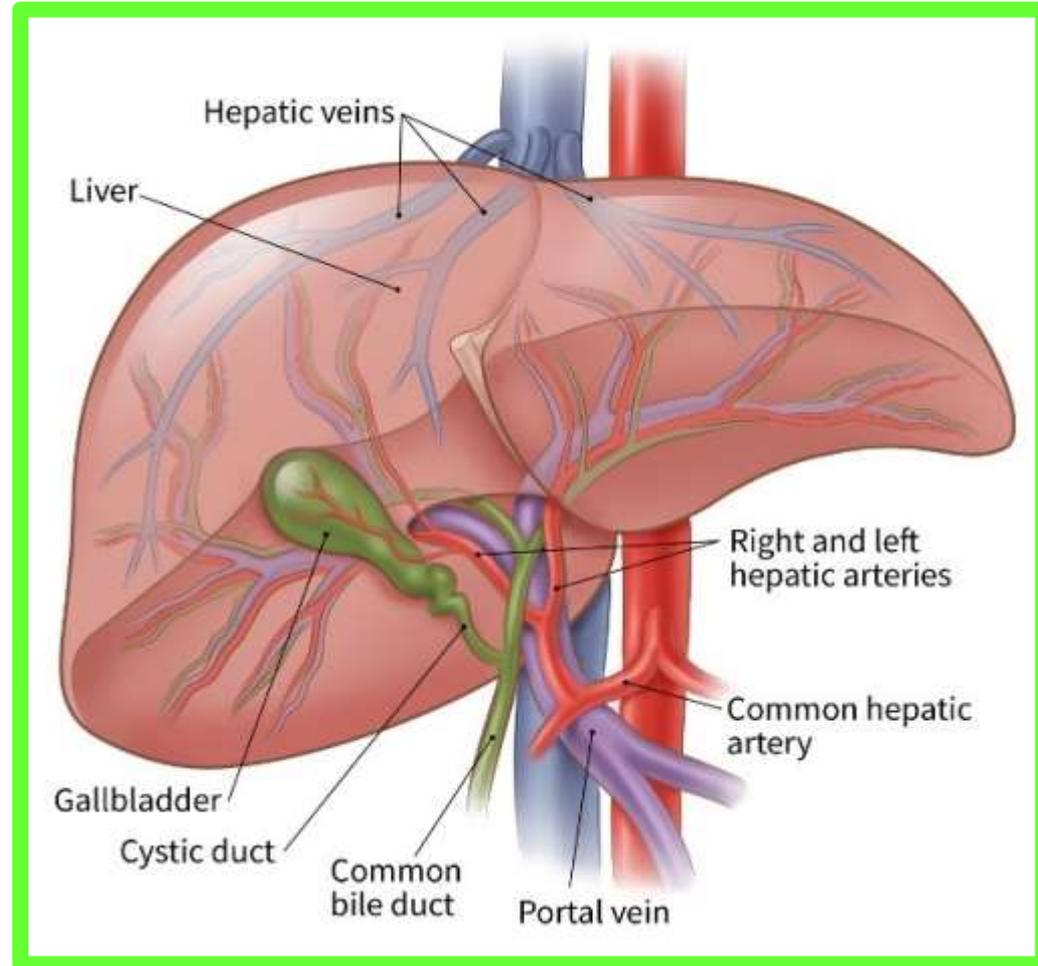
# □ Celiac Artery

## Hepatic Artery

✓ Ascends between the layers of the lesser omentum

✓ It lies in front of the opening into the lesser sac and is placed to the left of the bile duct and in front of the portal vein.

✓ At the porta hepatis it divides into right and left branches to supply the corresponding lobes of the liver

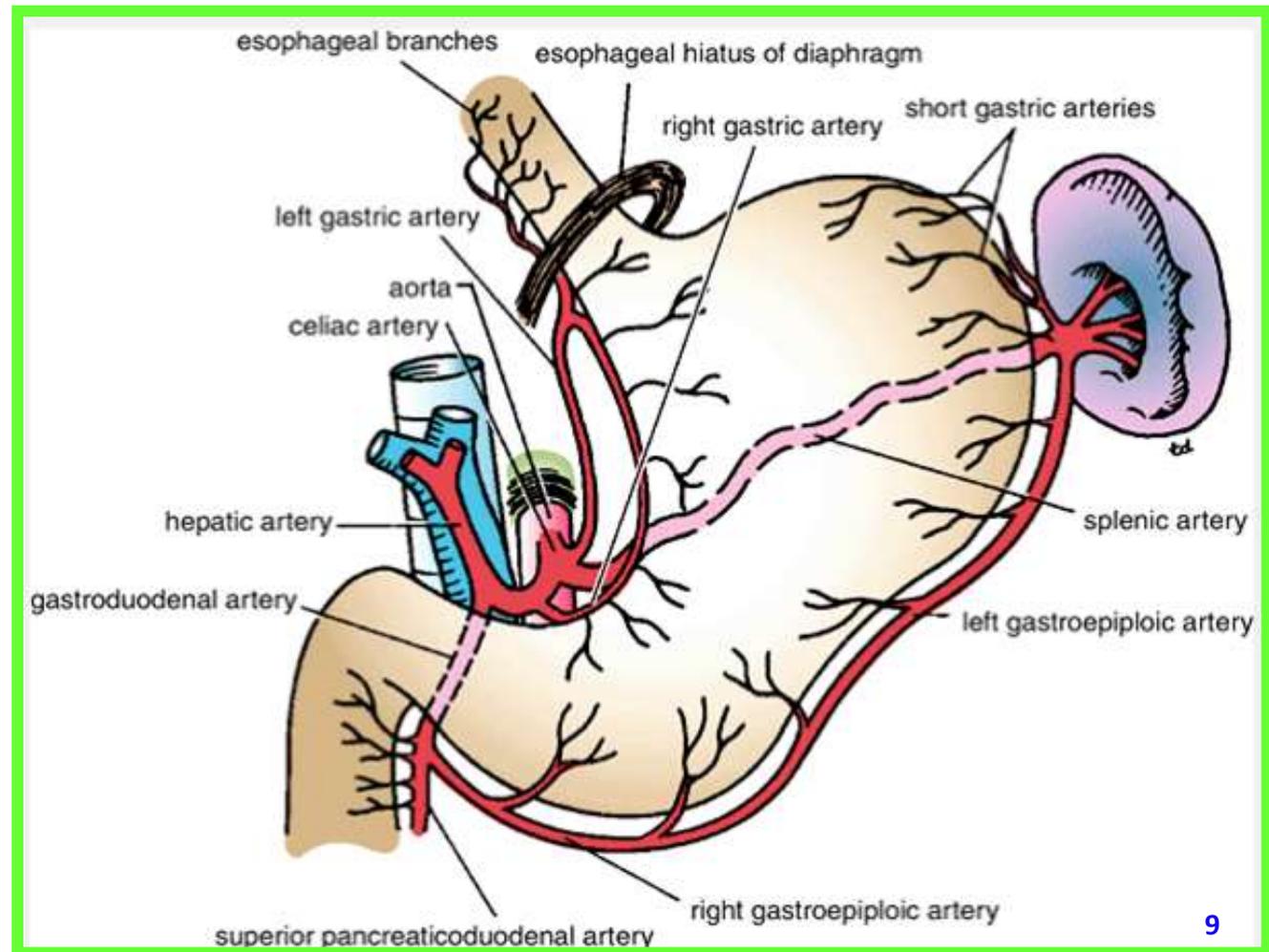


# Celiac Artery

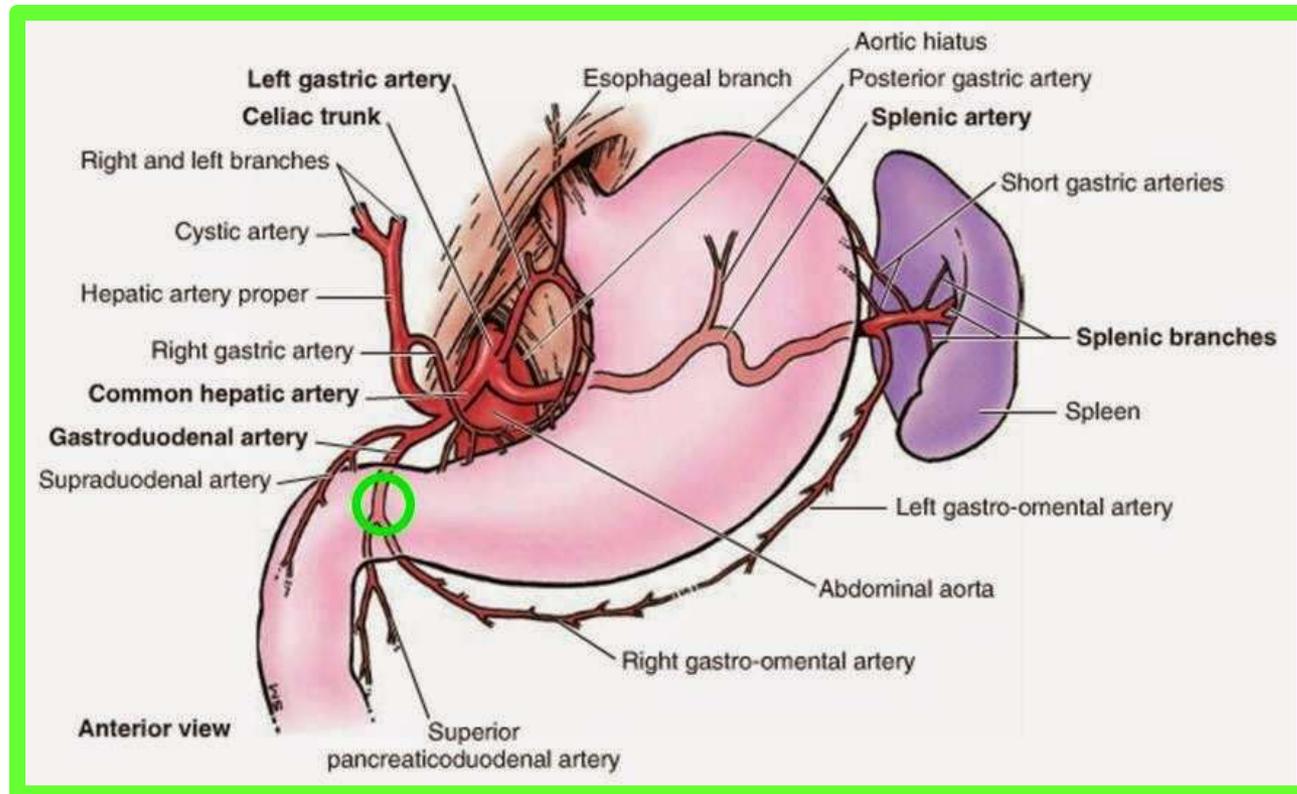
# Branches of Hepatic Artery

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❖ The **right gastric artery** arises from the hepatic artery and runs to the left in **the lesser omentum** along the lesser curvature of the stomach. It anastomoses with **the left gastric artery**



❖ The **gastrooduodenal artery** is a large branch that descends behind the first part of the duodenum. It divides into **the right gastroepiploic artery** that runs along **the greater curvature** of the stomach between the layers of the greater omentum and **the superior pancreaticoduodenal artery** that descends between the **second part of the duodenum** and the **head of the pancreas**.

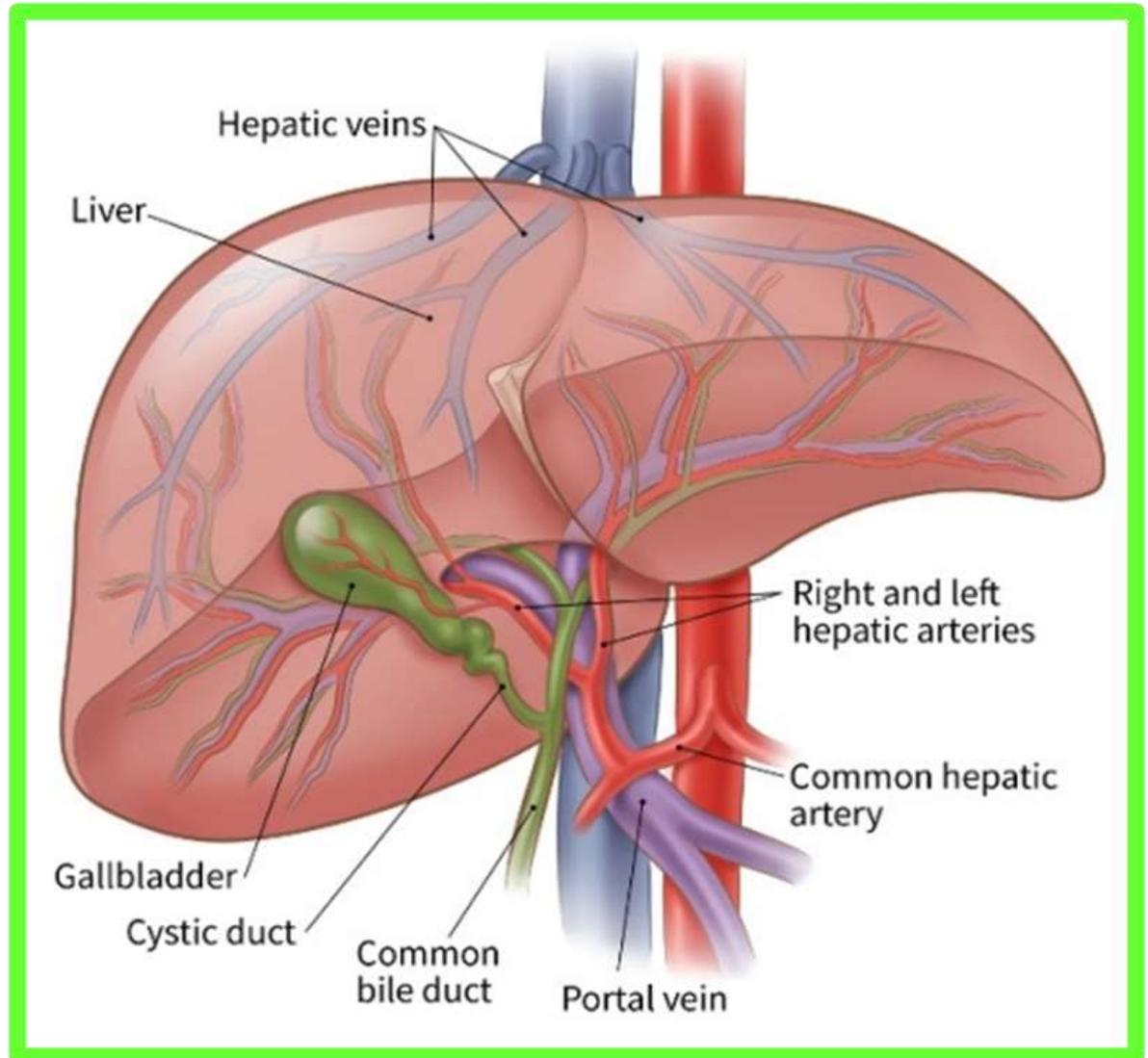


# Celiac Artery

# Branches of Hepatic Artery

❖ The right and left hepatic arteries enter the porta hepatis.

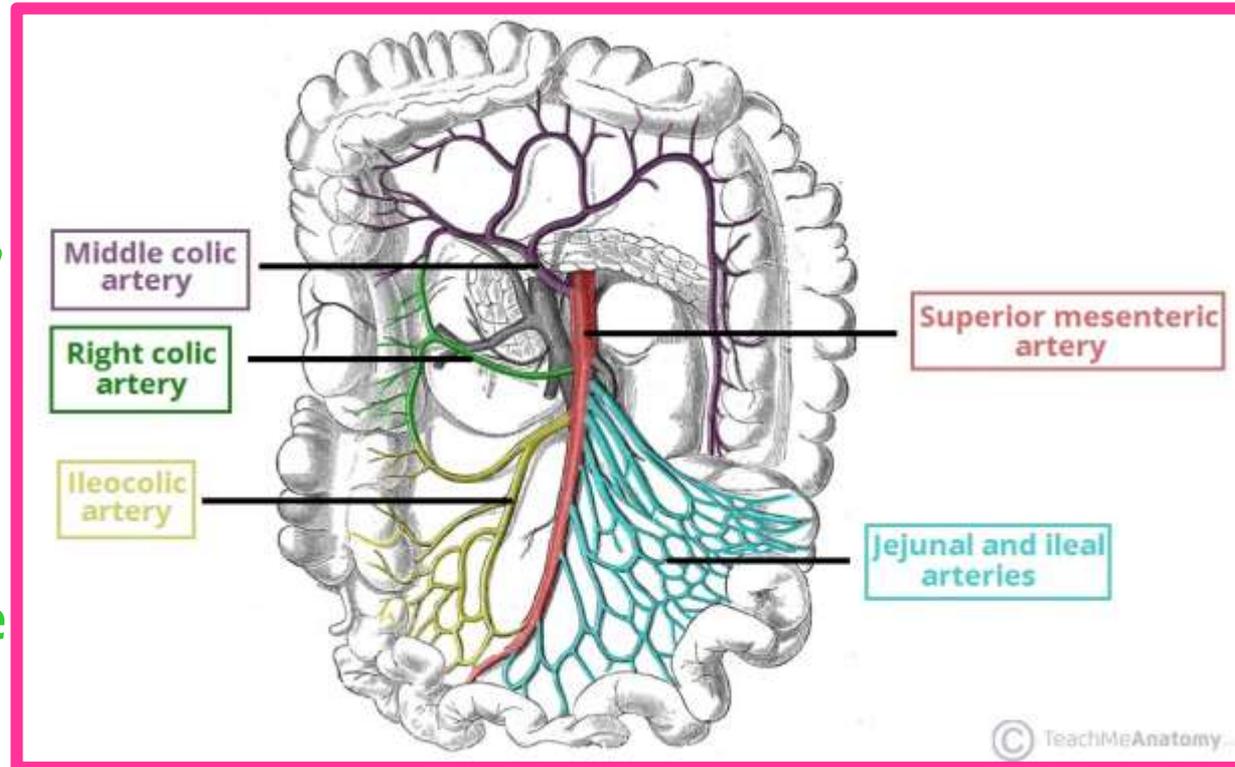
The right hepatic artery usually gives off the **cystic artery**, which runs to the neck of the gallbladder



# Blood Supply of the Gastrointestinal Tract

## Superior Mesenteric Artery

The superior mesenteric artery supplies the distal part of the duodenum, the jejunum, the ileum, the cecum, the appendix, the ascending colon, and most of the transverse colon.

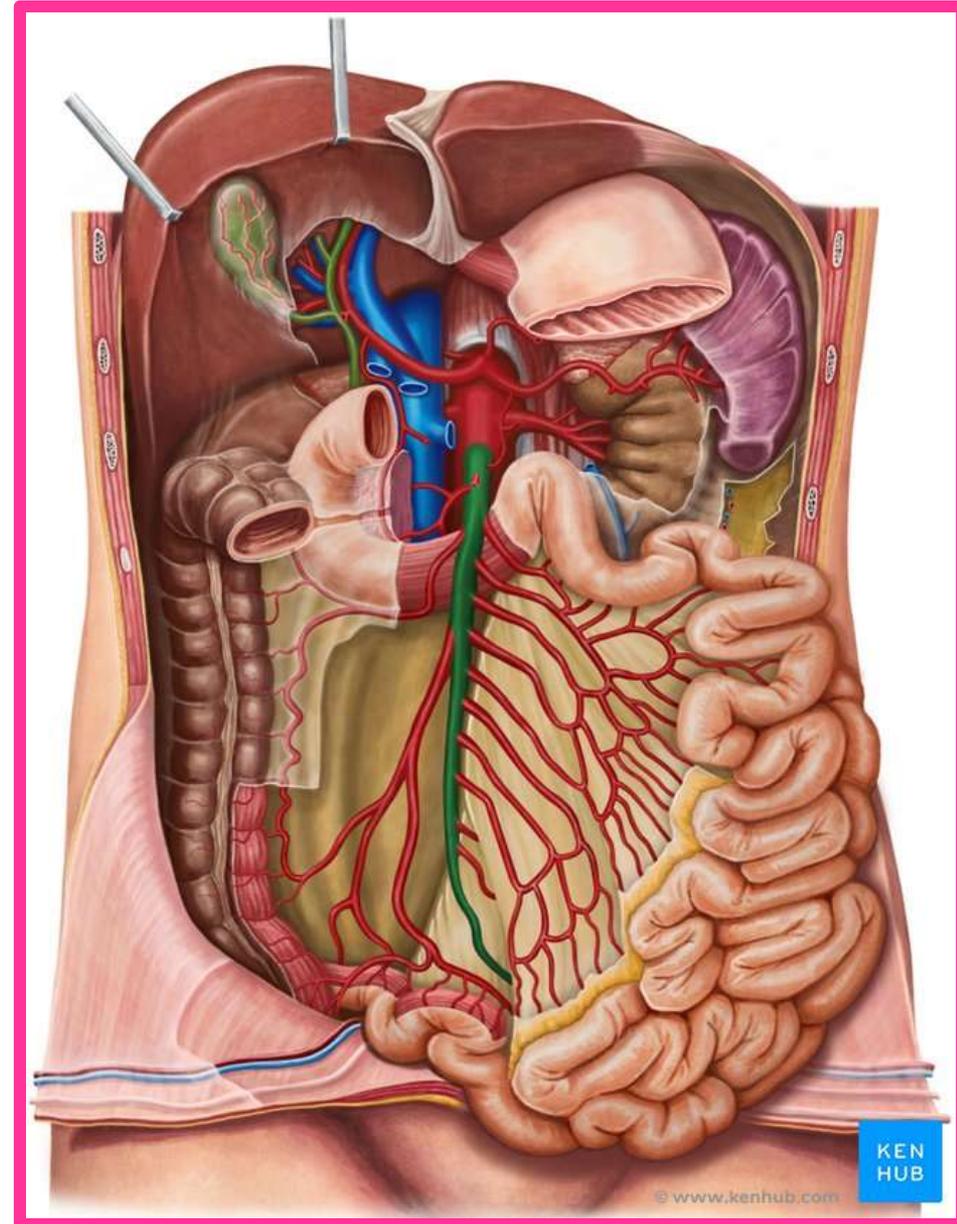


It arises from the front of the abdominal aorta just below the celiac artery

# Superior Mesenteric Artery

Runs downward and to the right behind the neck of the pancreas and in front of the third part of the duodenum.

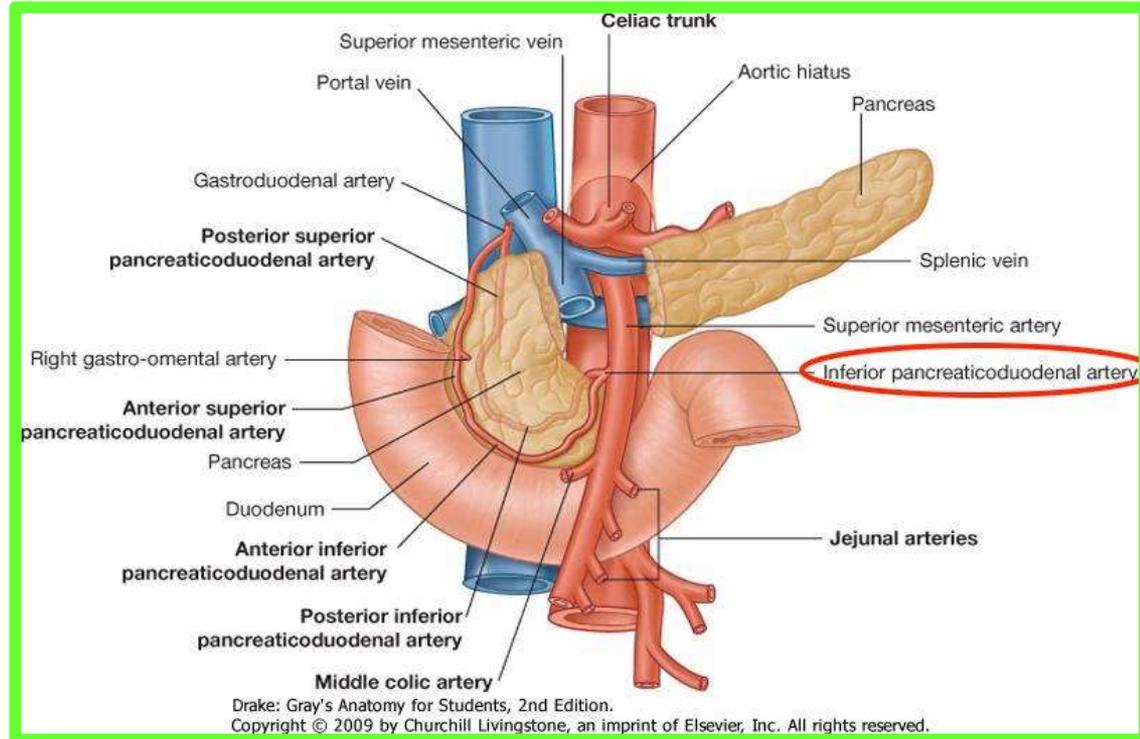
It continues downward to the right between the layers of the mesentery of the small intestine and ends by anastomosing with the ileal branch of its own ileocolic branch



# Superior Mesenteric Artery Branches

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❖ **The inferior pancreaticoduodenal artery** passes to the right as a single or double branch along the **upper border of the third part of the duodenum and the head of the pancreas**. It supplies the **pancreas and the adjoining part of the duodenum**.

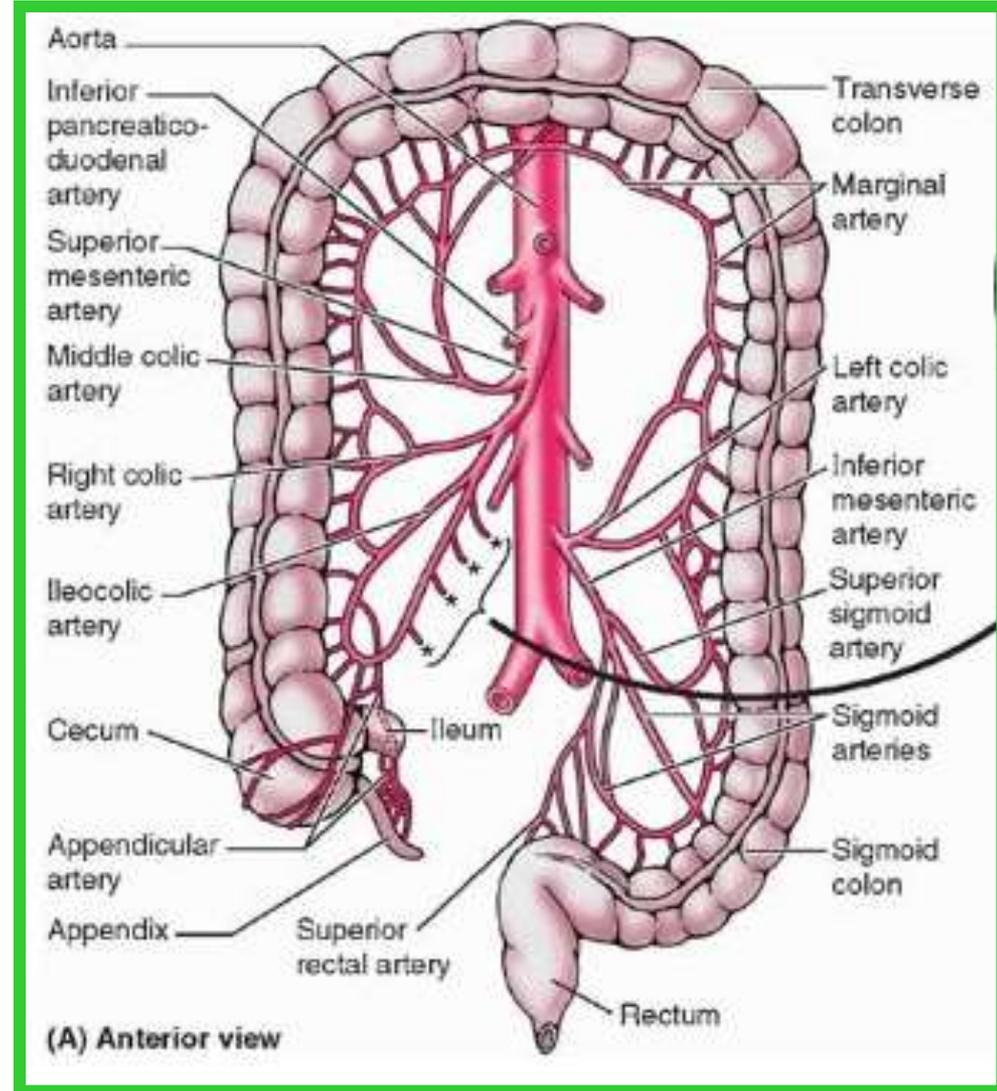


❖ **The middle colic artery** runs forward in the **transverse mesocolon** to supply the transverse colon and divides into right and left branches

# Superior Mesenteric Artery

❖ The right colic artery is often a branch of the ileocolic artery. It supplies the ascending colon and divides into ascending and descending branches.

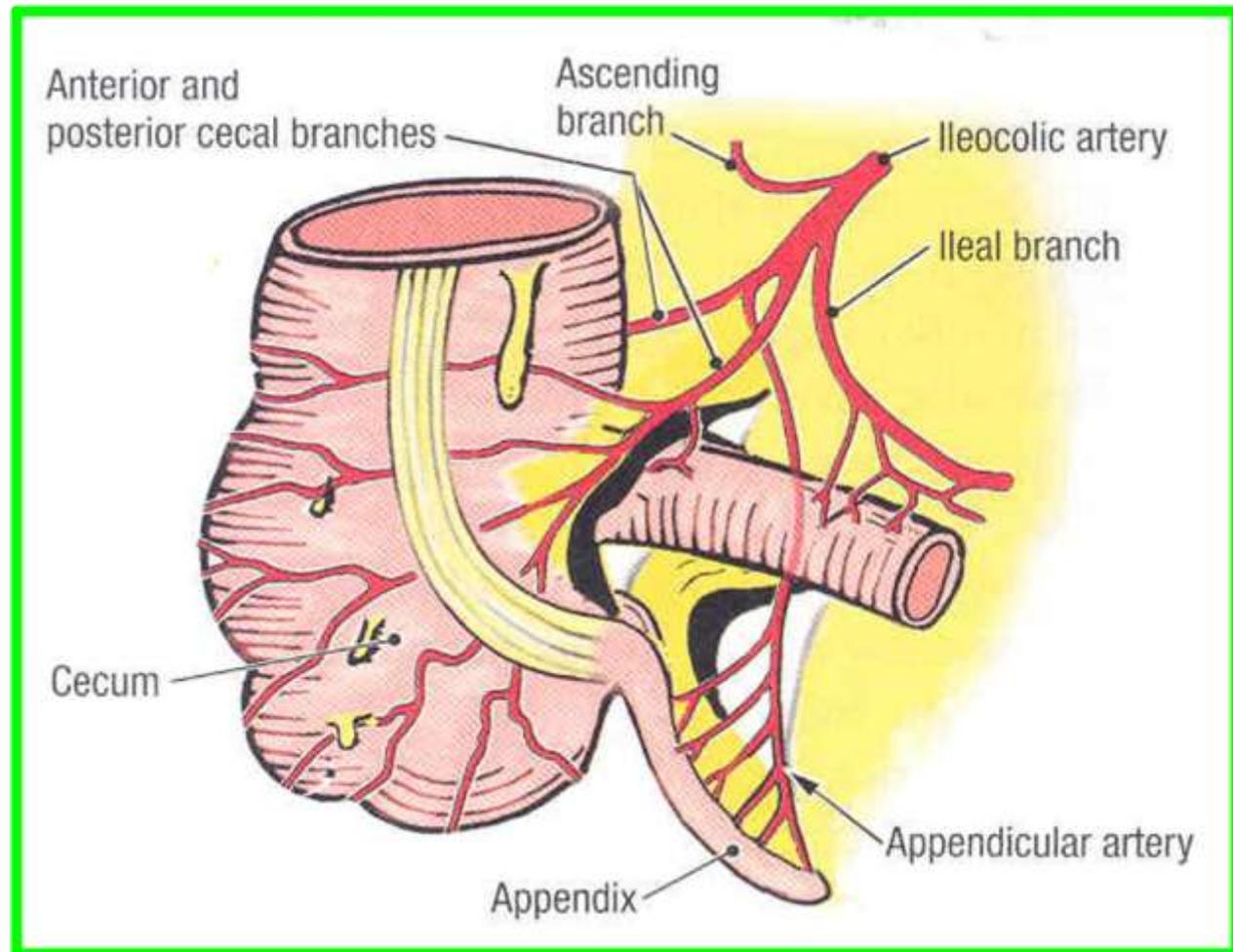
❖ The ileocolic artery gives rise to a superior branch that anastomoses with the right colic artery and an inferior branch that anastomoses with the end of the superior mesenteric artery.



# Superior Mesenteric Artery

The inferior branch of the ileocolic artery gives rise to:

- ❖ The anterior and posterior cecal arteries
- ❖ The appendicular artery is a branch of the posterior cecal artery



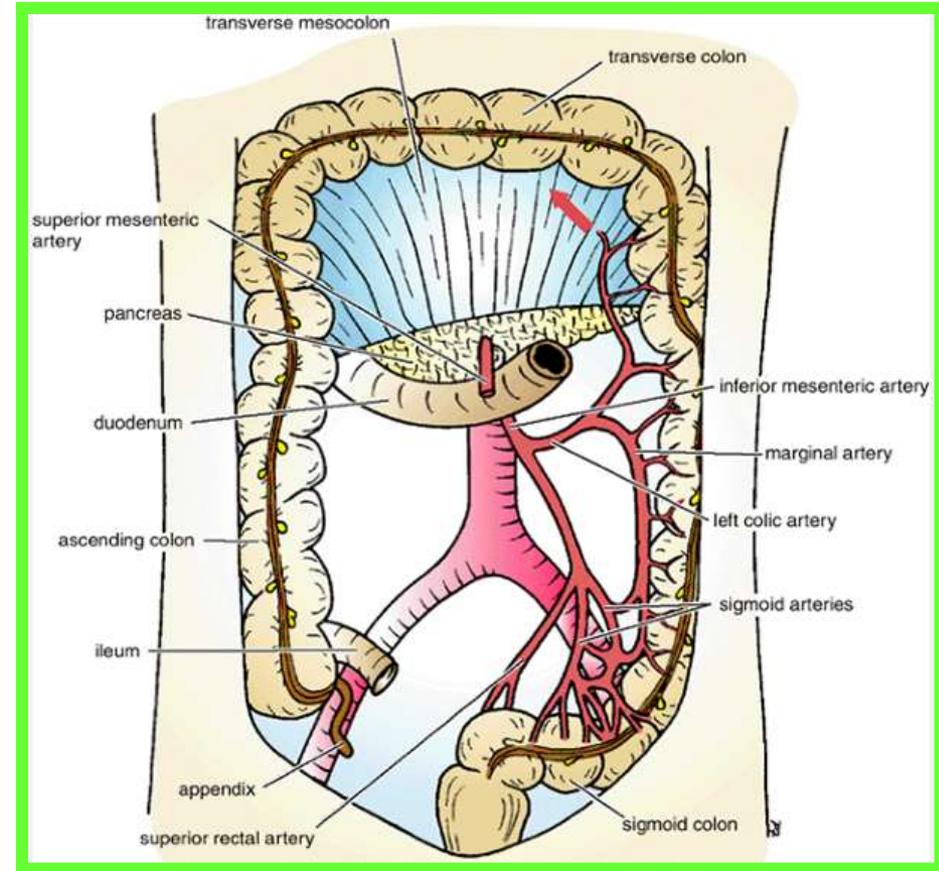


# Inferior Mesenteric Artery

Supplies the distal third of the **transverse colon**, the **left colic flexure**, the **descending colon**, the **sigmoid colon**, the **rectum**, and the upper **half of the anal canal**.

It arises from the **abdominal aorta** about 1.5 in. (**3.8 cm**) above its bifurcation .

The artery runs downward becomes the **superior rectal artery**

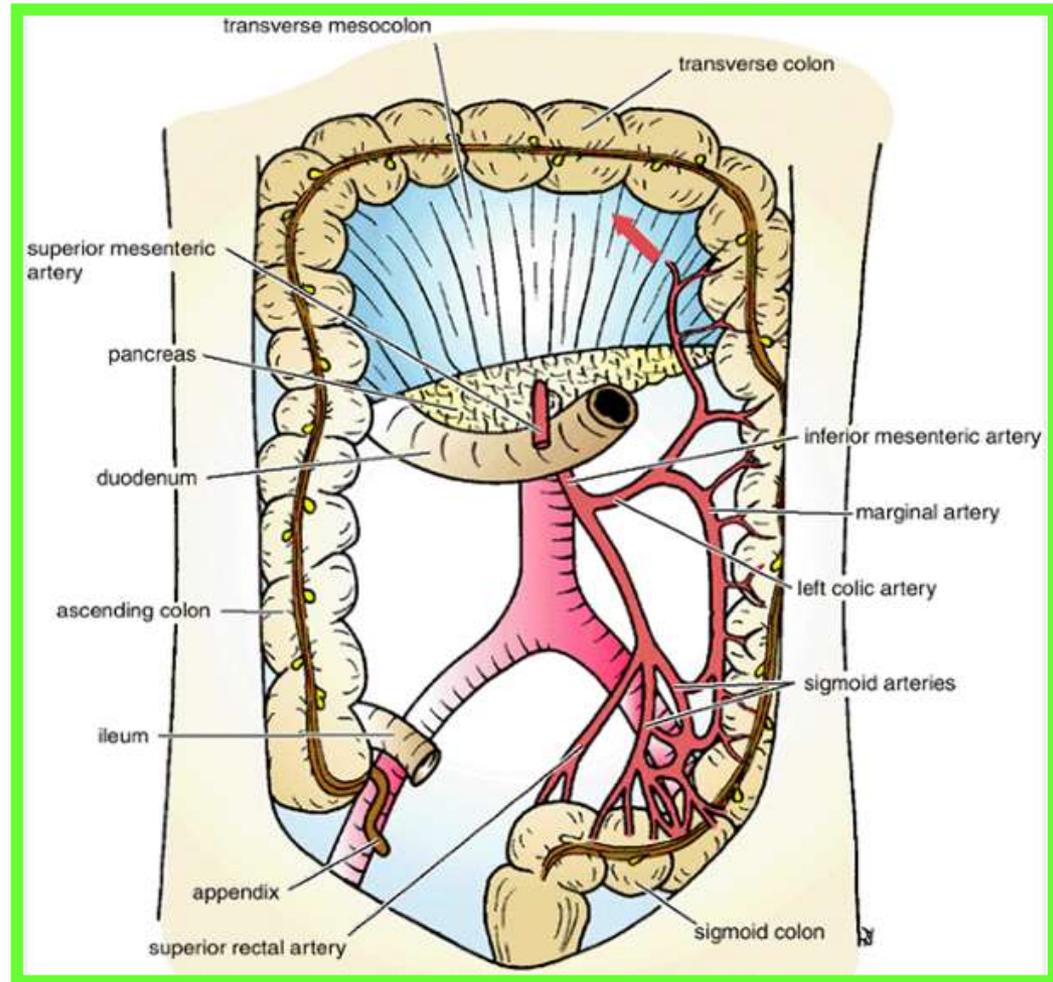


# Inferior Mesenteric Artery

## Branches

❖ The **left colic artery** runs upward and to the left and supplies the **distal third of the transverse colon**, the **left colic flexure**, and the **upper part of the descending colon**. It divides into **ascending** and **descending** branches.

❖ The **sigmoid arteries** are two or three in number and supply **the descending and sigmoid colon**



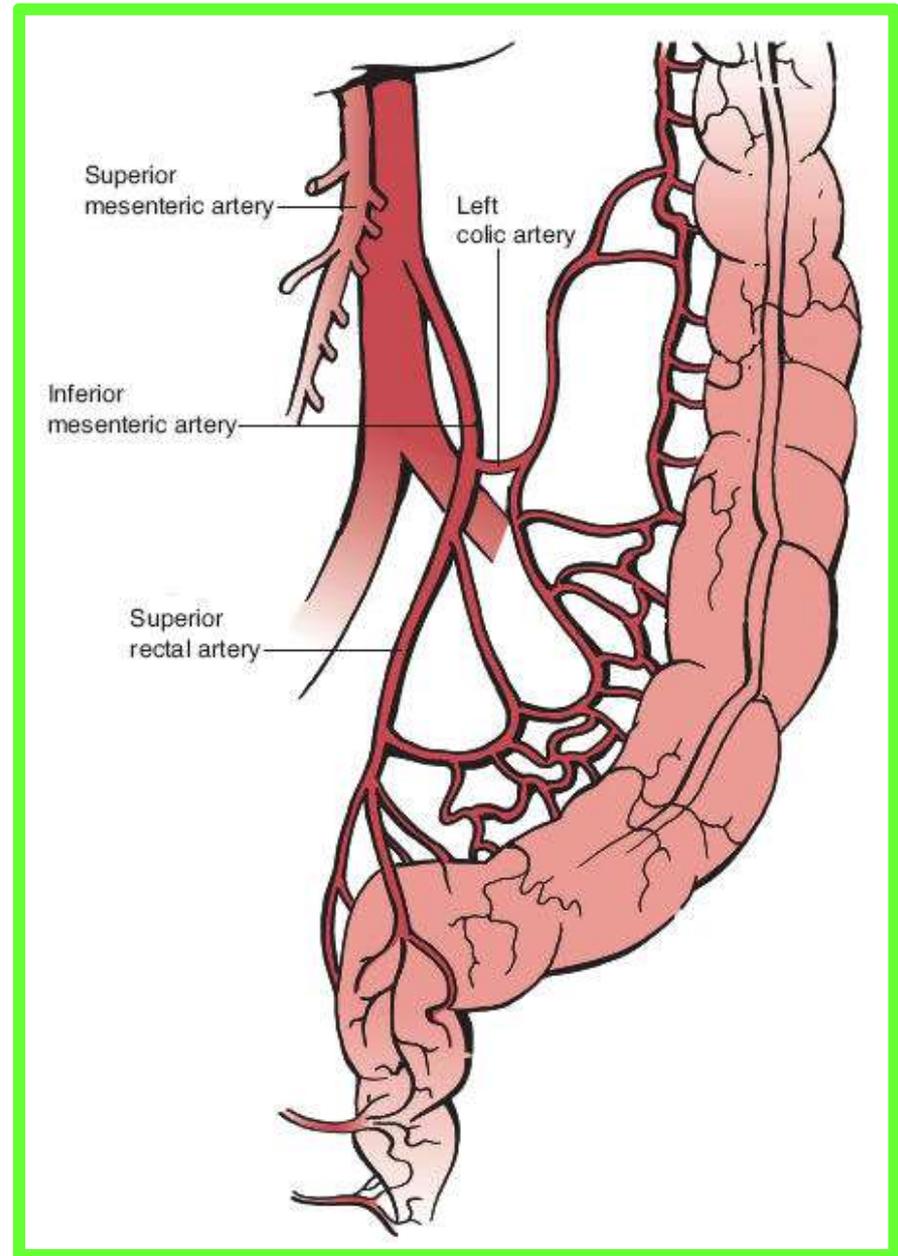
# Inferior Mesenteric Artery

## Branches

❖ **The superior rectal artery** is a continuation of the inferior mesenteric artery

It descends into the pelvis behind the rectum.

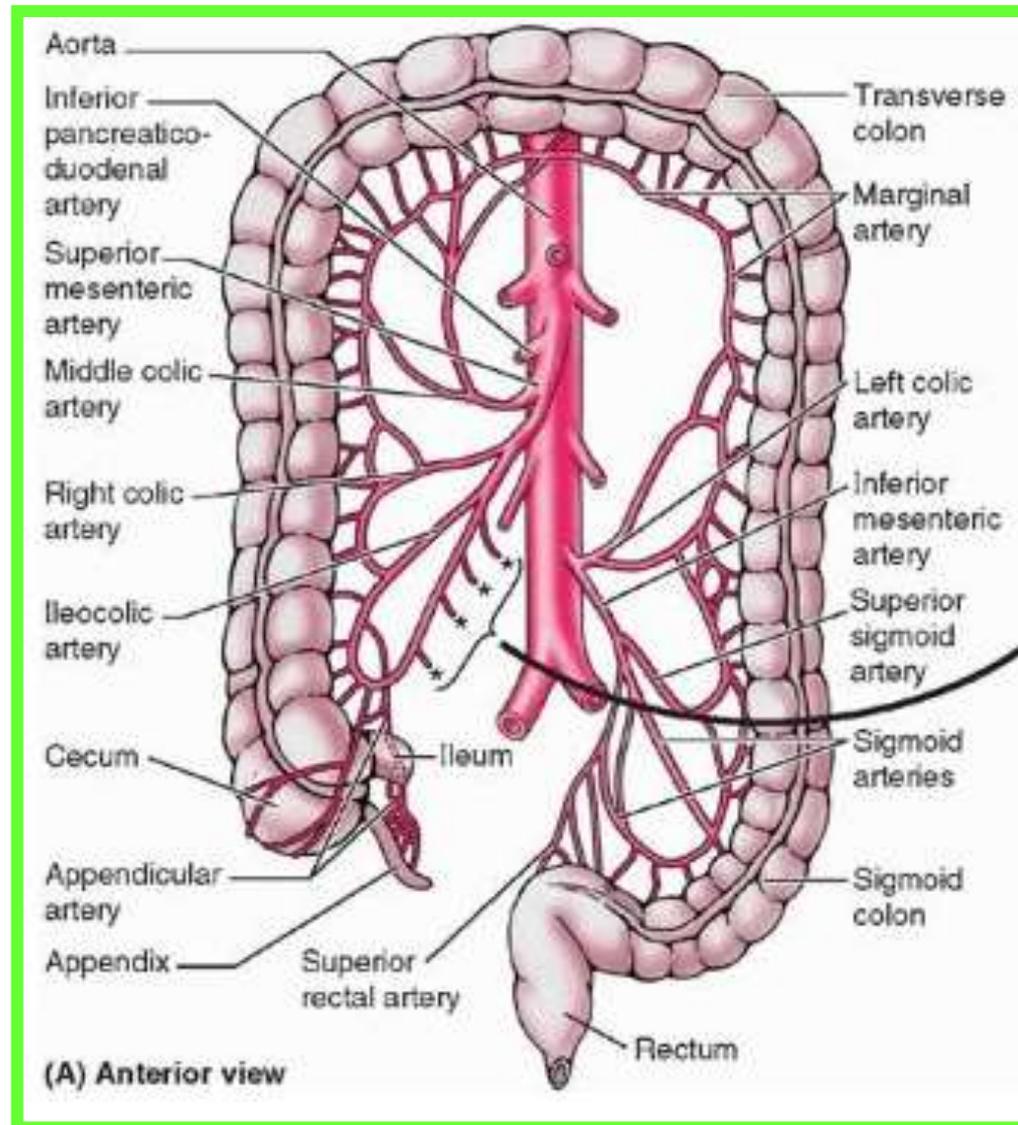
The artery supplies **the rectum** and **upper half of the anal canal** and anastomoses with the **middle rectal** and **inferior rectal arteries**



# Marginal Artery

The anastomosis of **the colic arteries** around the concave margin of the large intestine forms a single arterial trunk called the **marginal artery**.

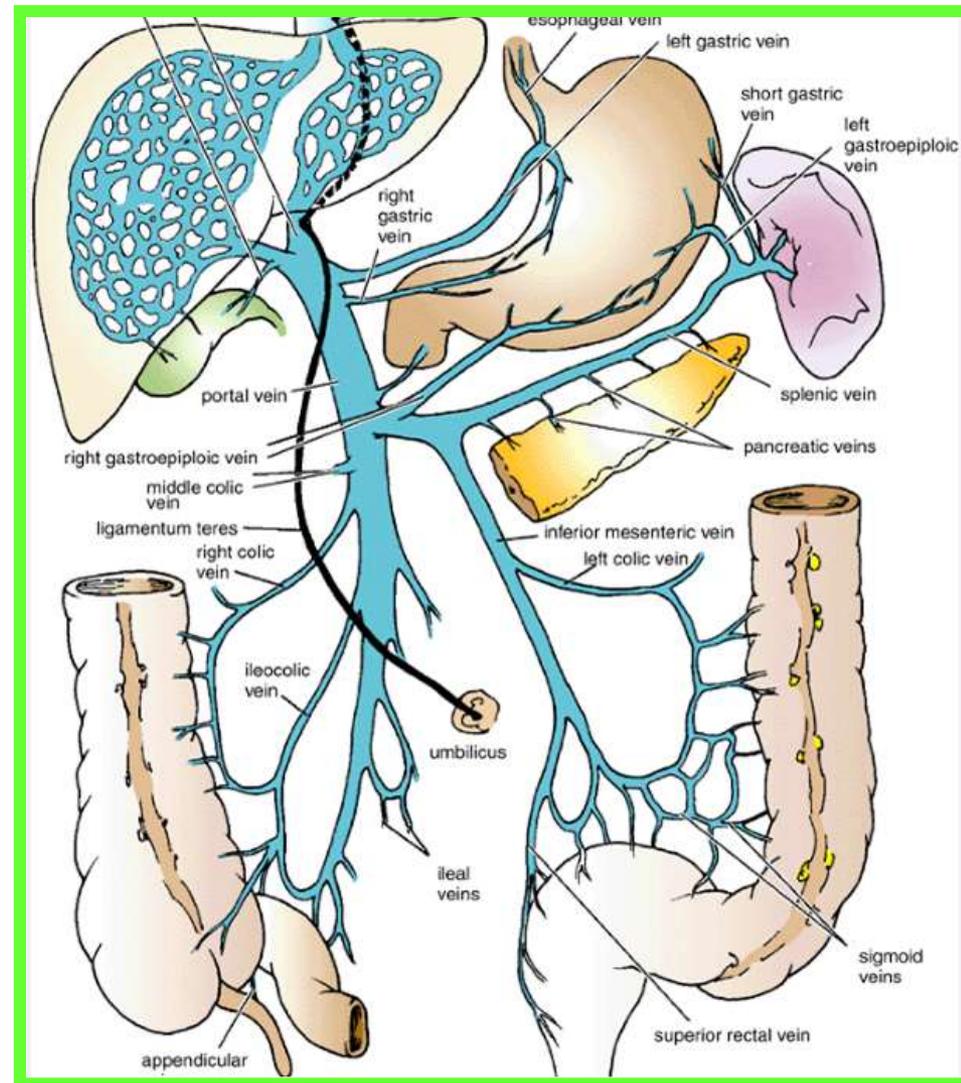
This begins at **the ileocecal junction**, where it anastomoses with **the ileal branches** of the superior mesenteric artery, and it ends where it anastomoses less freely with **the superior rectal artery**.



# Portal Vein (Hepatic Portal Vein)

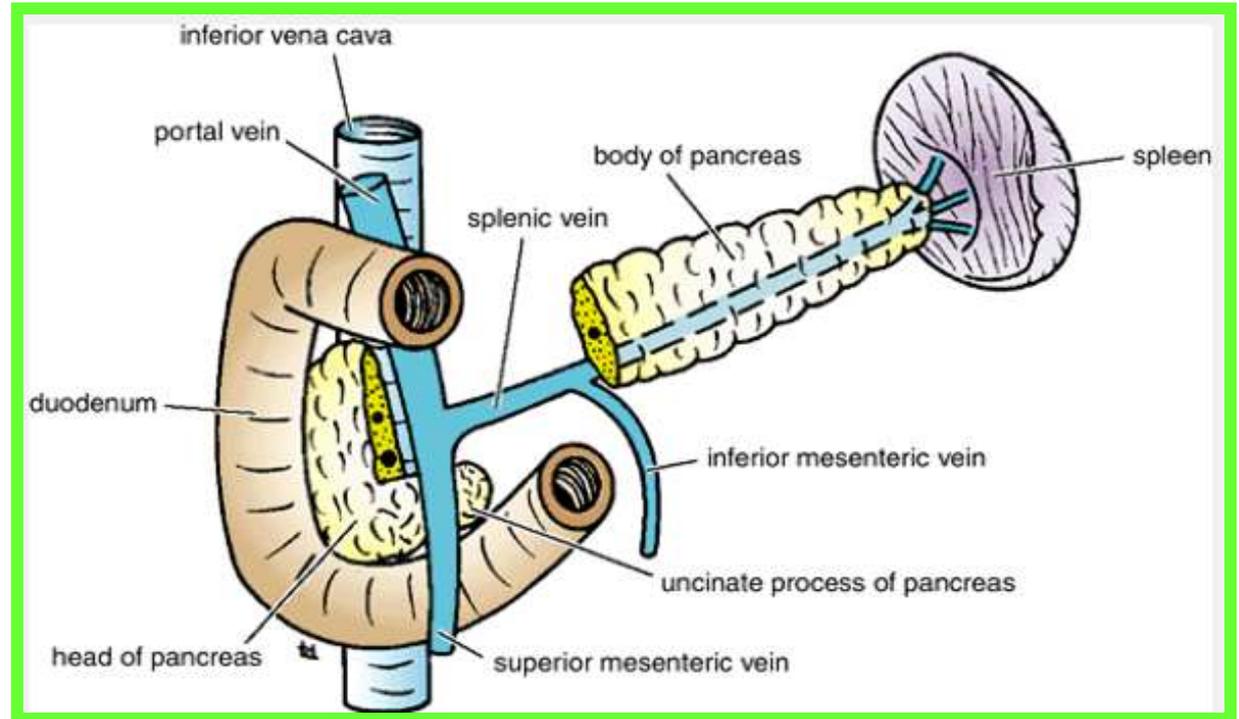
The portal vein drains blood from the abdominal part of the gastrointestinal tract **from the lower third of the esophagus to halfway down the anal canal**; it also drains blood from the **spleen, pancreas, and gallbladder**

The portal vein enters the liver and breaks up into sinusoids, from which blood passes into the hepatic veins that join the **inferior vena cava**



# Portal Vein (Hepatic Portal Vein)

The portal vein is about 2 in. (5 - 8 cm) long and is formed behind the neck of the pancreas by the union of the superior mesenteric and splenic veins.



✓ It ascends to the right, behind the **first part of the duodenum**, and enters the lesser omentum

✓ **The portal vein and its tributaries have no valves.**

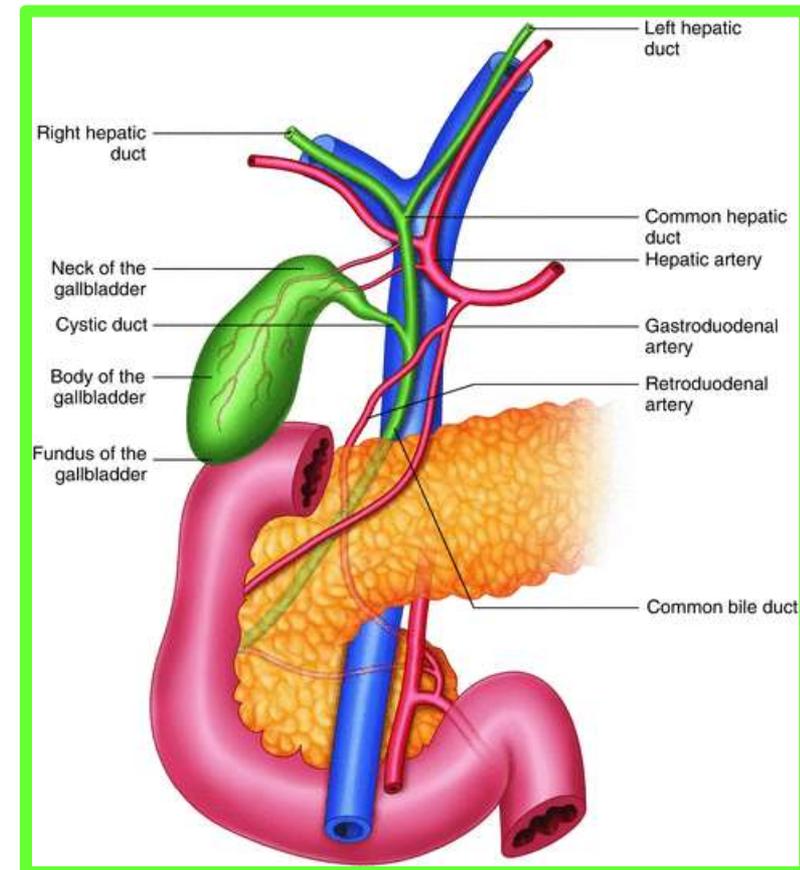
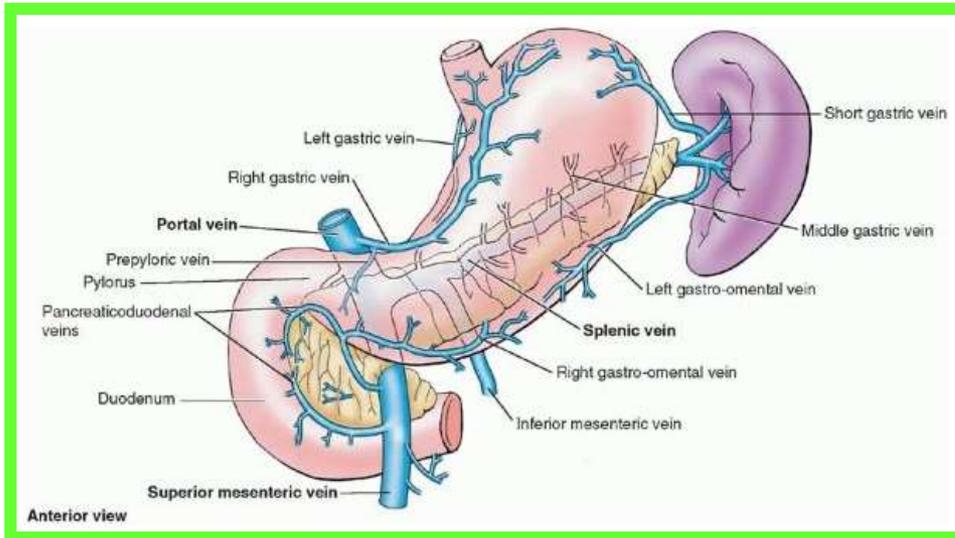
# Portal Vein (Hepatic Portal Vein)

**A- The retro-duodenal,**

**a- Anteriorly;**

- 1) **Bile duct** (anterior and to the right).
- 2) **Gastroduodenal artery** (anterior and to the left).
- 3) **First part of the duodenum**

**b- Posteriorly, inferior vena cava**



# Portal Vein (Hepatic Portal Vein)

B -The supra-duodenal, It ascends in the **right free margin of the lesser omentum**.

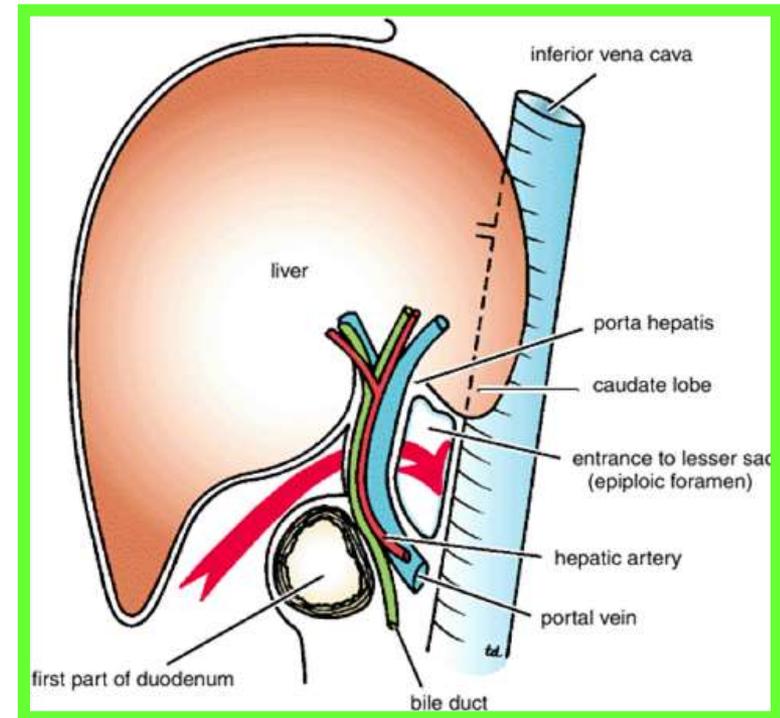
a- Anteriorly;

1) **Bile duct** (anterior and to the right).

2) **Hepatic artery** (anterior and to the left).

b- Posteriorly, **inferior vena cava** and epiploic foramen.

✓ It then runs upward in front of the opening into the lesser sac to **the porta hepatis**, where it divides into **right** and **left** terminal branches



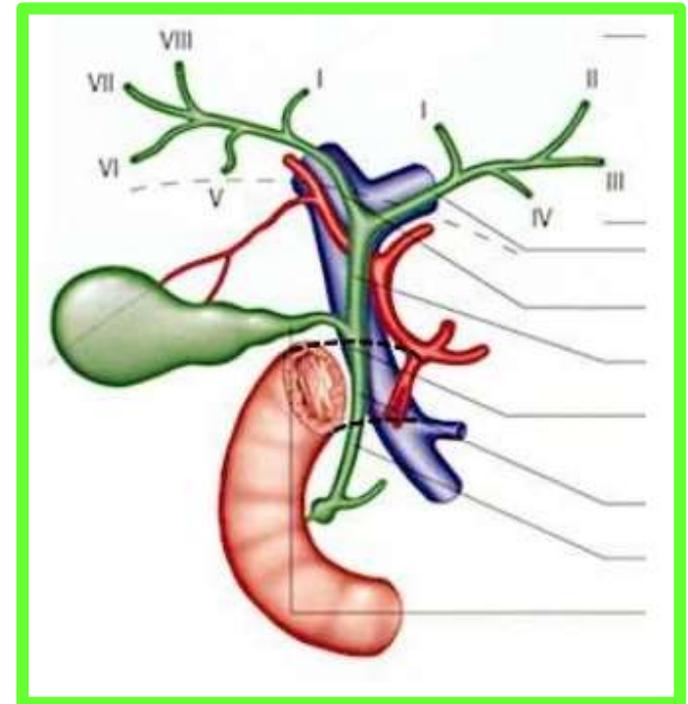
# Portal Vein (Hepatic Portal Vein)

**C- Termination, at the porta hepatis of the liver.**

**- It divides into right and left branches to the corresponding lobes of the liver.**

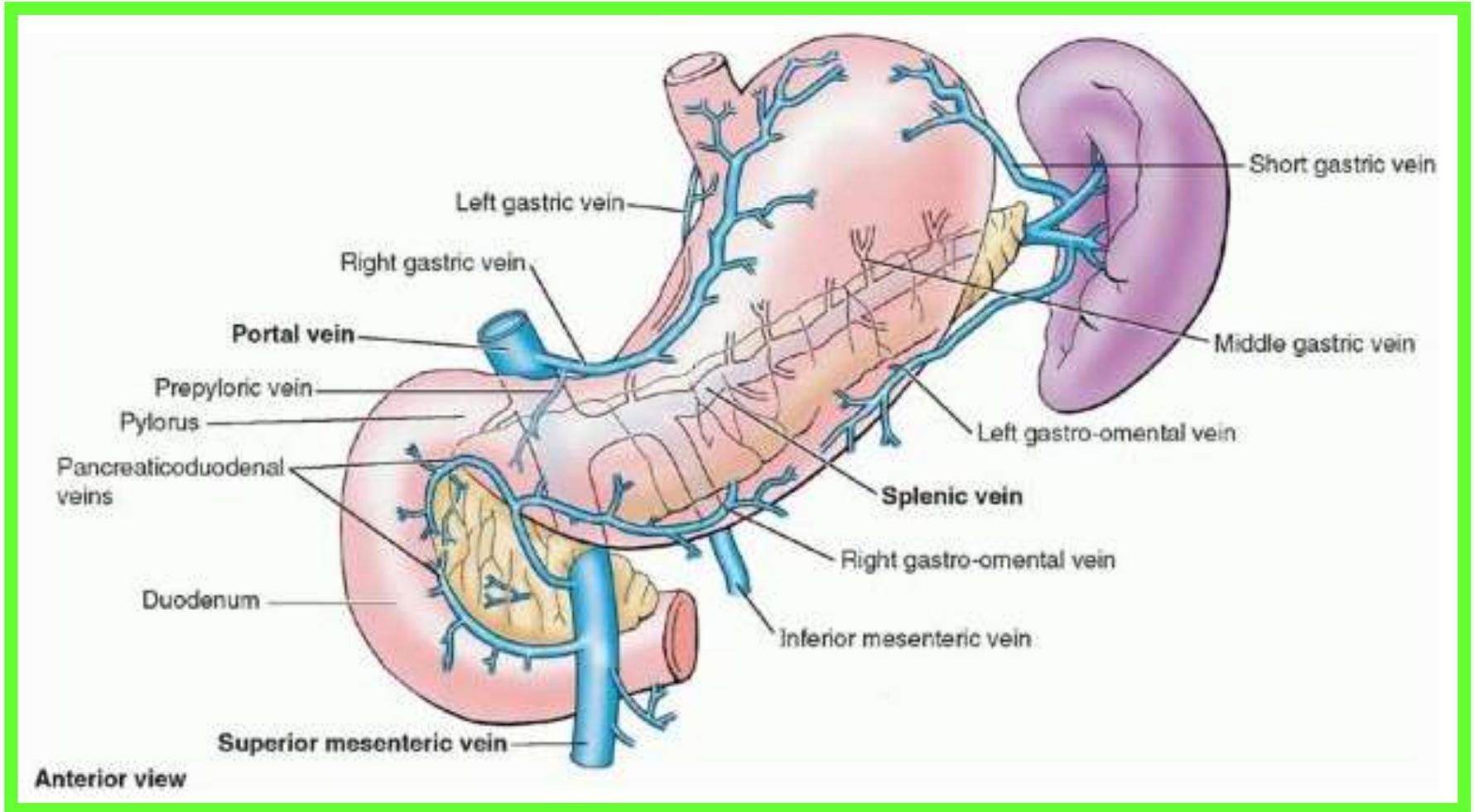
**a- Anteriorly, 1) Right and left hepatic ducts (most anterior).  
2) Right and left branches of hepatic artery (in the middle).**

**b- Posteriorly, inferior vena cava and caudate process**



# Portal Vein (Hepatic Portal Vein)

## Tributaries of the Portal Vein



# Portal Vein (Hepatic Portal Vein)

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## Tributaries

A- 2 veins join each other to form the portal vein.

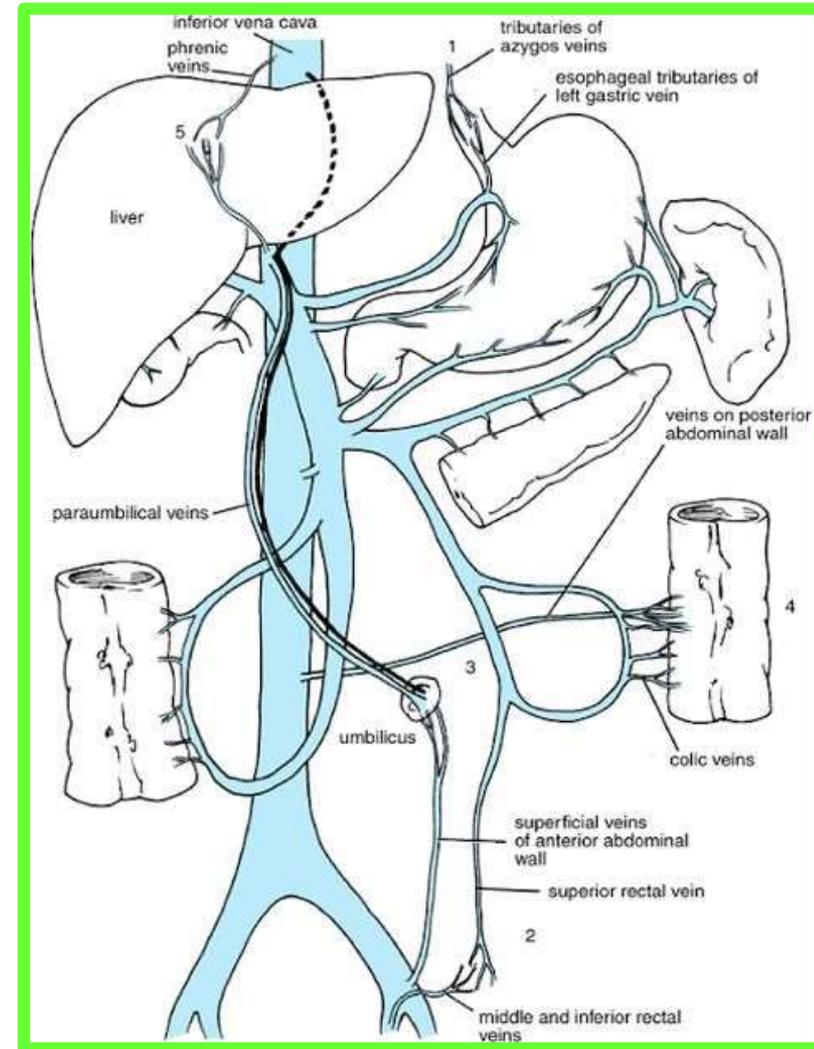
- 1- Superior mesenteric vein.
- 2- Splenic vein.

B- 2 veins from the lesser curvature of the stomach;

- 3- Right gastric vein.
- 4- Left gastric vein.

C- 2 veins end into the terminal branches;

- 5- Paraumbilical vein to the left terminal branch.
- 6- Cystic vein to the right terminal branch.

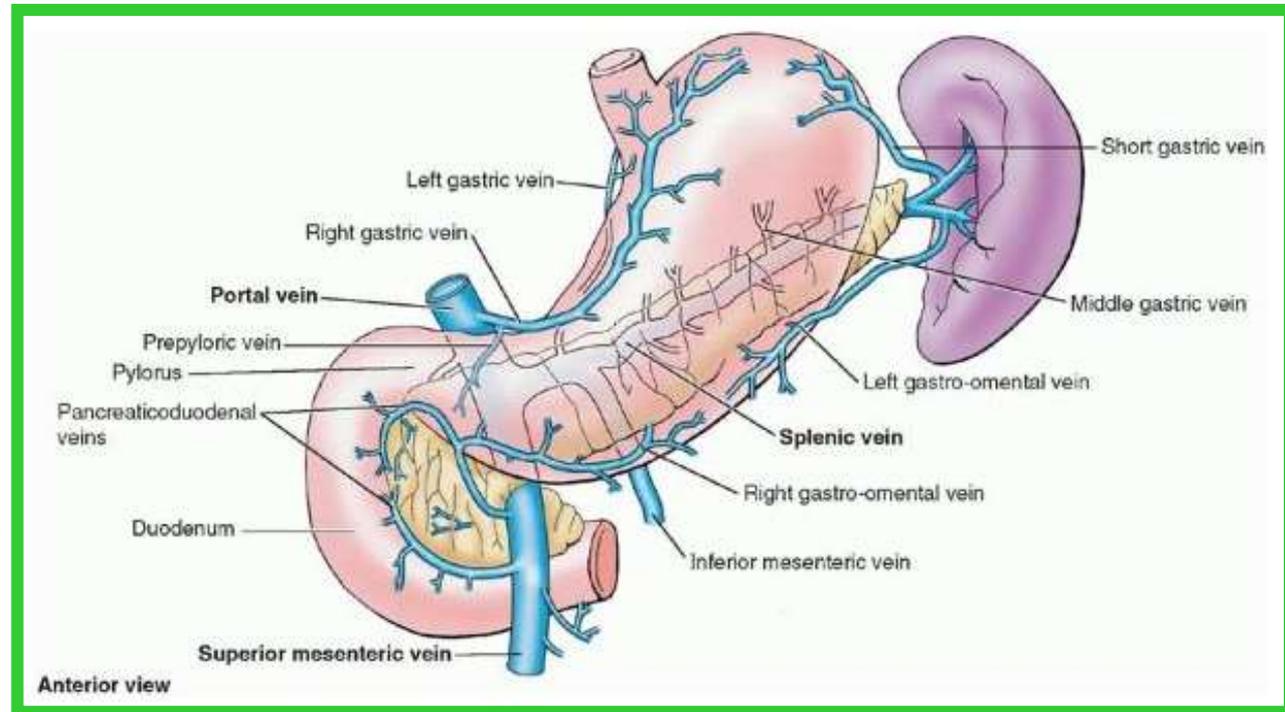


# Tributaries of the Portal Vein

❖ **Splenic vein:** This vein leaves the hilum of the spleen and passes to the right in **the splenicorenal ligament**. It unites with **the superior mesenteric vein** behind the neck of the pancreas to form the portal vein.

It receives the :

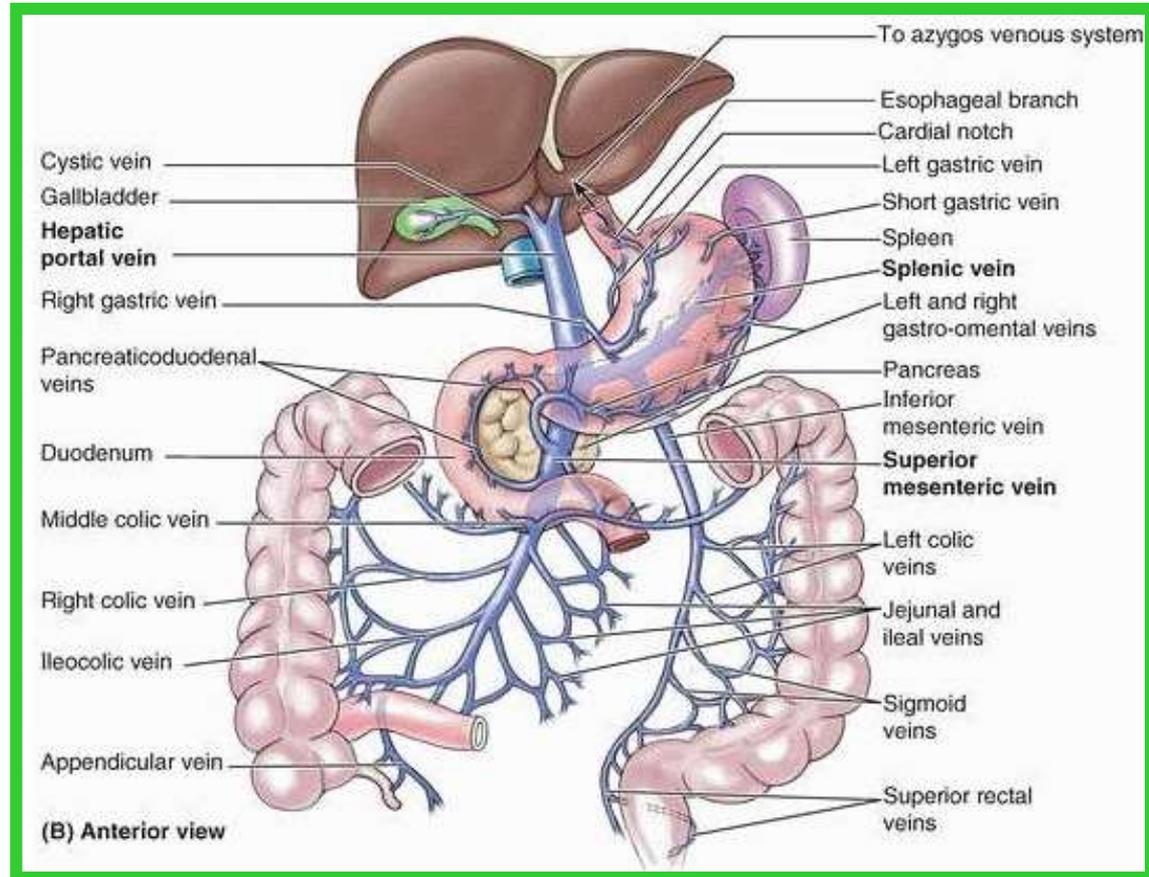
- ✓ Short gastric,
- ✓ left gastroepiploic,
- ✓ inferior mesenteric,
- ✓ pancreatic veins



# Tributaries of the Portal Vein

❖ **Inferior mesenteric vein:** This vein ascends on the posterior abdominal wall and joins the **splenic vein** behind the **body of the pancreas**

It receives the **superior rectal veins**, the **sigmoid veins**, and the **left colic vein**.

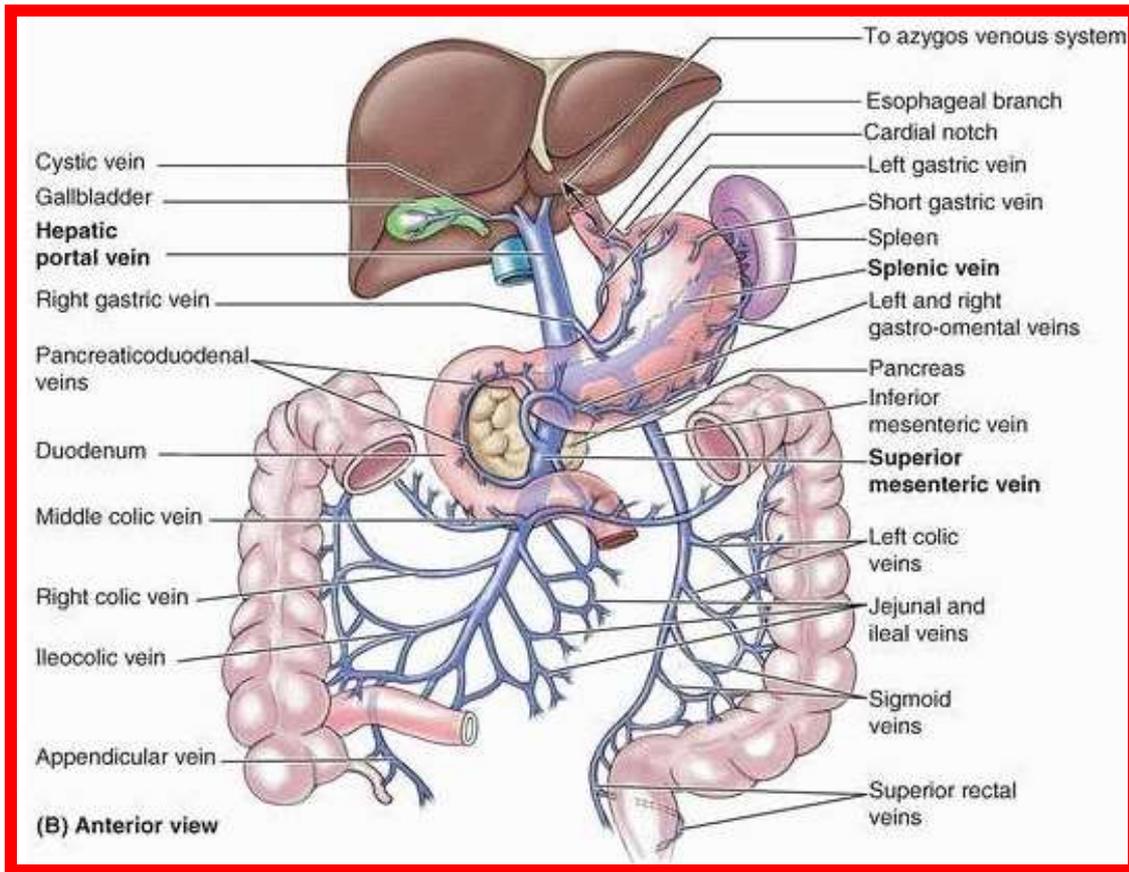


# Tributaries of the Portal Vein

❖ **Superior mesenteric vein:** This vein ascends in **the root of the mesentery of the small intestine**. It passes in front of the third part of the duodenum and joins the splenic vein behind the neck of the pancreas .

**It receives :**

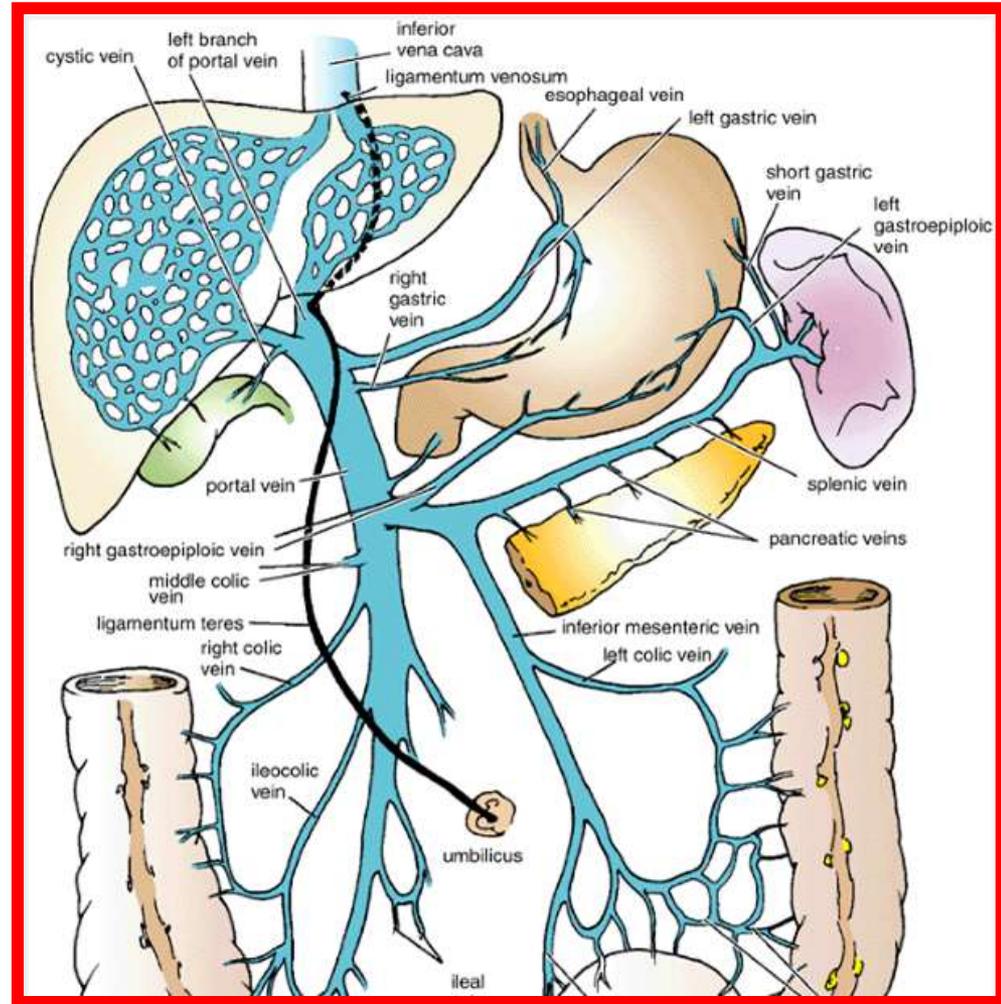
- ✓ The jejunal,
- ✓ The ileal,
- ✓ The ileocolic,
- ✓ The right colic,
- ✓ The middle colic,
- ✓ The inferior pancreaticoduodenal, and
- ✓ The right gastroepiploic veins



# Tributaries of the Portal Vein

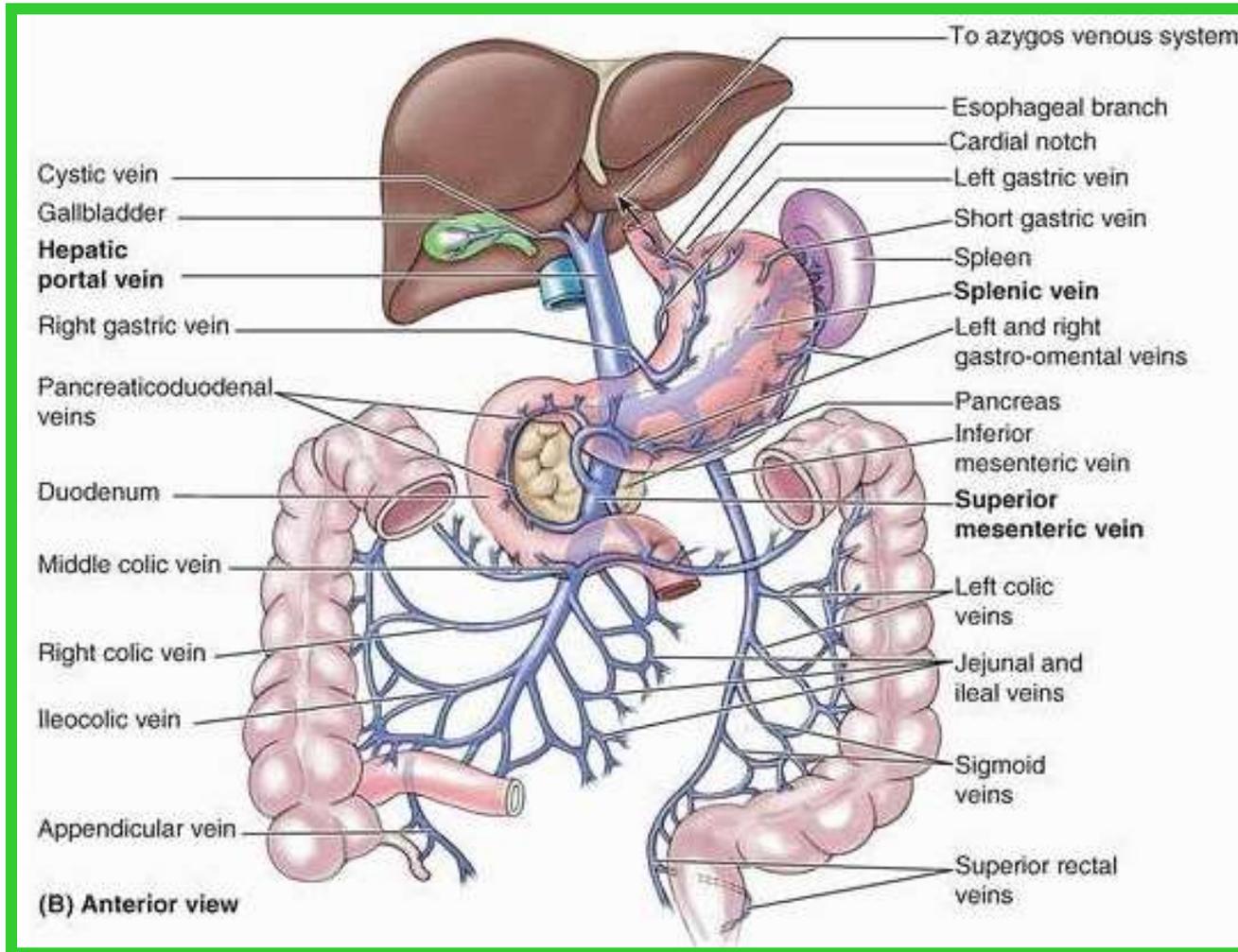
❖ **Left gastric vein:** This vein drains the left portion of the lesser curvature of the stomach and the distal part of the esophagus. It **opens directly** into the **portal vein**

❖ **Right gastric vein:** This vein drains the right portion of the lesser curvature of the stomach and **drains directly** into the **portal vein**



# Tributaries of the Portal Vein

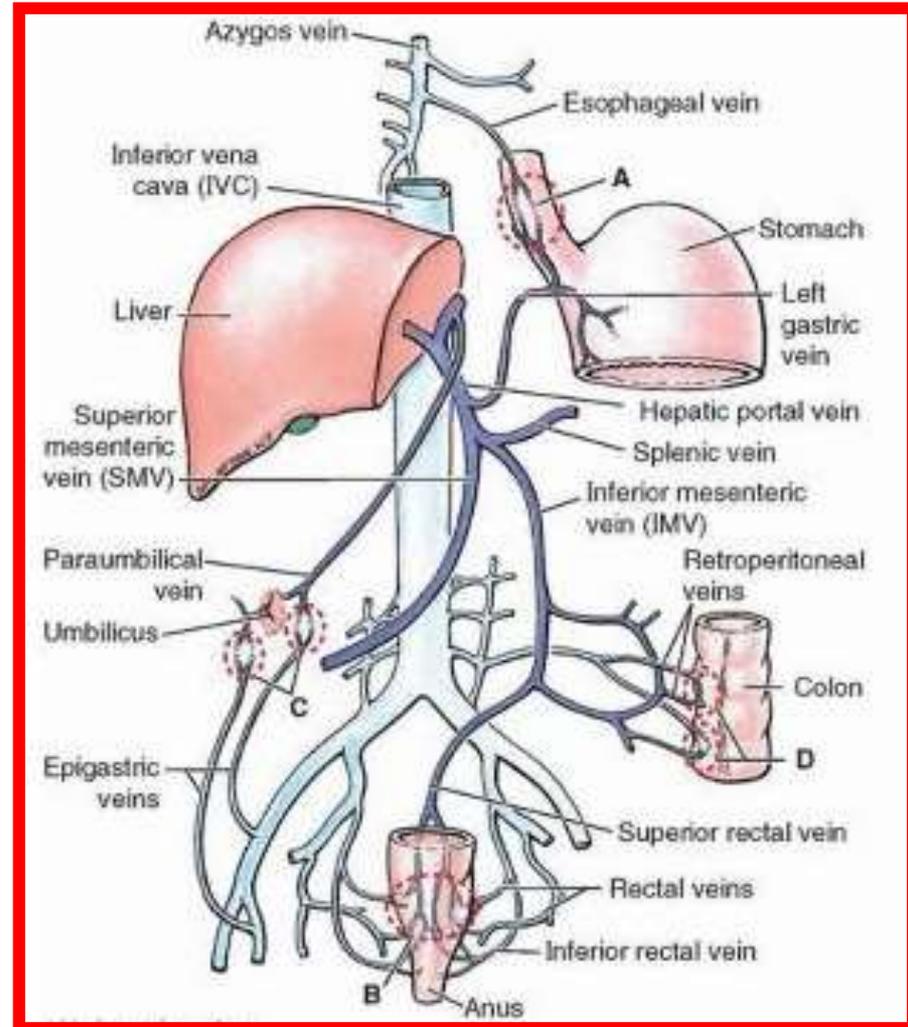
**Cystic veins:** These veins either drain the gallbladder directly into the liver or join the portal vein



# HEPATIC PORTAL VEIN AND PORTAL-SYSTEMIC ANASTOMOSES

**Portal-systemic anastomoses**, in which the **portal venous system** communicates with the **systemic venous system**, are formed in the submucosa of :

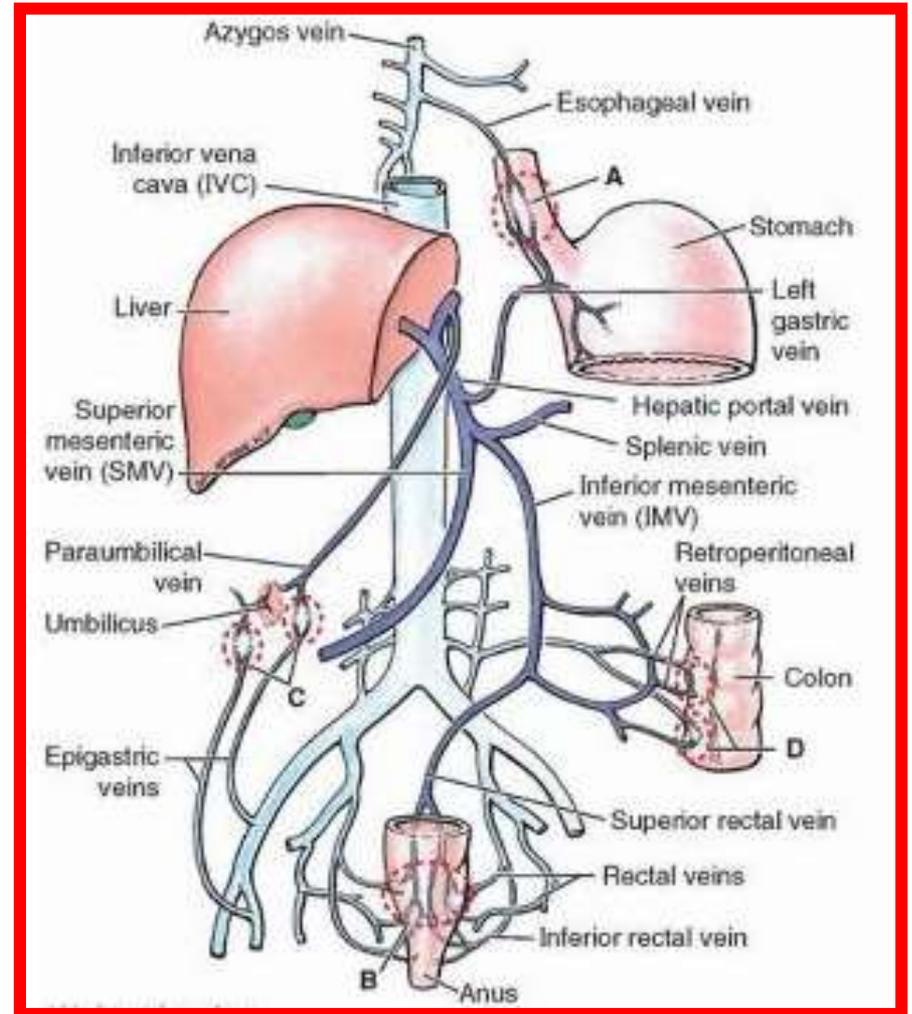
- ✓ The inferior esophagus,
- ✓ The submucosa of the anal canal
- ✓ The paraumbilical region,
- ✓ The posterior aspects (bare areas)



# HEPATIC PORTAL VEIN AND PORTAL-SYSTEMIC ANASTOMOSES

*At the lower third of the **esophagus**, the esophageal branches of the **left gastric vein** (portal tributary) anastomose with the esophageal veins draining the middle third of the esophagus into **the azygos veins** (systemic tributary).*

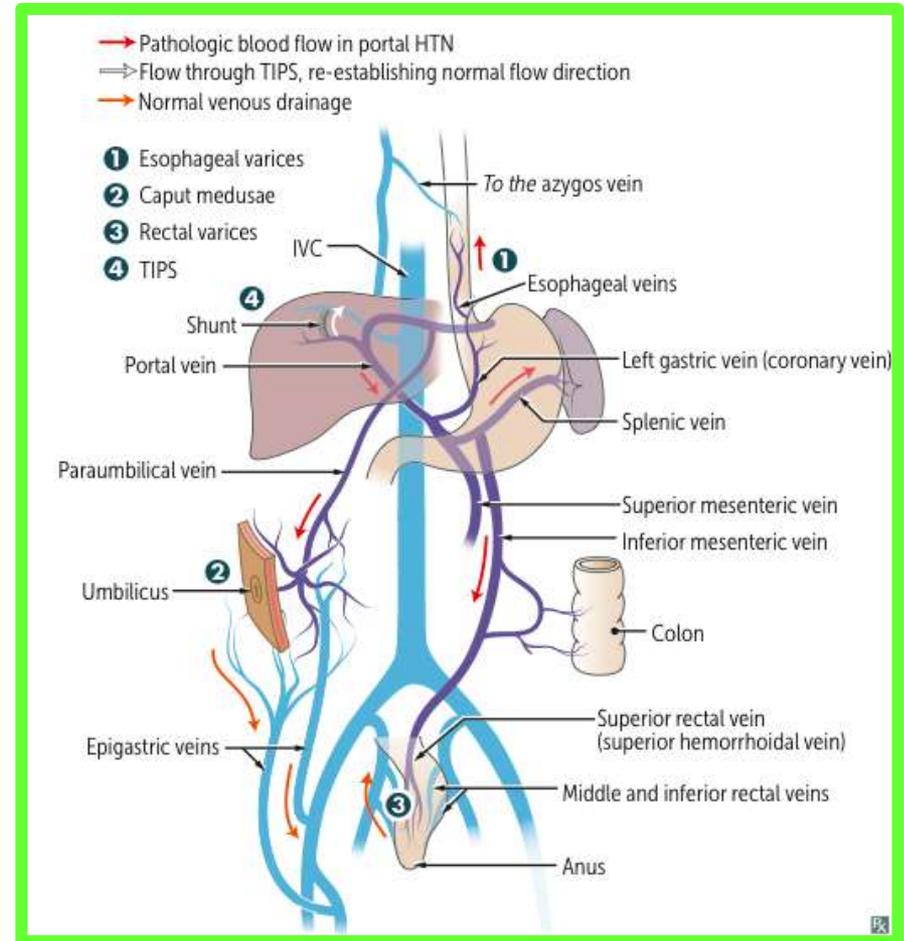
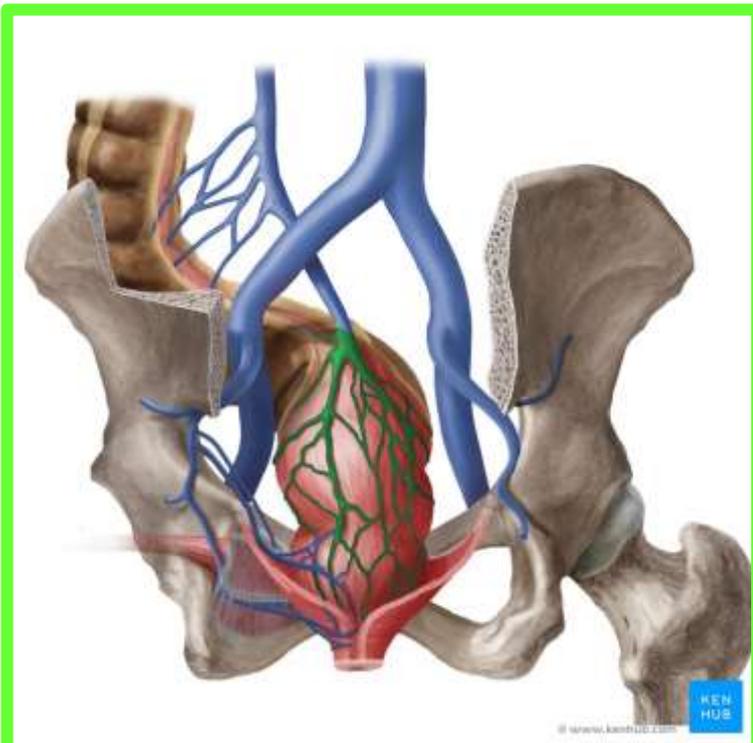
*Enlargement of these anastomoses result to **oesophageal varices** leading to **hematemesis** (vomiting of blood).*



# HEPATIC PORTAL VEIN AND PORTAL-SYSTEMIC ANASTOMOSES

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**Halfway down the anal canal,** the **superior rectal veins** (portal tributary) anastomose with the **middle and inferior rectal veins** (systemic tributaries),.



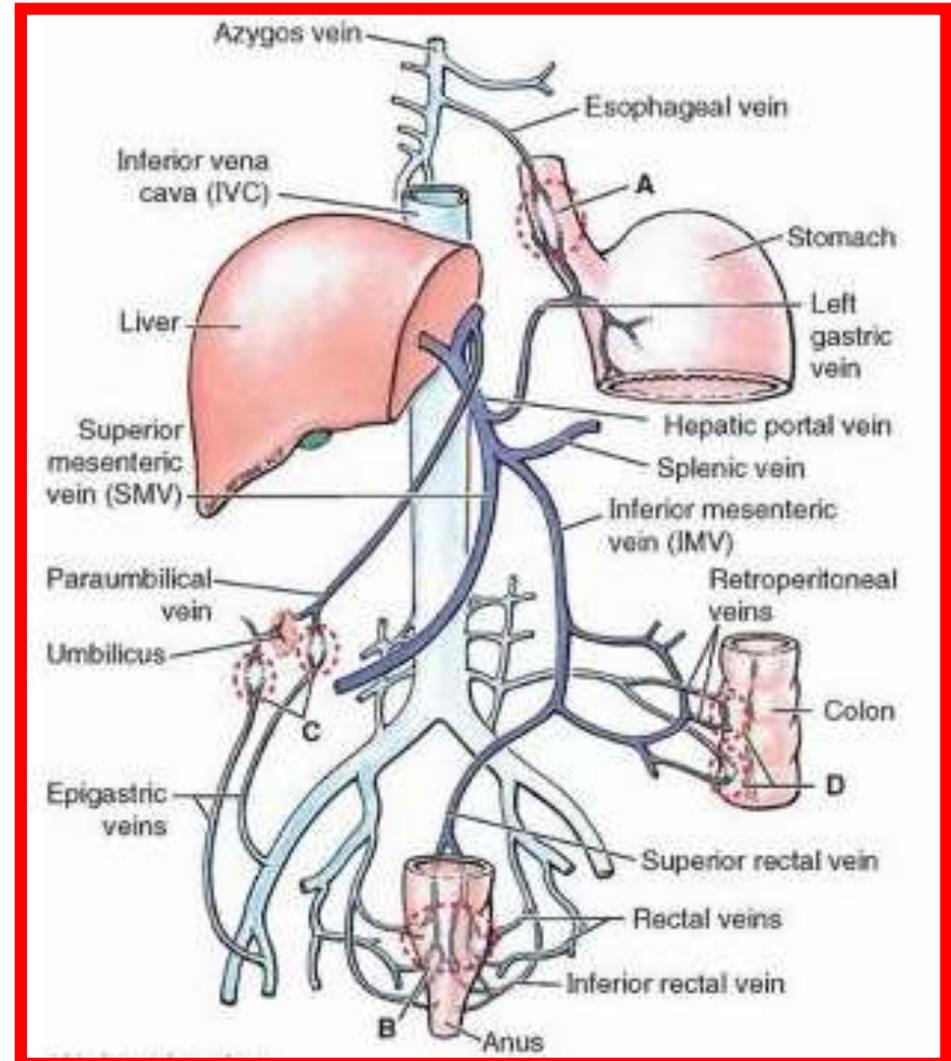
- **Enlargement of these anastomoses leads to formation of piles.**

# HEPATIC PORTAL VEIN AND PORTAL-SYSTEMIC ANASTOMOSES

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**The paraumbilical veins** connect the left branch of the portal vein with the superficial veins of the anterior abdominal wall (systemic tributaries). **The paraumbilical veins** travel in the falciform ligament and accompany the ligamentum teres.

- **Enlargement of these anastomoses produces caput medusae (dilated veins radiating around the umbilicus).**



# HEPATIC PORTAL VEIN AND PORTAL-SYSTEMIC ANASTOMOSES

At the posterior abdominal wall, between

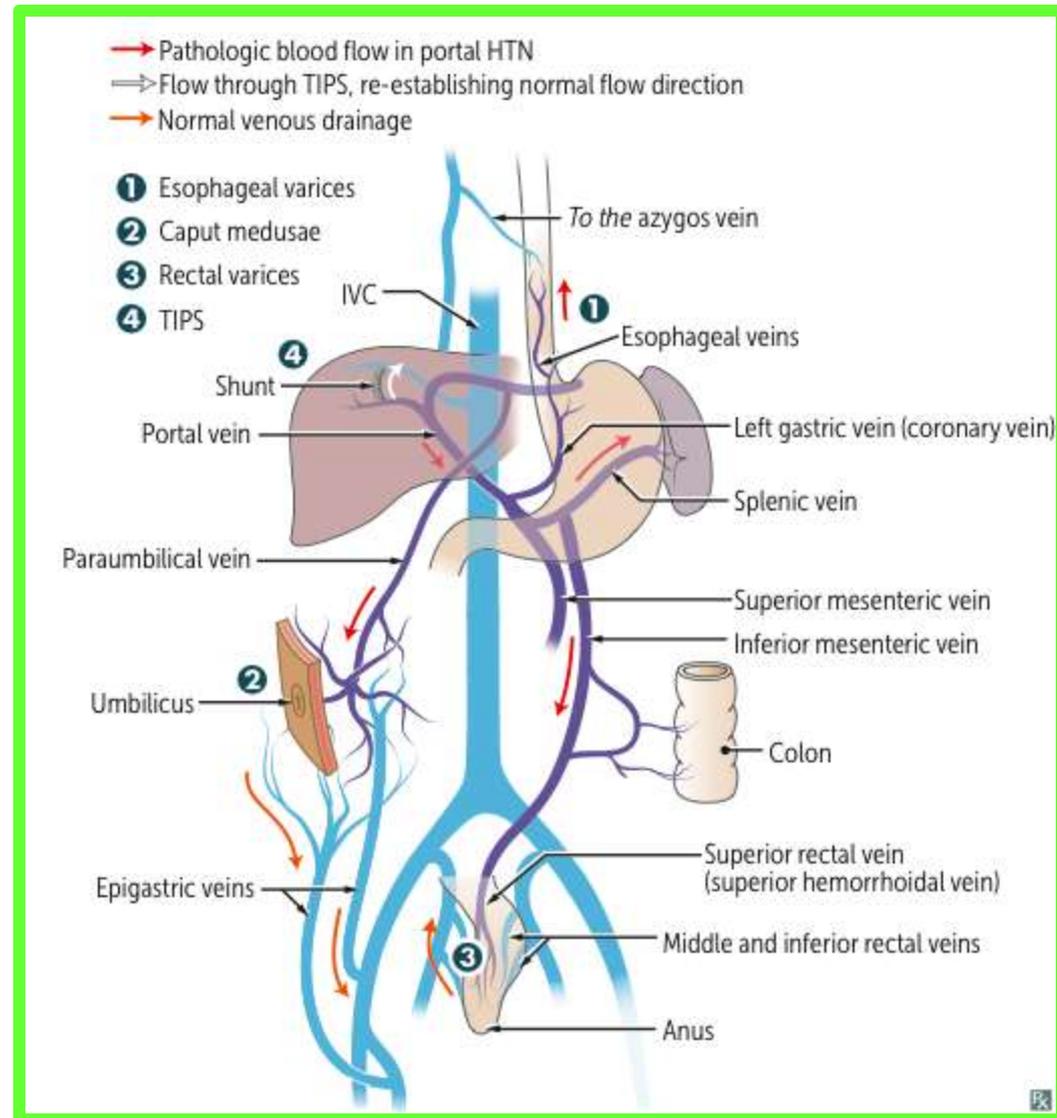
a- Veins of the colon and duodenum (portal).

b- Veins of the posterior abdominal wall and left renal vein (systemic).

At the bare area of the liver,

a- Veins of the liver (portal).

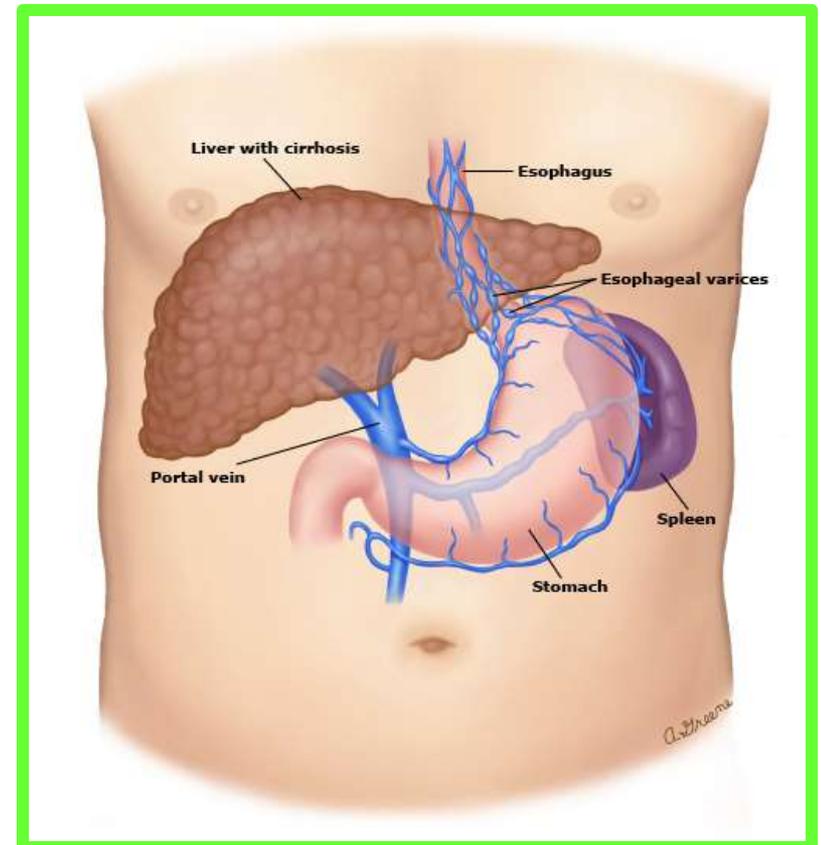
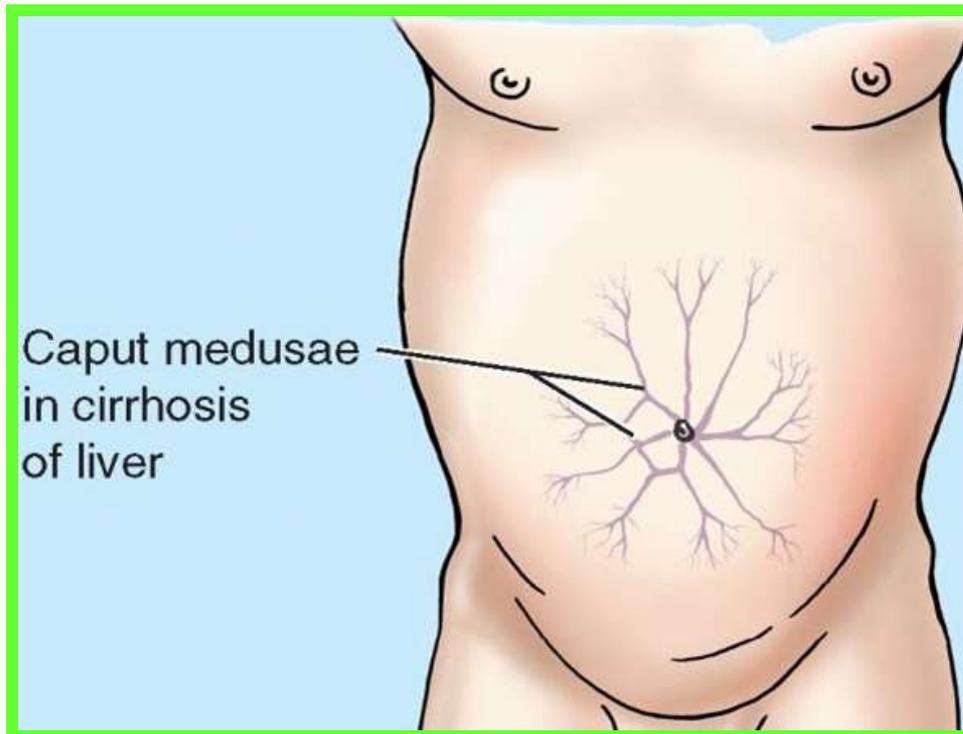
b- Inferior phrenic veins of the diaphragm (systemic).



# Portal Hypertension

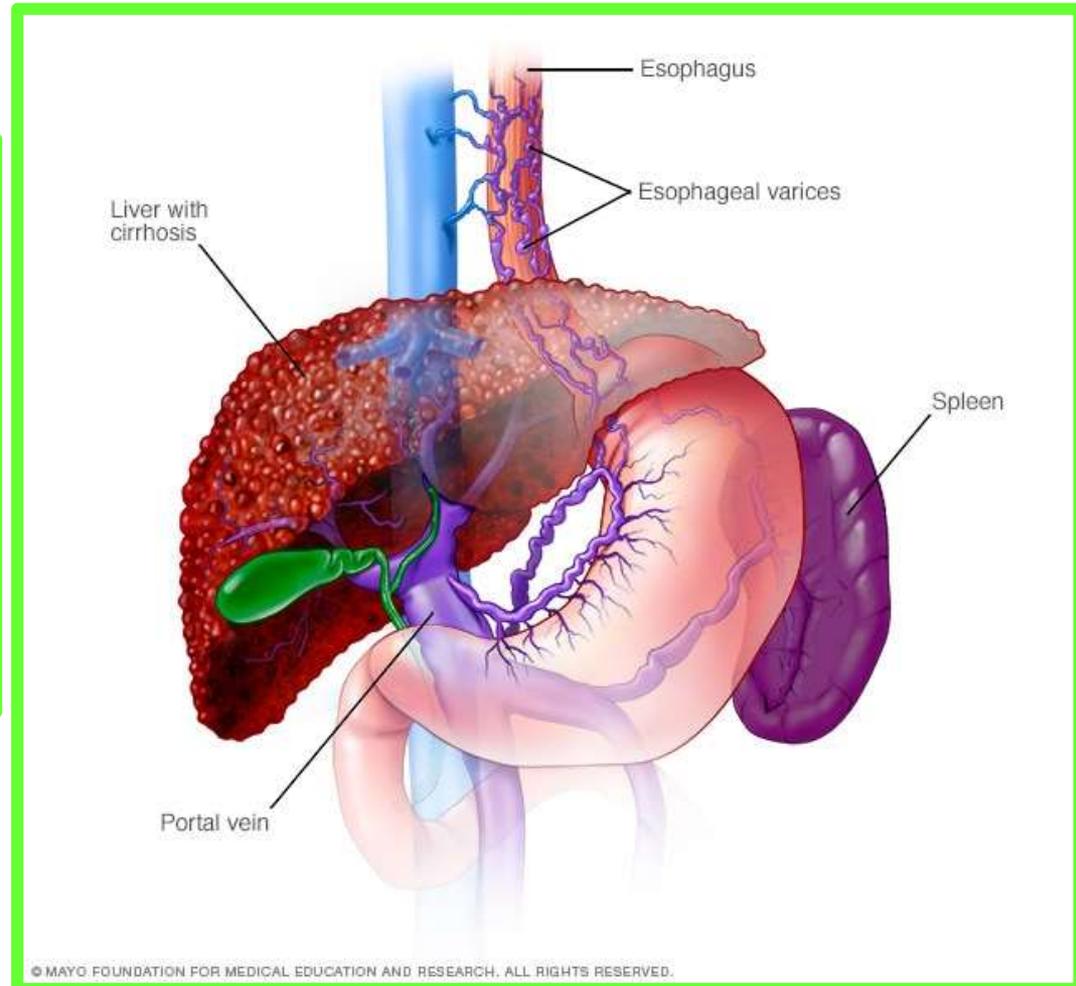
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When **scarring and fibrosis from cirrhosis of the liver obstruct the hepatic portal vein**, pressure rises in the hepatic portal vein and its tributaries, producing **portal hypertension**. At the sites of **anastomoses between portal and systemic veins**, portal hypertension produces **enlarged varicose veins** and blood flow from the portal to the systemic system of veins



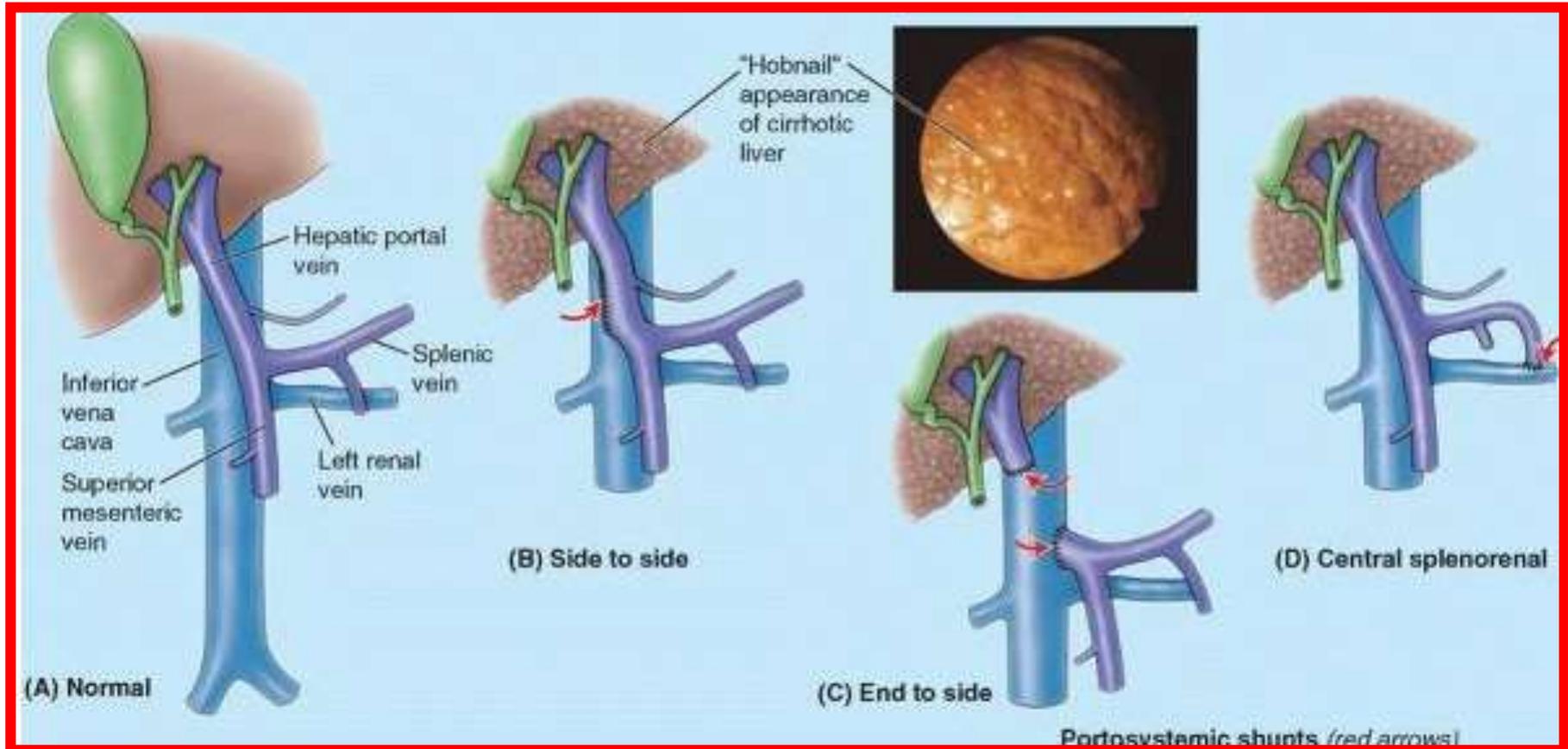
# Portal Hypertension

The veins may become so dilated that their walls rupture, resulting in hemorrhage. Bleeding from esophageal varices (*dilated esophageal veins*) at the distal end of the esophagus is often *severe and may be fatal*.



# Portal Hypertension

A common method for reducing portal hypertension is to divert blood from the portal venous system to the systemic venous system by creating a communication between **the portal vein and the IVC** or by joining **the splenic and left renal veins** — **a portacaval anastomosis or portosystemic shunt**



***Dr Aiman Al-Maathidy***



***Thursday 14 April 2022***