

# Liver & Gallbladder

**Modified slides done by Reenas Khresat**

- Its weight is about 1 Kg and it depends on the human body weight .
- A man has a weight ( 50 Kg ) → his liver's weight will be(1 Kg). On the same time , in a child who has a weight ( 20 Kg) his liver's weight will be(1 Kg) due to the more activity it has .
- It is :-
  - 1- exocrine because it secretes (bile, and bile salts ) → which done by the bile duct to the 2nd part of the duodenum .
  - 2-endocrine organ(Albumen , globulins, prothrombin & fibrinogen)formation .

# Liver



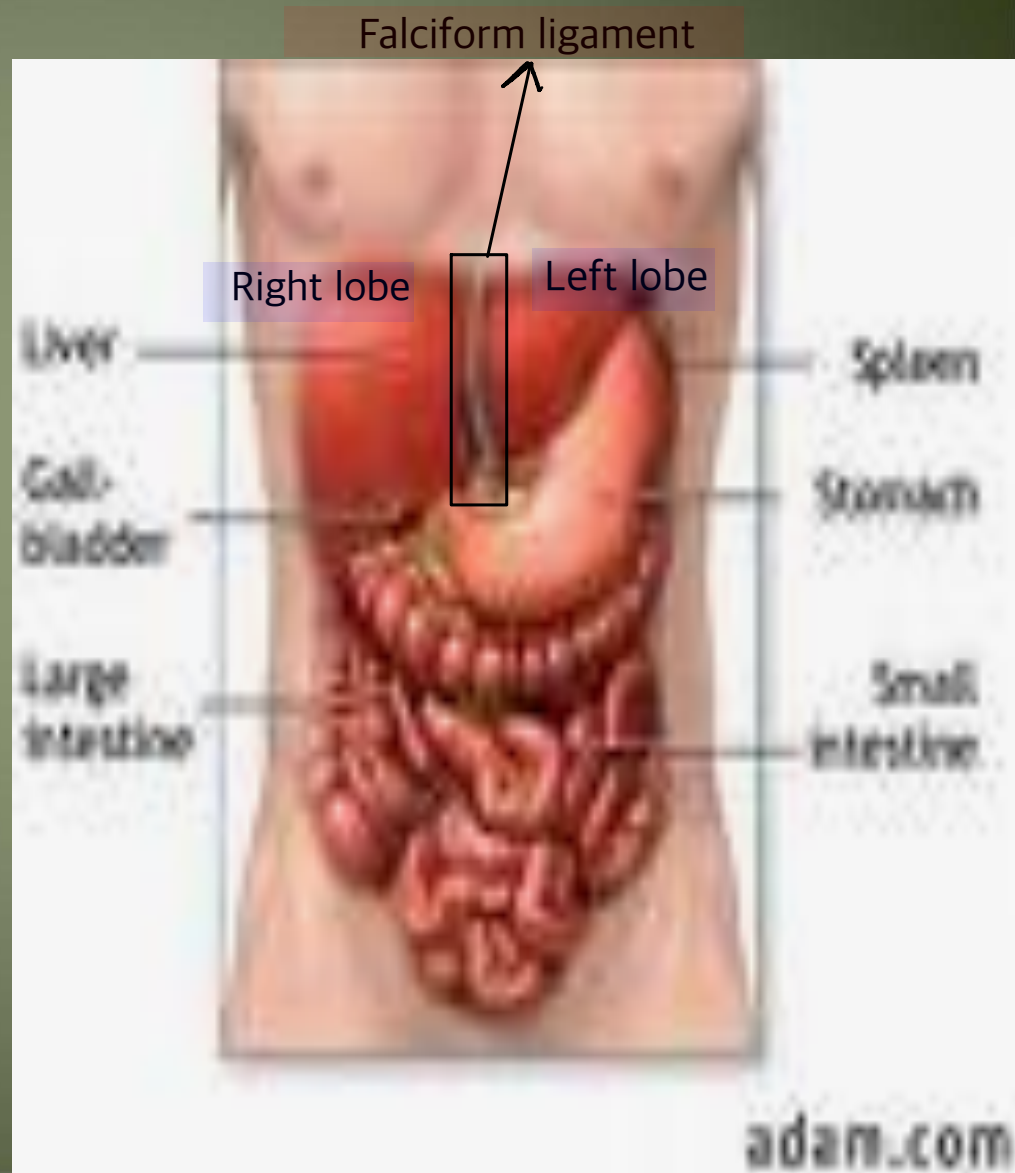
- The liver is the largest gland in the body and has a wide variety of functions
- Weight:  $\frac{1}{50}$  of body weight in adult &  $\frac{1}{20}$  of body weight in infant *→ more active in children.*
- It is exocrine (bile) & endocrine organ (Albumen, prothrombin & fibrinogen)

## • Function of the liver

- Secretion of bile & bile salt For fat digestion ( exocrine)
- Metabolism of carbohydrate, fat and protein
- Formation of heparin & anticoagulant substances *anticoagulant* And it forms substances which are very important for coagulation
- Detoxication For drug's materials. Also kidneys do this function
- Storage of glycogen and vitamins Which are very important in energy production Like the conversion of glycogen to glucose
- Activation of vita .D *→ in case of excess glucose.*

# Location ...

- Occupies right hypochondrium + epigastrium & extends to left hypochondrium



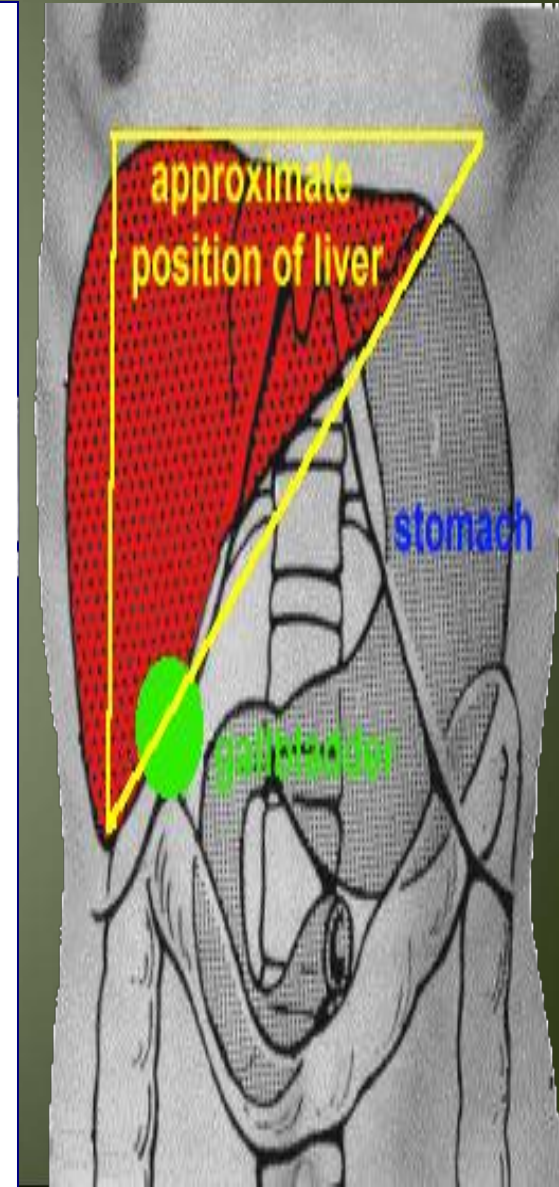
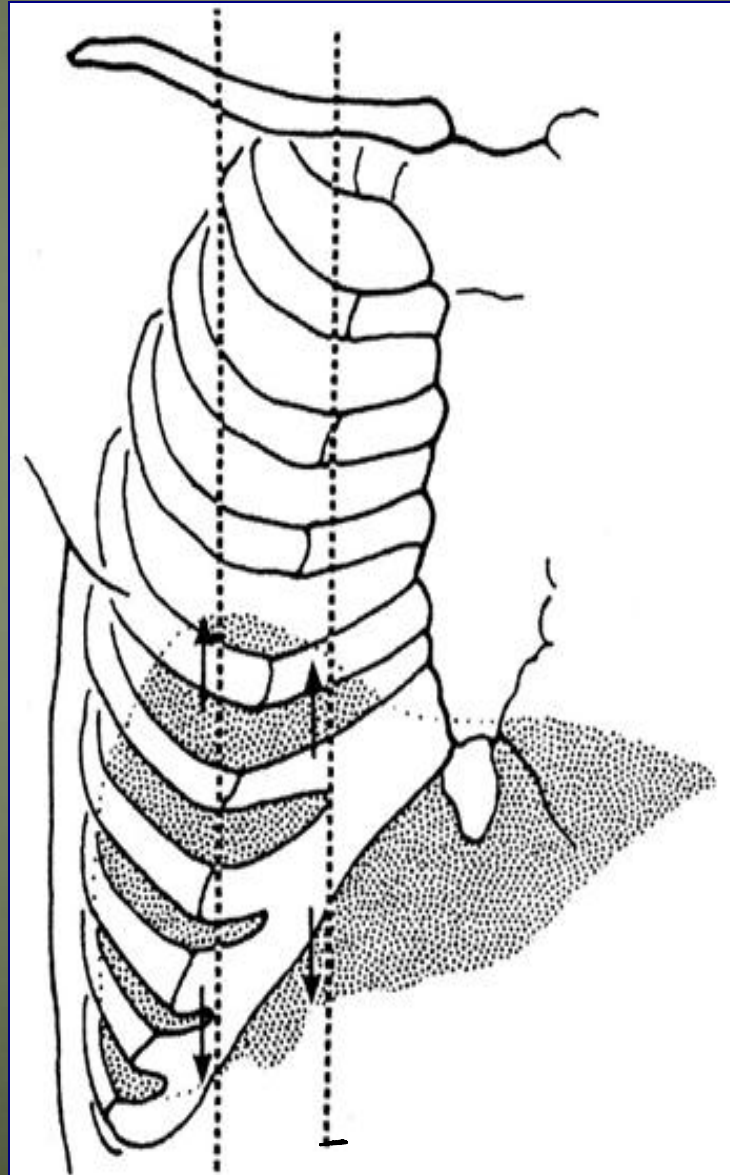
# Surface anatomy of the liver

-The greater part of the liver is situated under cover of the right costal margin

- Diaphragm separates it from the pleura, lungs, pericardium, and heart.

- sharp border (inferiorly located) in the abdomen

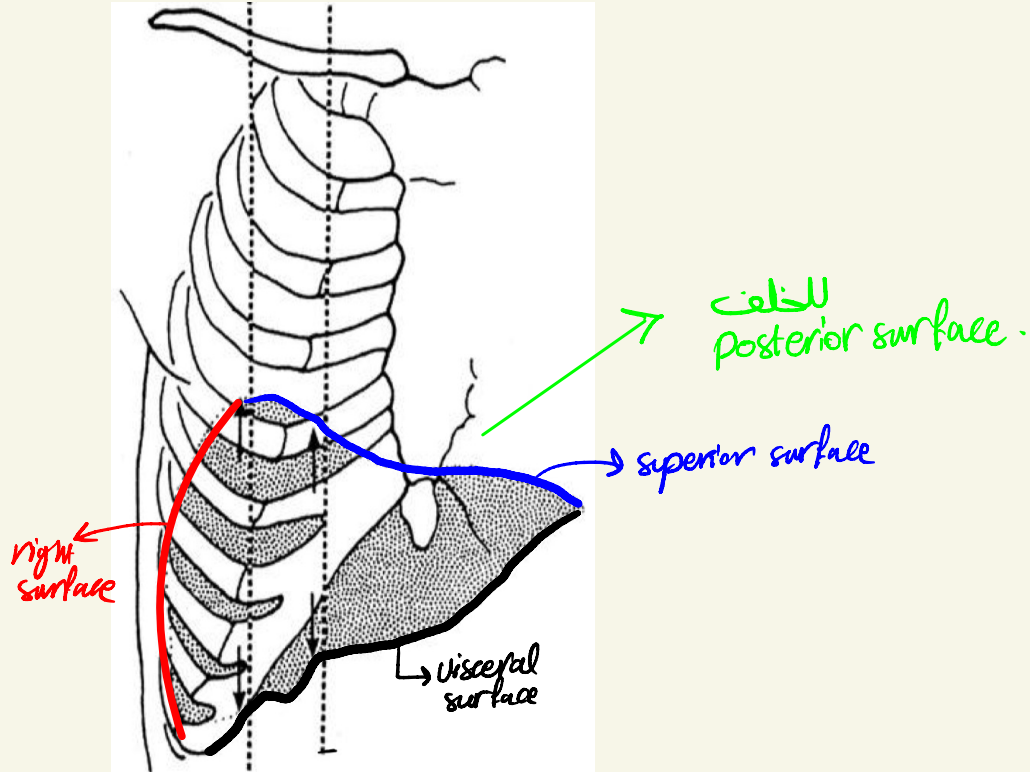
في حالة تفتيح  
الكبد يكون واضح  
للعيين  
He can touch it



- The surface anatomy:

—> On the right side , it reaches to the 5th Costal Cartilage .

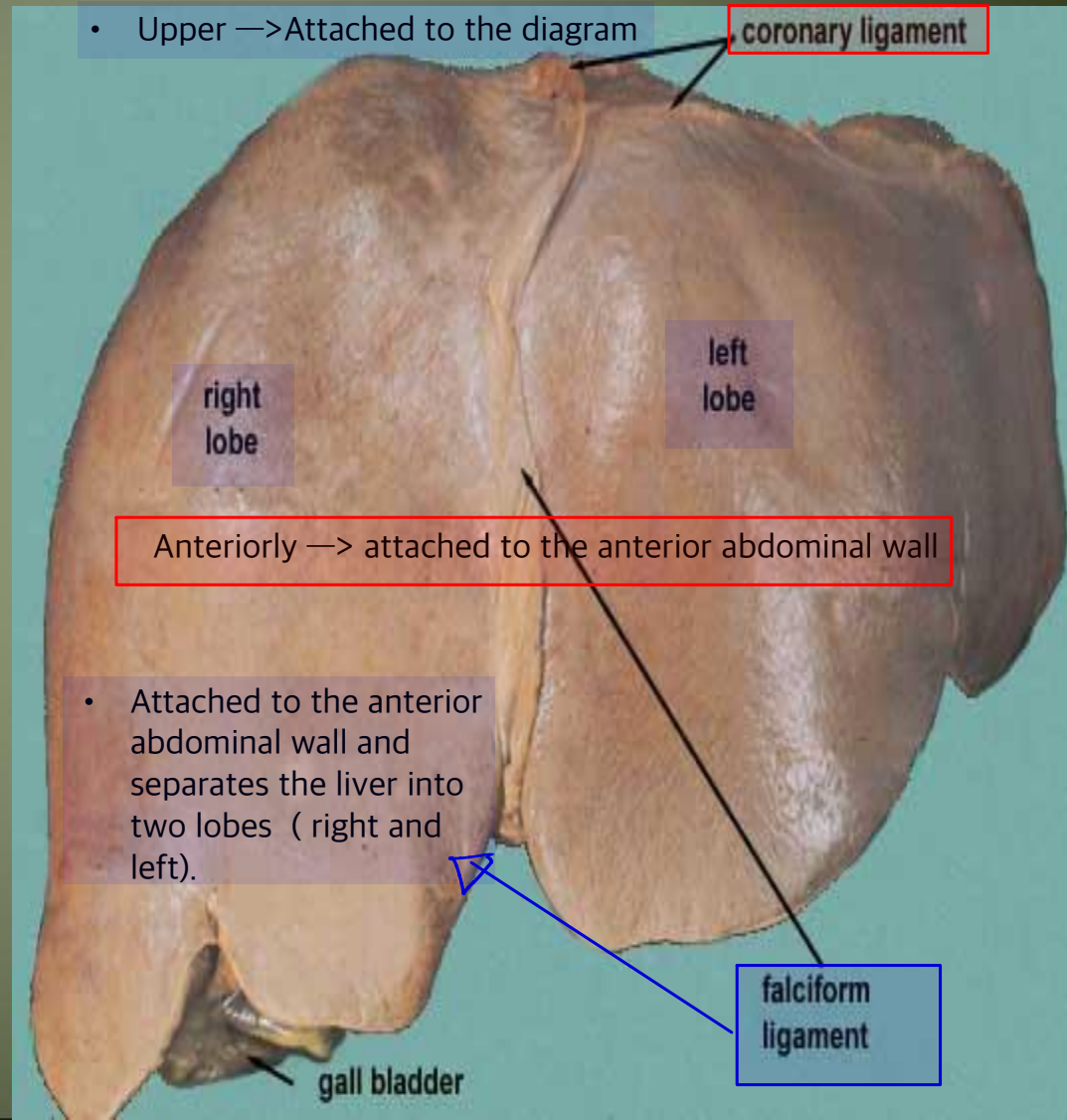
—> It has 5 surfaces ( upper , anterior, posterior, right surfaces and the cavity ( the visceral surface , toward viscera ( the abdomen) ) )



# Ant. View of the liver

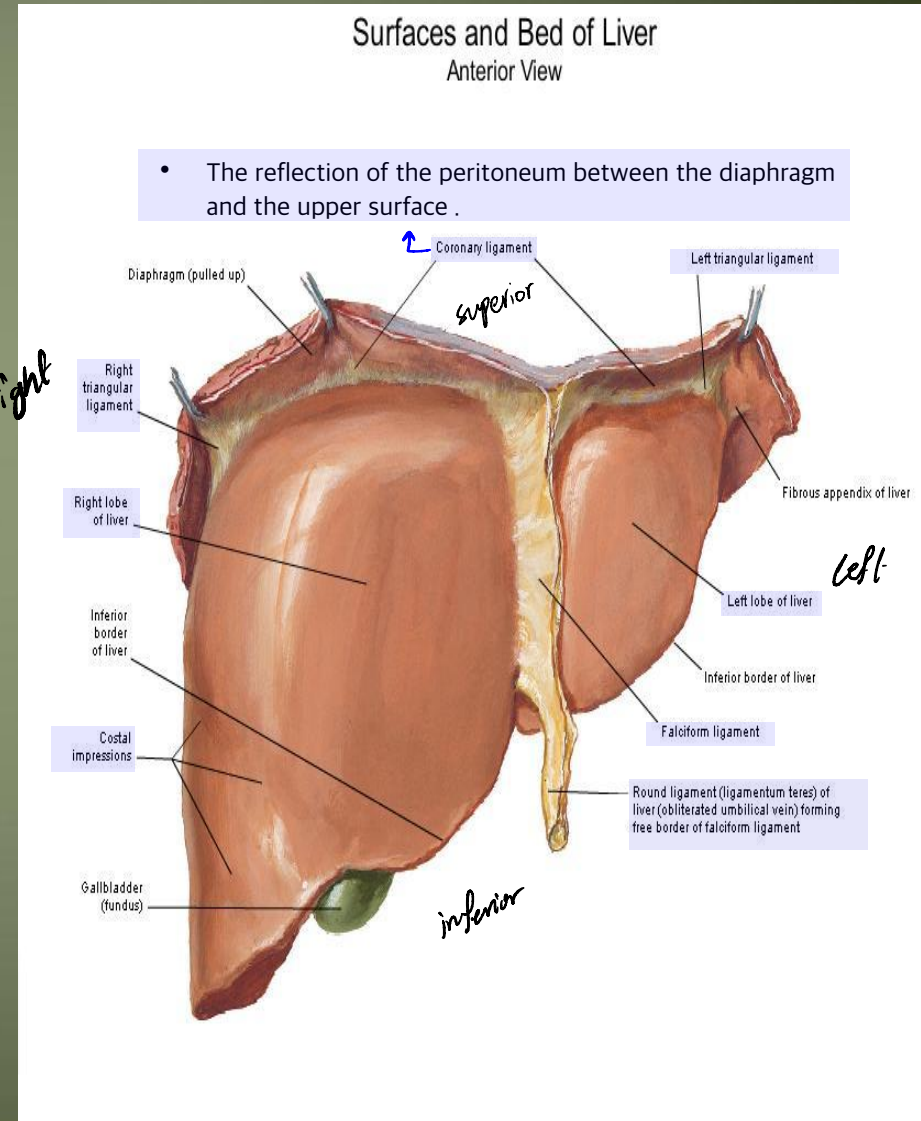
- Right lobe
- Cut edge of the Falciform ligament  
left lobe
- Diverging cut edges of the superior part of the coronary ligament
- Fundus of the gall bladder

- Reflection of peritoneum between liver and diaphragm .



# Surfaces of the liver, their relations & impressions

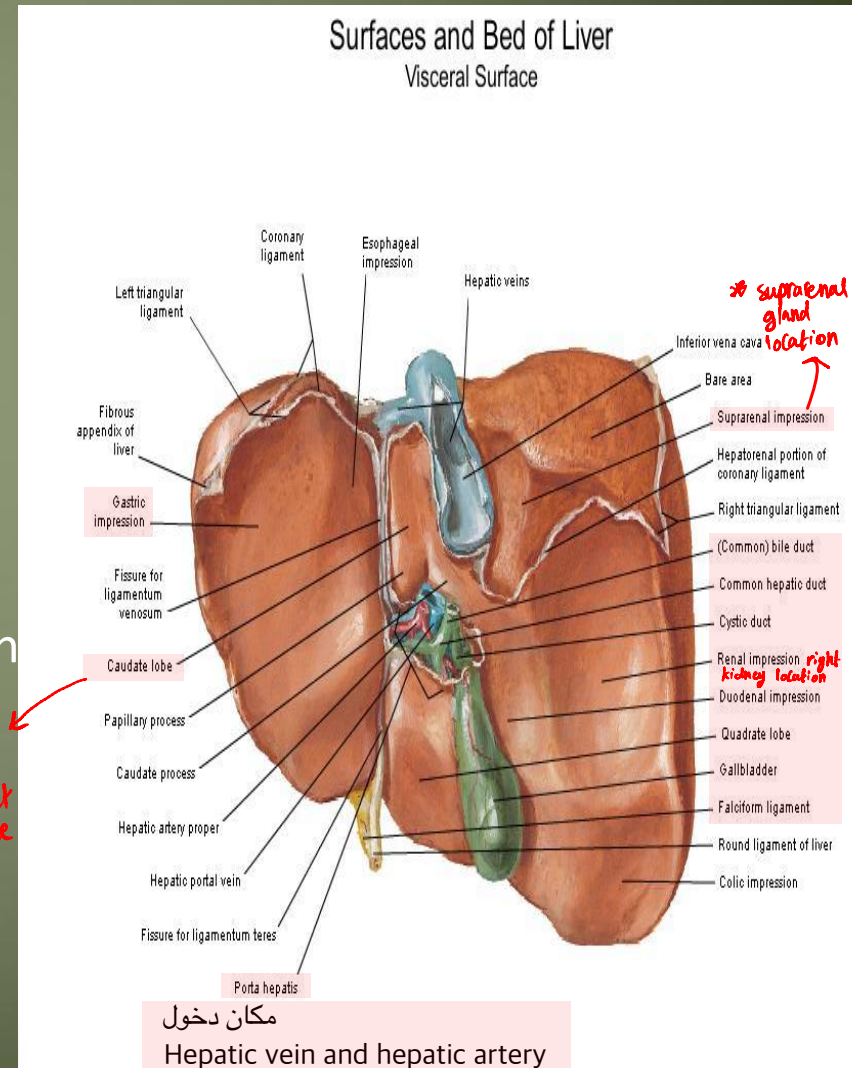
- Postero - inferior surface = visceral surface
- Superior surface = Diaphragmatic surface
- Anterior surface
- Posterior surface
- Right surface



# Postero- infero surface= visceral surface

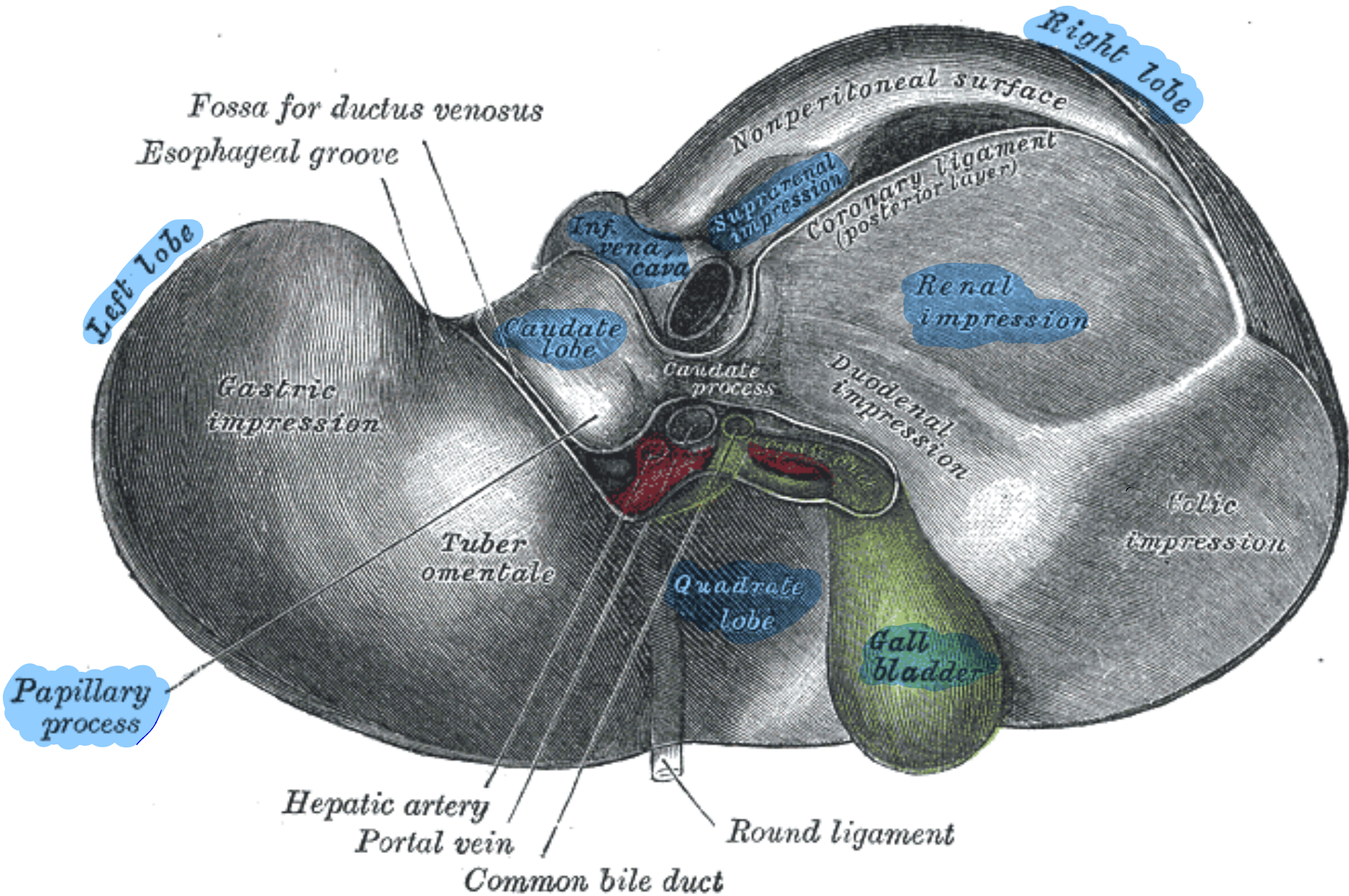
## Relations

- I.V.C
- the esophagus
- the stomach
- the duodenum
- the right colic flexure
- the right kidney
- Rt. Suprarenal gland
- the gallbladder.
- Porta hepatic( bile duct,H.a.H.V)
- Fissure for lig. Venosum & lesser omentum
- Tubular omentum
- Lig.teres



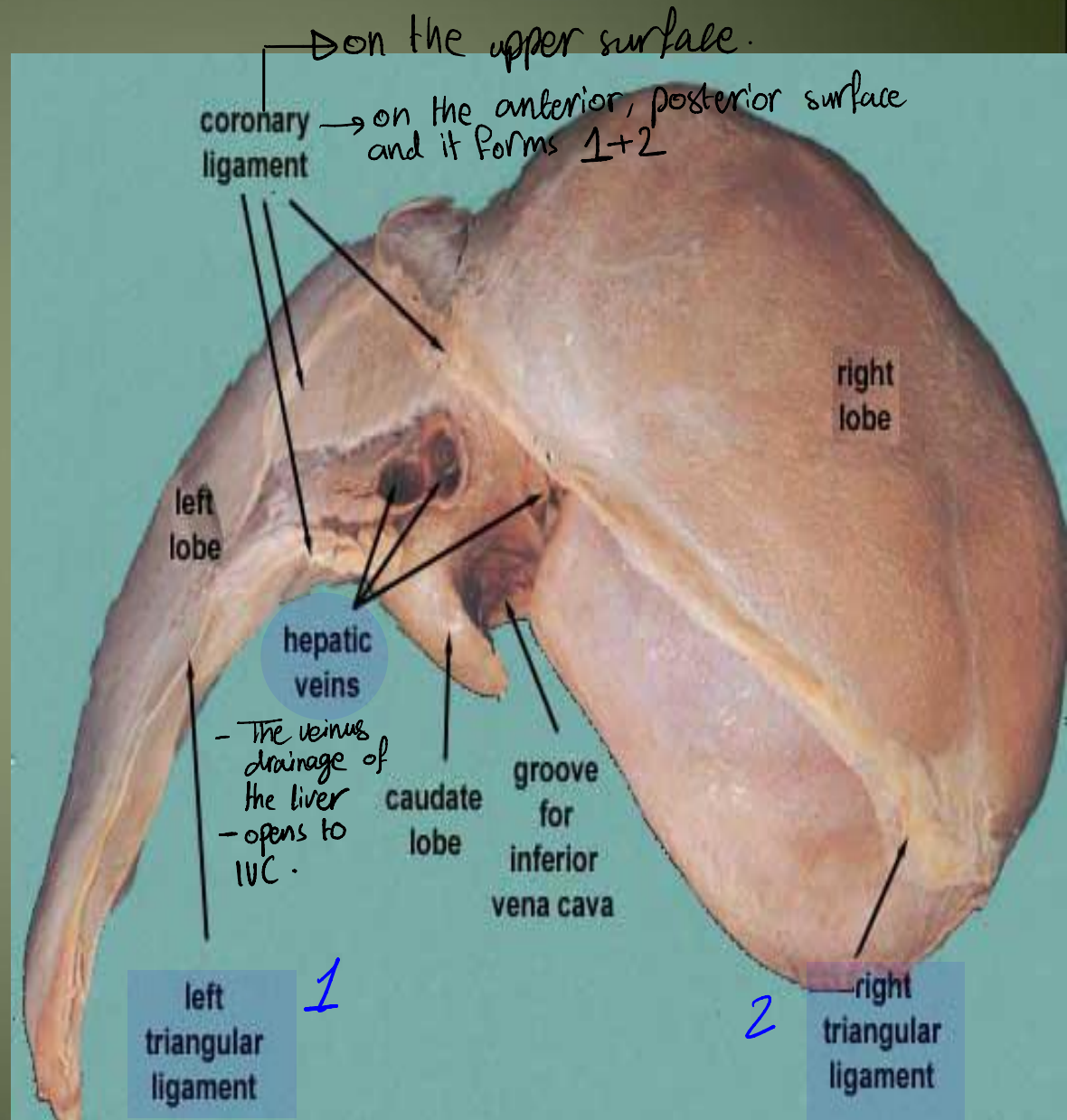


# Postero-inferior surface of the liver



# Sup. Surface of the liver

- Right & left lobes
- Cut edge of the Falciform ligament
- The cut edges of the superior and inferior parts of the coronary ligament
- The left triangular ligament
- The right triangular ligament
- Bare area of the liver (where there is no peritoneum covering the liver)
- Groove for the inferior vena cava and the hepatic veins
- Caudate lobe of the liver more or less wrapping around the groove of the inferior vena cava
- Fundus of gall bladder
- Lig.teres

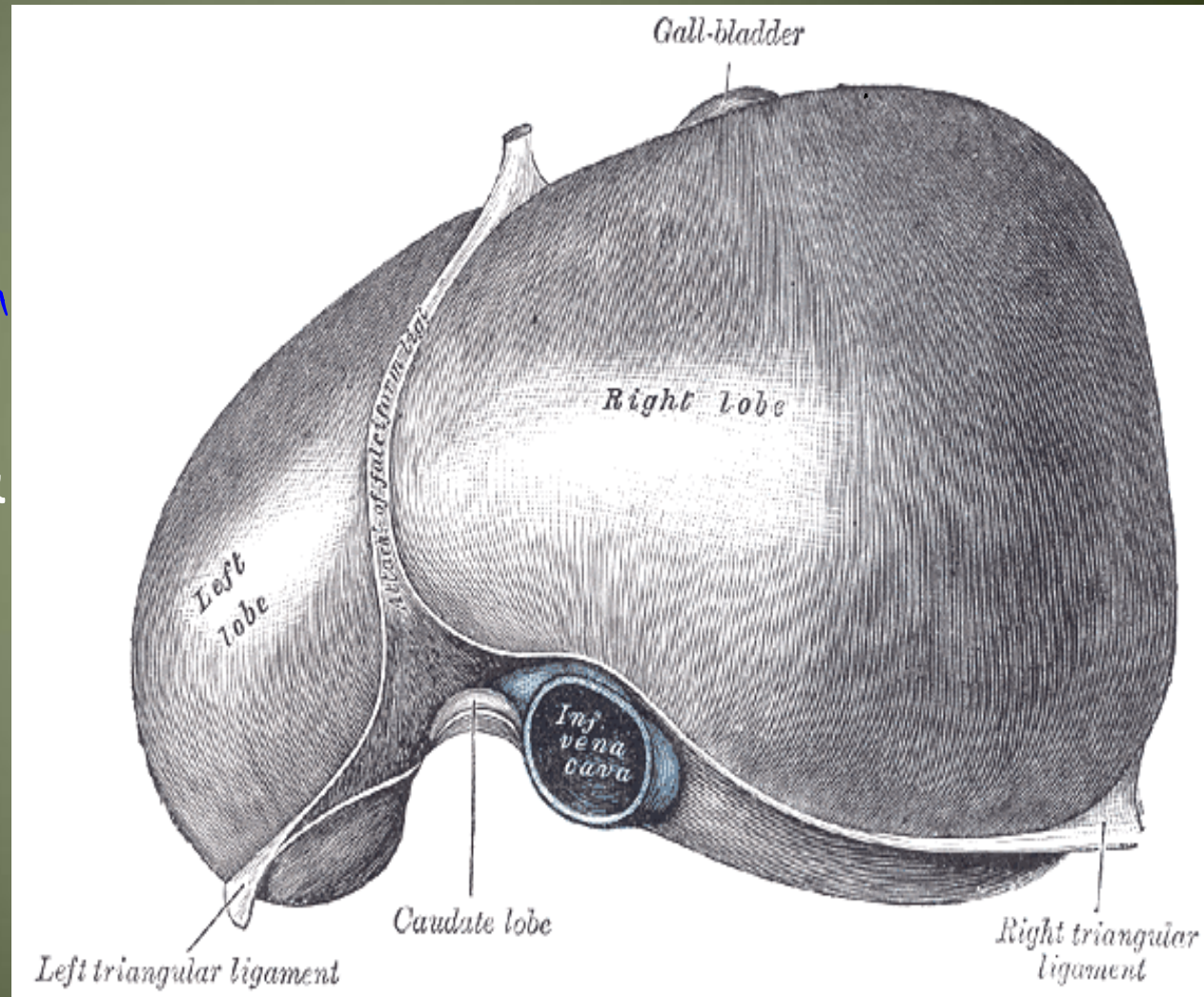


# Relations of Sup . surface of liver

*- 4 surfaces except visceral (They are covered by diaphragm)*

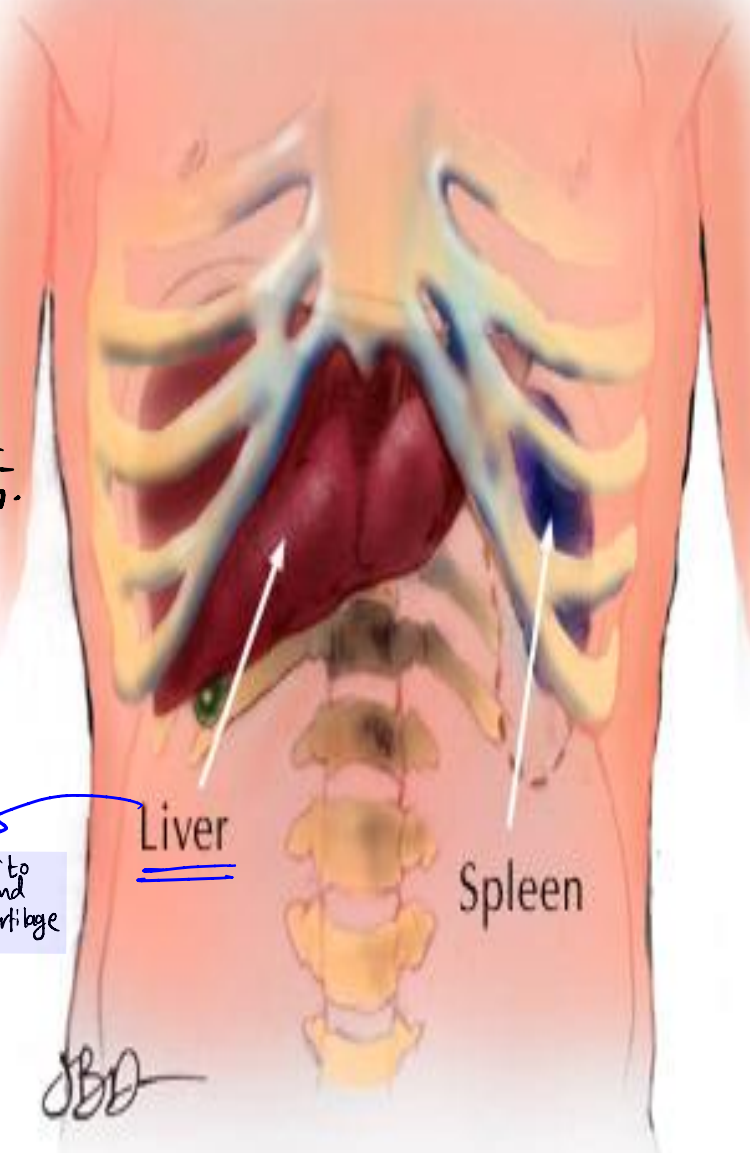
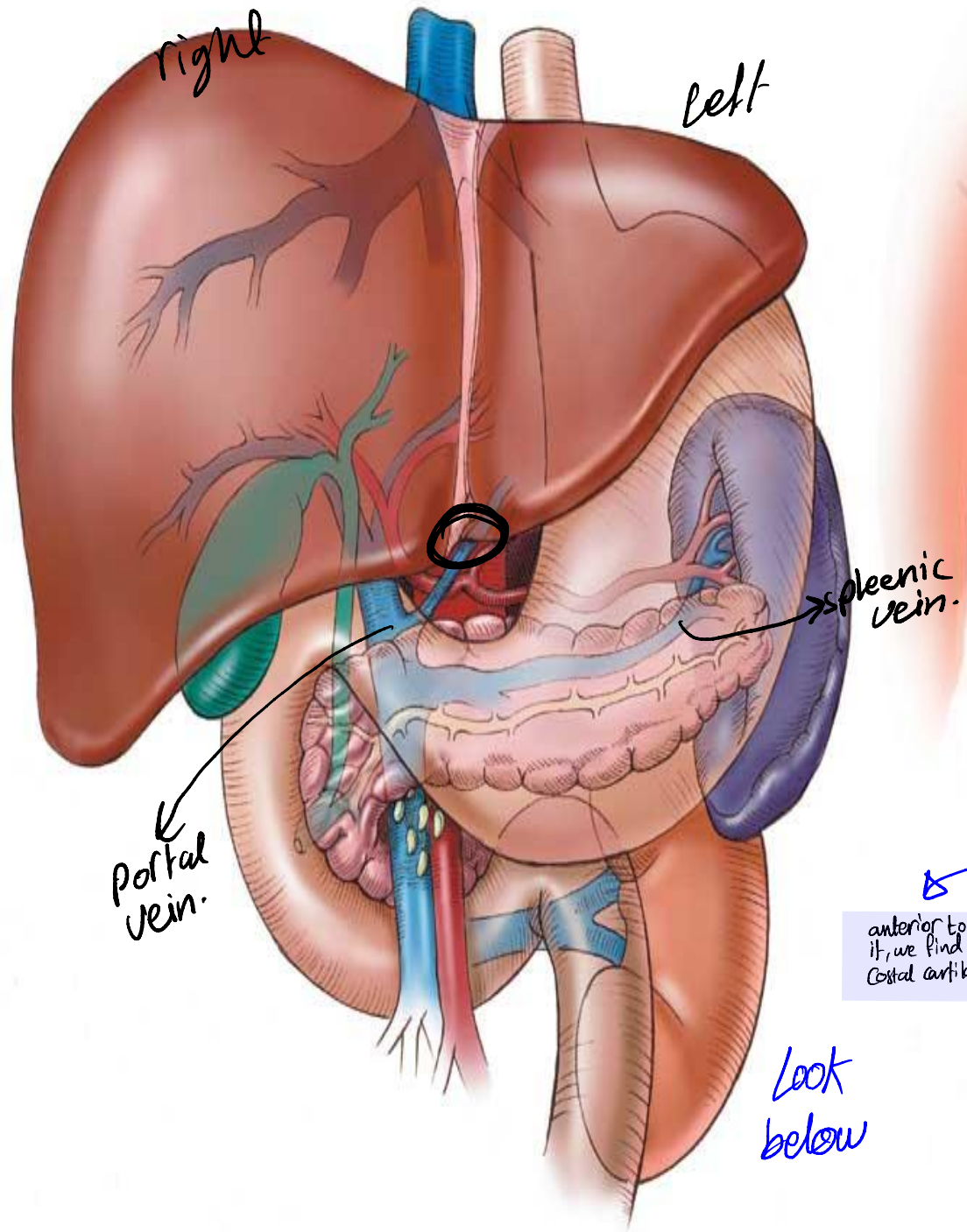
- Diaphragm  
*it separate liver from*
- Pleura & lung  
*In the middle*
- Pericardium & heart

- Diaphragm covers 4 surfaces of the liver  
→ Anterior, superior, posterior and the right surfaces except the visceral surface .



# Relations of the liver Anteriorly

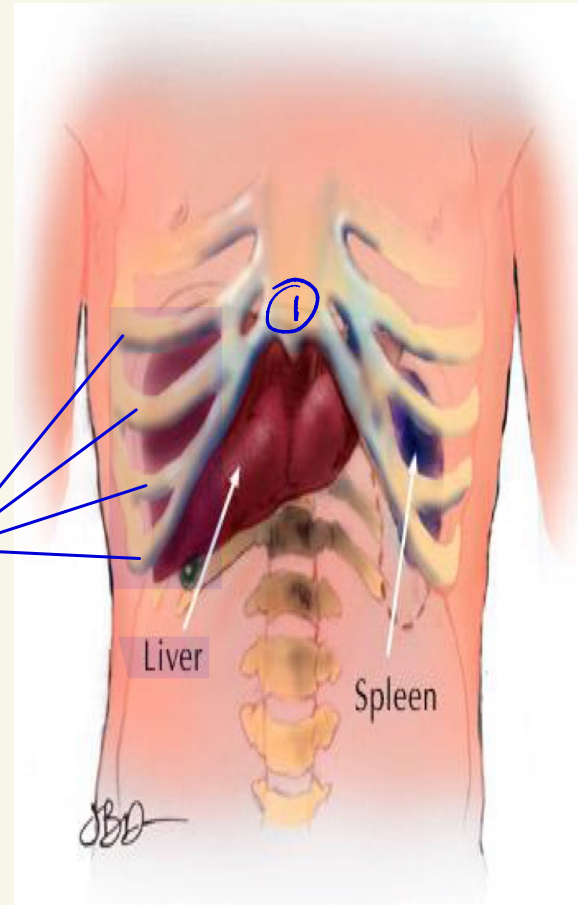
- Diaphragm
- Rt & Lt pleura and lung
- Costal cartilage
- Xiphoid process
- Ant. abdominal wall



## The anterior relations

①  
xiphoid process

②  
Lower  
Costal  
Cartilage

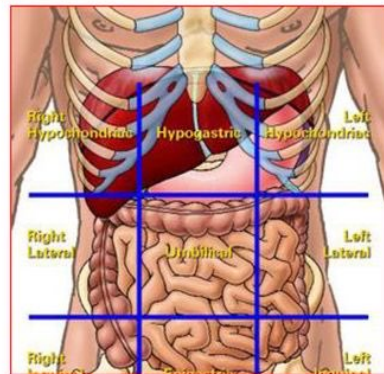


# Relations of Liver

## • Anterior:

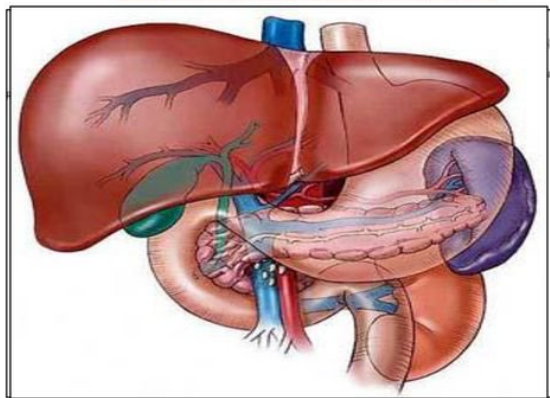
1. Diaphragm,
2. Right and left costal margins,
3. Right and left pleura,
4. Right and left lungs,
5. Xiphoid process,
6. Anterior abdominal wall.

Addition



## • Posterior:

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



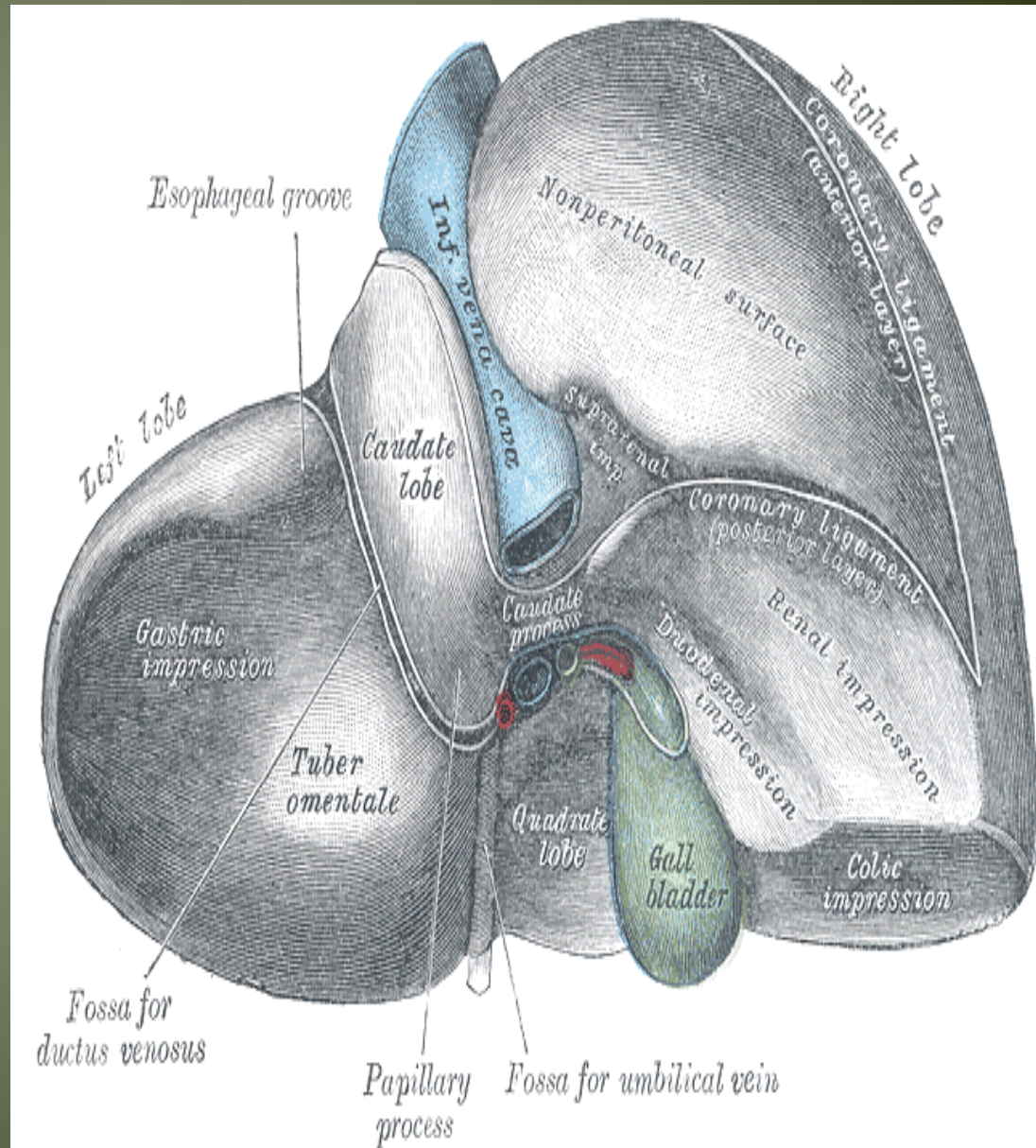
علاقته مع ال diaphragm فقط

# Posterior relation of the liver

And visceral surface

اللي همة الباقي

- Diaphragm
- Rt. Kidney
- Supra renal gland
- T.colon(hepatic flexure
- Duodenum
- Gall bladder
- I.V.C
- Esophagus
- Fundus of stomach





# Lobes of the liver

- Rt. Lobe →  $\text{Rt}$  → the largest → Right hepatic duct.

- Lt .lobe → left hepatic duct with below 1+2 .

1 • Quadrate lobe ↗ sided to Gallbladder

2 • Caudate lobe } Related to the left lobe

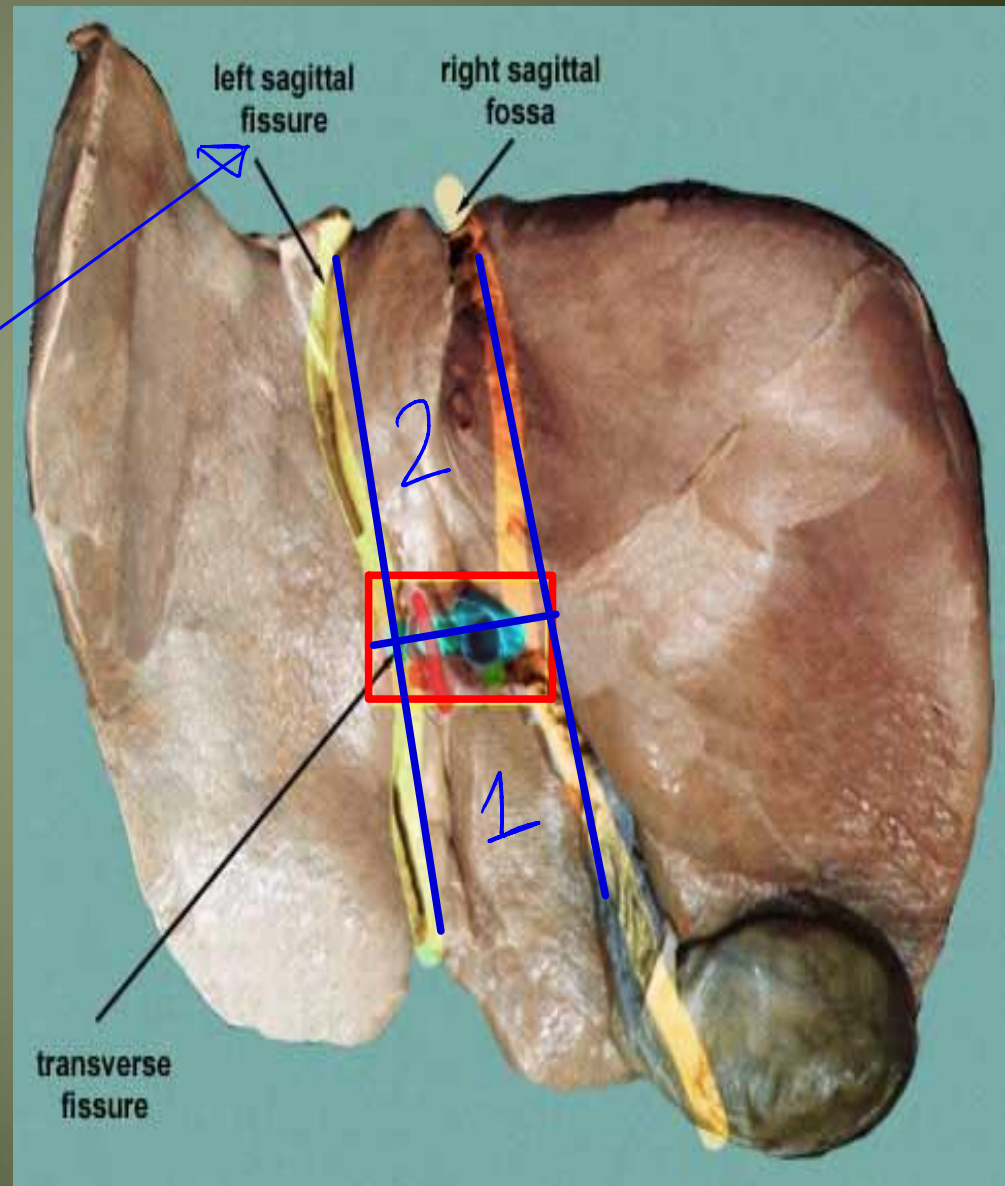
↳ sided to IVC .

- Generally 2 lobes but anatomically we have 4 lobes ✓

look below to the picture to see these numbers.

# Separation of the four lobes of the liver:

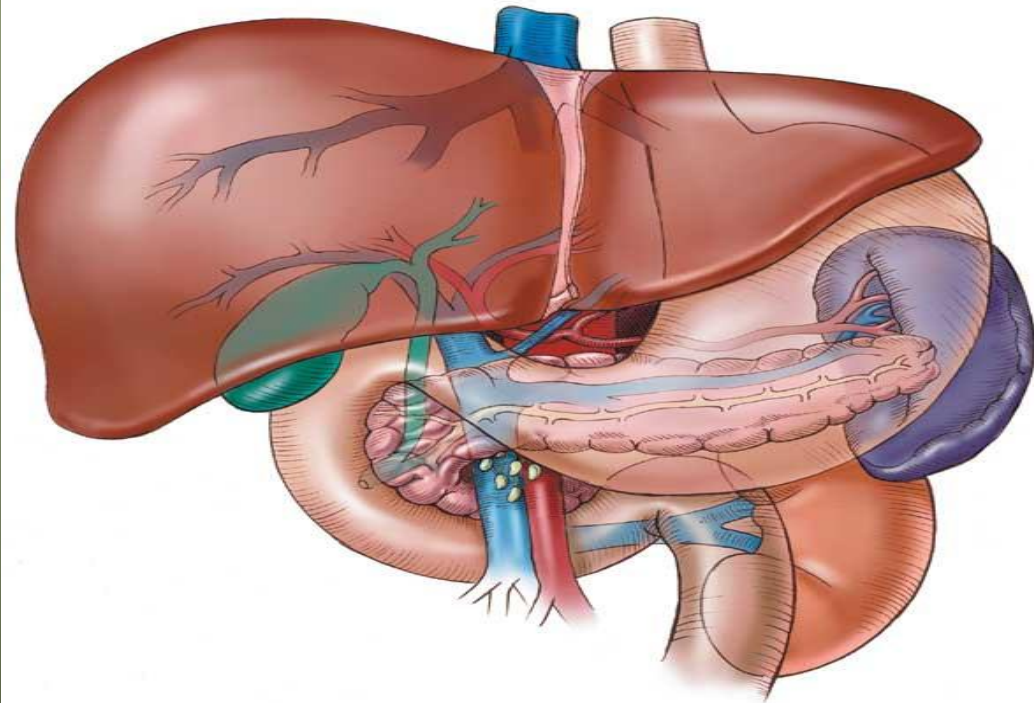
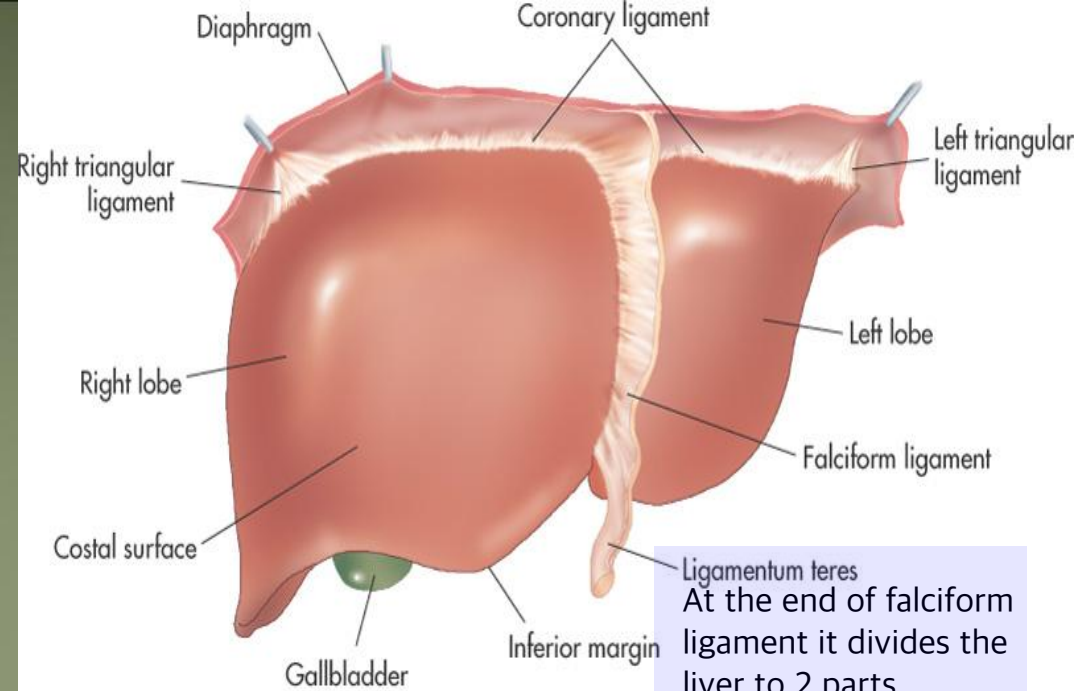
- Right sagittal fossa - groove for inferior vena cava and gall bladder
- left sagittal fissure - contains the Ligamentum Venosum and round ligament of liver
- Transverse fissure (also porta hepatis) - bile ducts, portal vein, hepatic arteries  
• And common bile duct , nerves, lymph nodes.



\* hepatic vein drain to inferior vena cava.

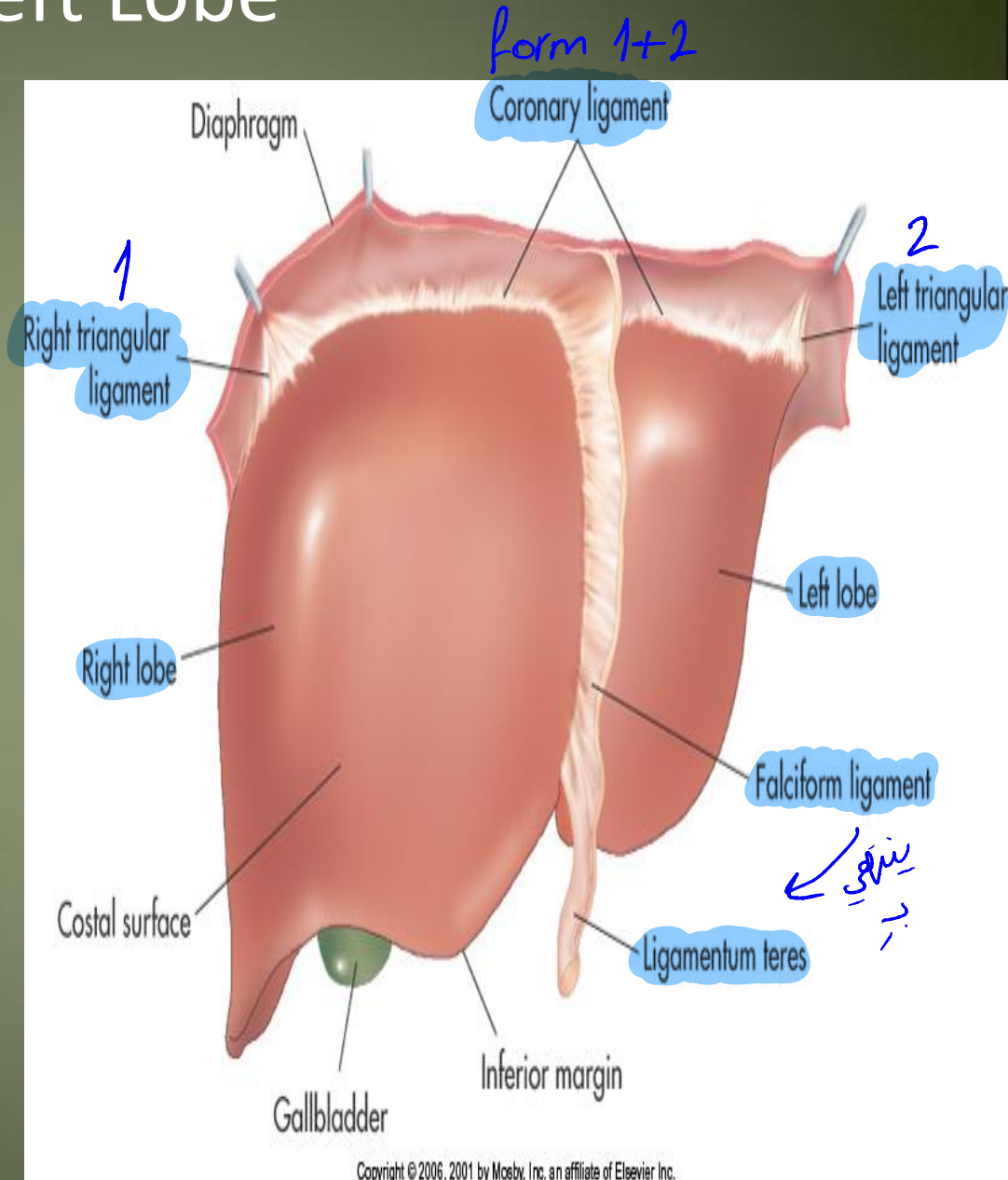
## Rt. Lobe

- Largest lobe
- Occupies the right hypochondrium
- Divided into anterior and posterior sections by the right hepatic vein
- Reidel's Lobe extend as far caudally as the iliac crest



# Left Lobe

- Varied in size
- Lies in the epigastric and left hypochondriac regions
- Divided into lateral and medial segments by the left hepatic vein



# Lobes of the liver....cont

Rt. & Lt lobe separated by

- Falciform ligament
- Ligamentum Venosum → *ductus venosum* دق<sup>5</sup>ل
- Ligamentum teres

# Caudate Lobe

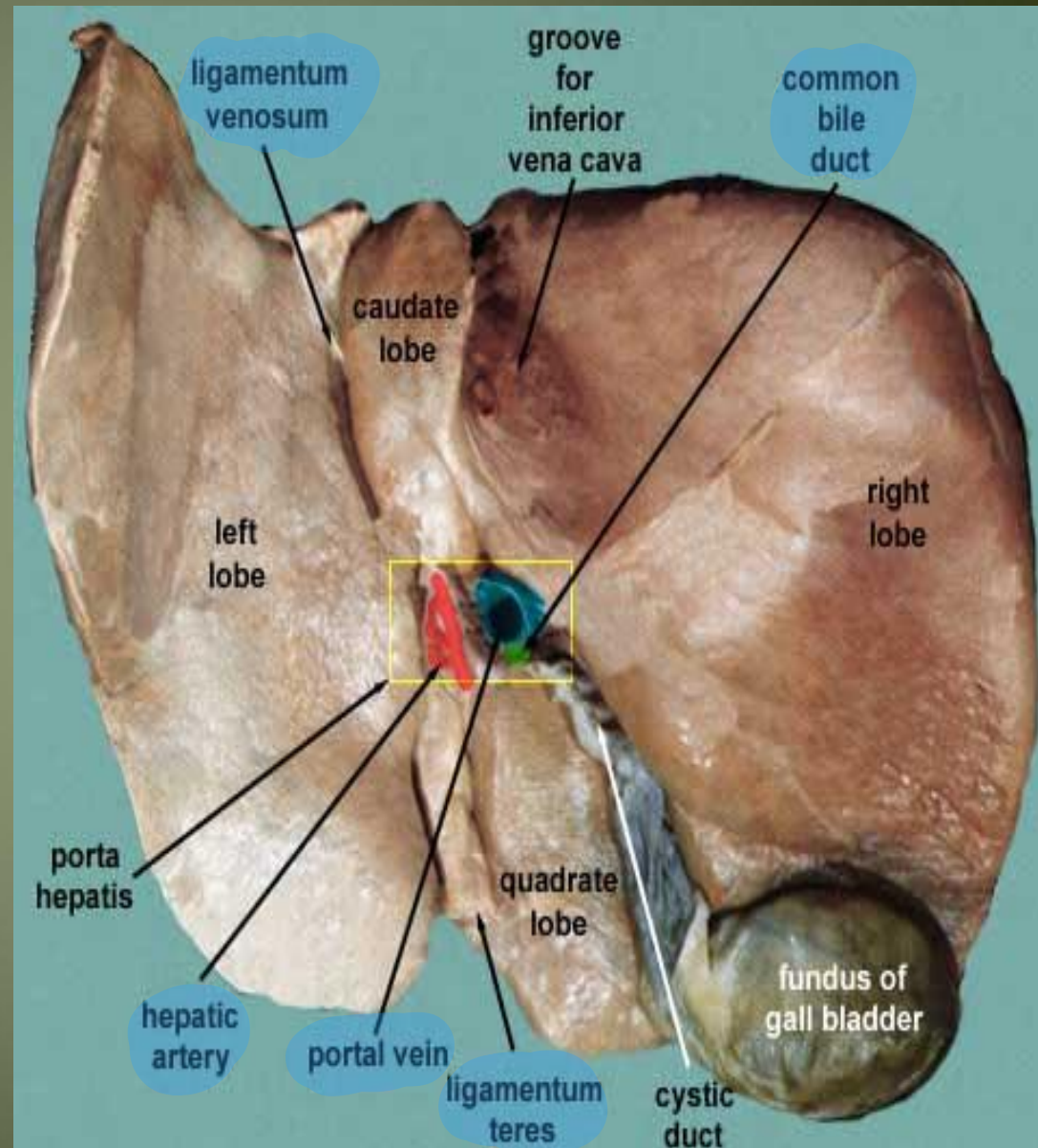
-present in the posterior surface from the Rt. Lobe

## Two processes

- 1- c- process
- 2- papillary process

## Relations of caudate lobe

- Inf. → the porta hepatis
- The right → the fossa for the inferior vena cava
- The left → the fossa for the lig.venosum.

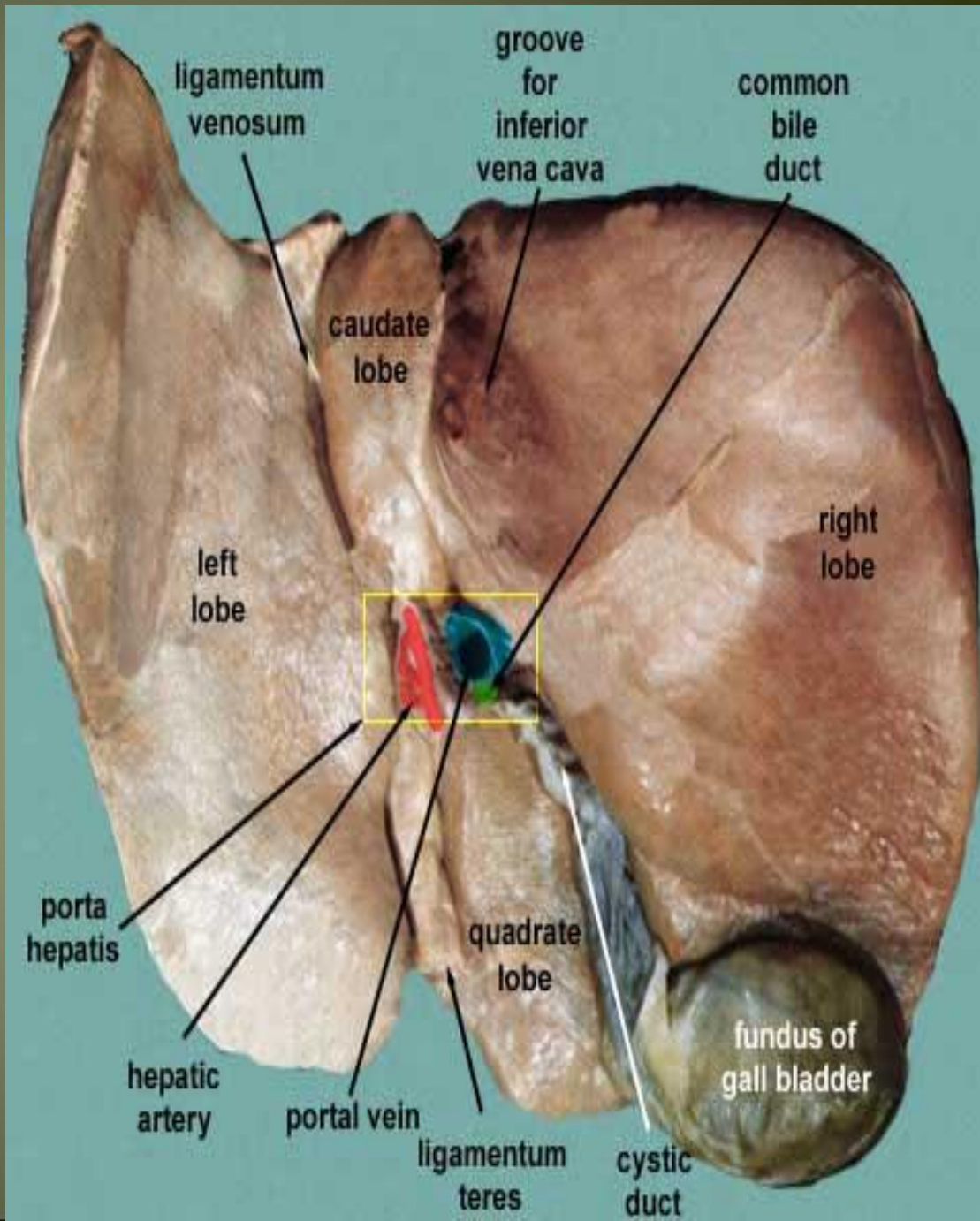


# Quadrato lobe

Present on the inferior surface from the Rt. Lobe

## Relation

- Ant. → anterior margin of the liver
- Sup. → porta hepatis
- Rt. → fossa for the gallbladder
- Lt → by the fossa for lig.teres



# Porta hepatis

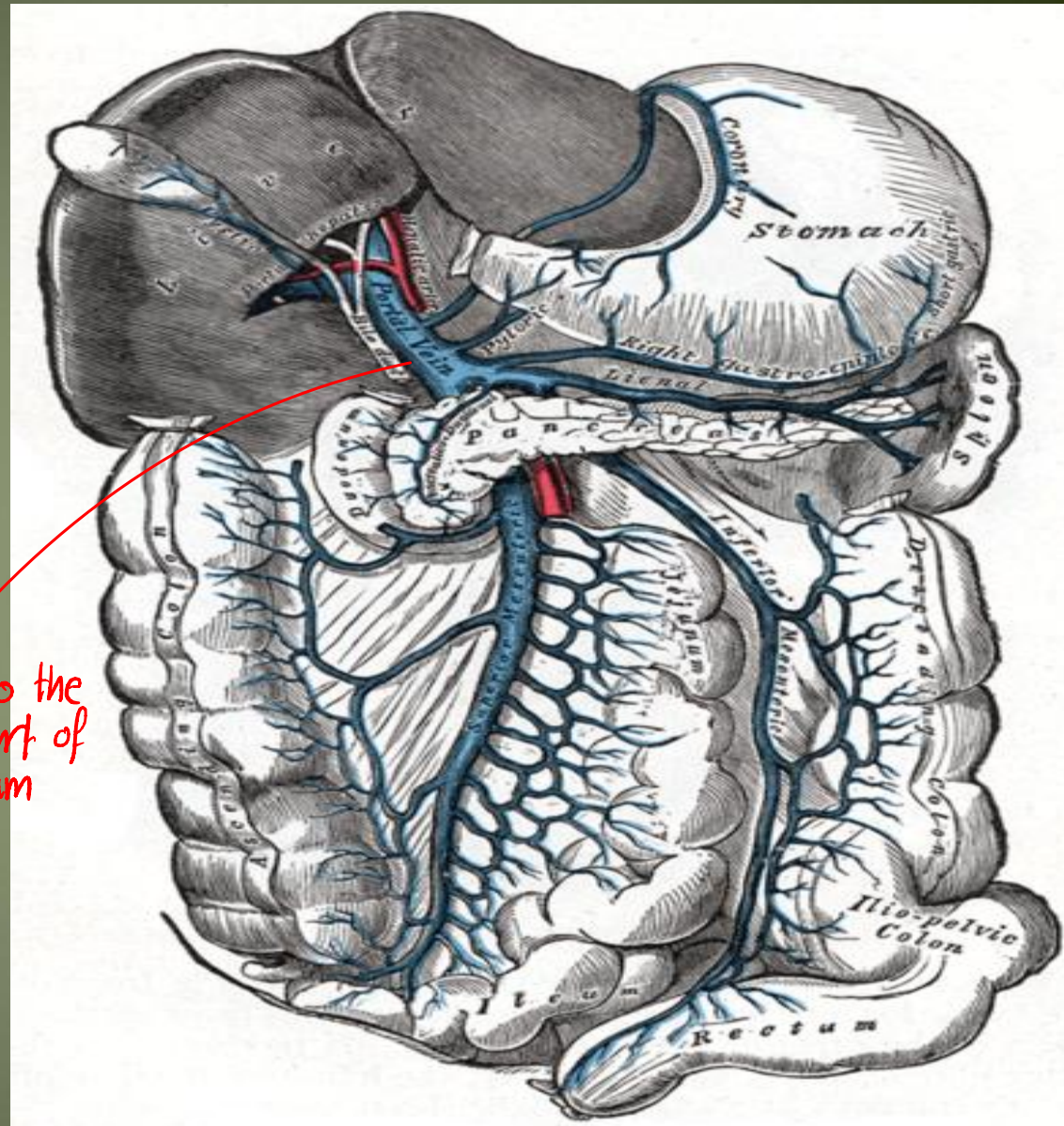
*\*Not covered by peritoneum.*

- It is the hilum of the liver
- It is found on the posteroinferior surface
- lies between the caudate and quadrate lobes
- Lesser omentum attach to its margin

## Contents

- Gallbladder → ant.
- Hepatic. Art + nerve + lymphatic node → middle.
- Portal vein → post.

*open to the 2nd part of duodenum*



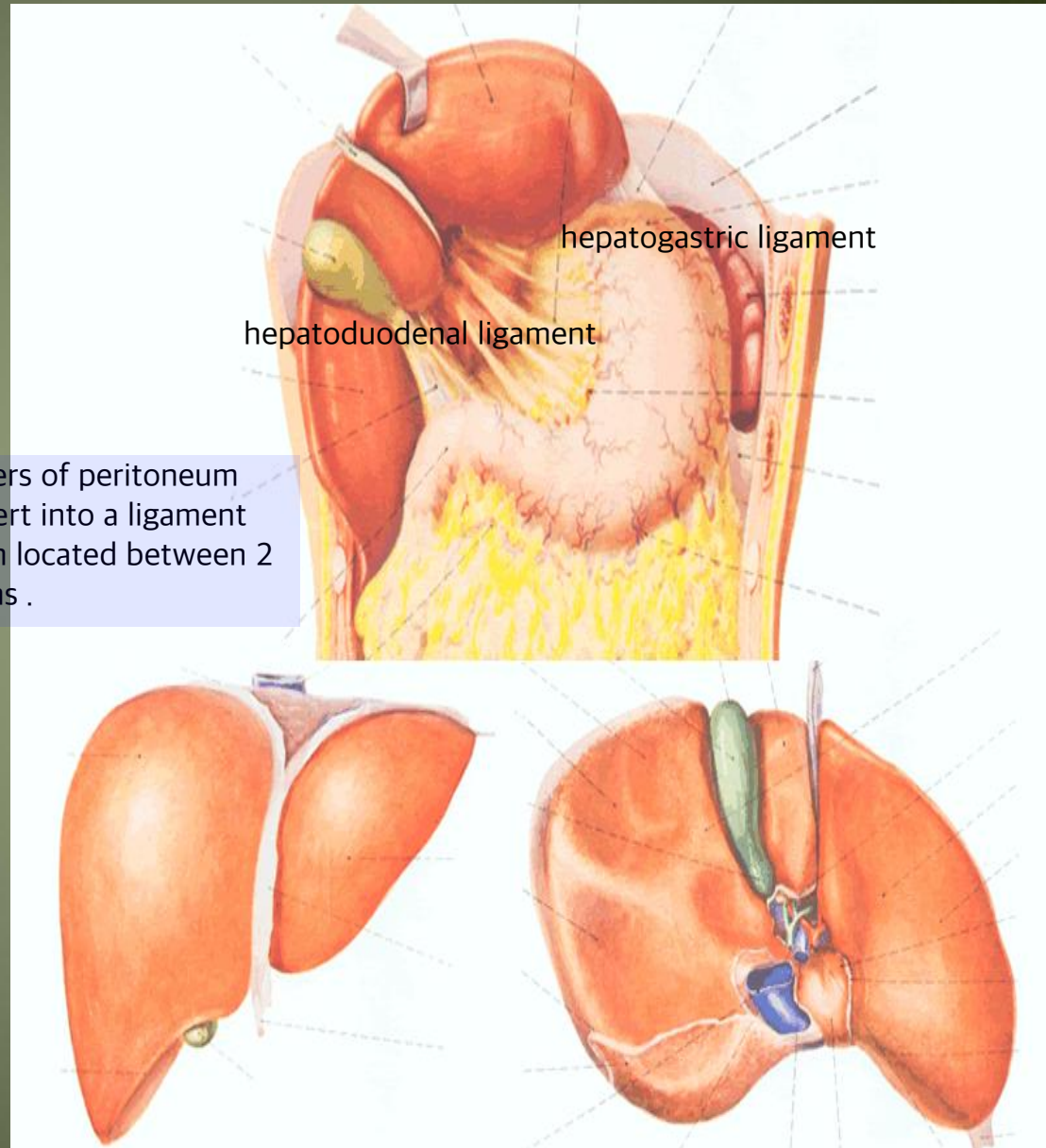


- Portal vein forms behind the neck of the pancreas by splenic and superior mesenteric .
- When it arrives porta hepatis it divides into right portal and left . The right portal receives cystic vein from the gallbladder. While hepatic artery, its origin from celiac trunk and when it arrives porta hepatis it divides into right and left hepatic .
- Right + left hepatic form common hepatic .

# Peritoneum of the liver

- The liver is covered by peritoneum (intraperitoneal organ) except at bare area (it is origin from septum transversum)
- Inferior surface covered with peritoneum of greater sac except porta hepatis, G.B & Lig.teres fissure
- Rt. Lateral surface covered by peritoneum, related to diaphragm which separate it from Rt. Pleura , lung and the Rt Ribs (6-11)

• 2 layers of peritoneum convert into a ligament which located between 2 organs .

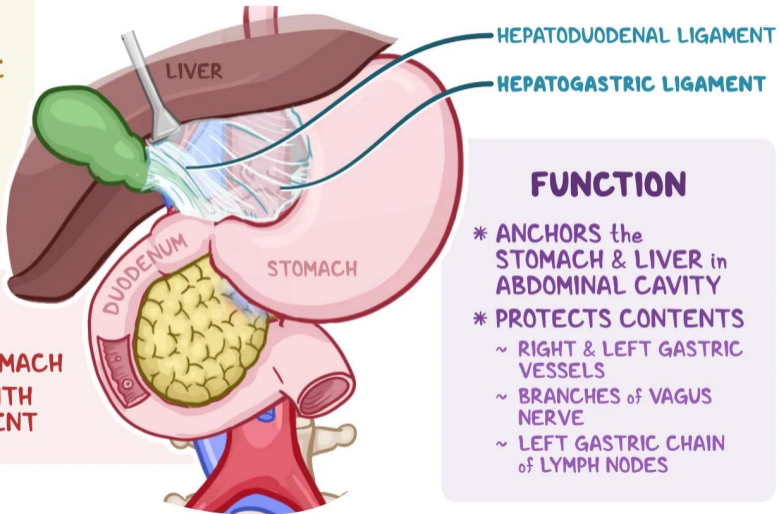


## BACKGROUND

- \* DOUBLE-LAYERED MEMBRANE that CONNECTS the LIVER to the STOMACH
- \* FORMS the LESSER OMENTUM with the HEPATODUODENAL LIGAMENT

## ANATOMY

- \* EXTENDS from LIVER → STOMACH
- \* LOWER END is CONTINUOUS WITH the HEPATODUODENAL LIGAMENT



## FUNCTION

- \* ANCHORS the STOMACH & LIVER in ABDOMINAL CAVITY
- \* PROTECTS CONTENTS
  - ~ RIGHT & LEFT GASTRIC VESSELS
  - ~ BRANCHES of VAGUS NERVE
  - ~ LEFT GASTRIC CHAIN of LYMPH NODES

# 1. The ligaments of the liver

1- The **Falciform ligament of liver**

Separate right and left lobes.

2- The **Ligamentum teres hepatis**

3- The **coronary ligament**

4- The **right triangular ligament**

5- The **left triangular ligament**

*They form*

6- The **Hepatogastric ligament**

They Form the lesser omentum.

7- The **hepatoduodenal ligament**

8- The **Ligamentum Venosum**

Ductus venosum

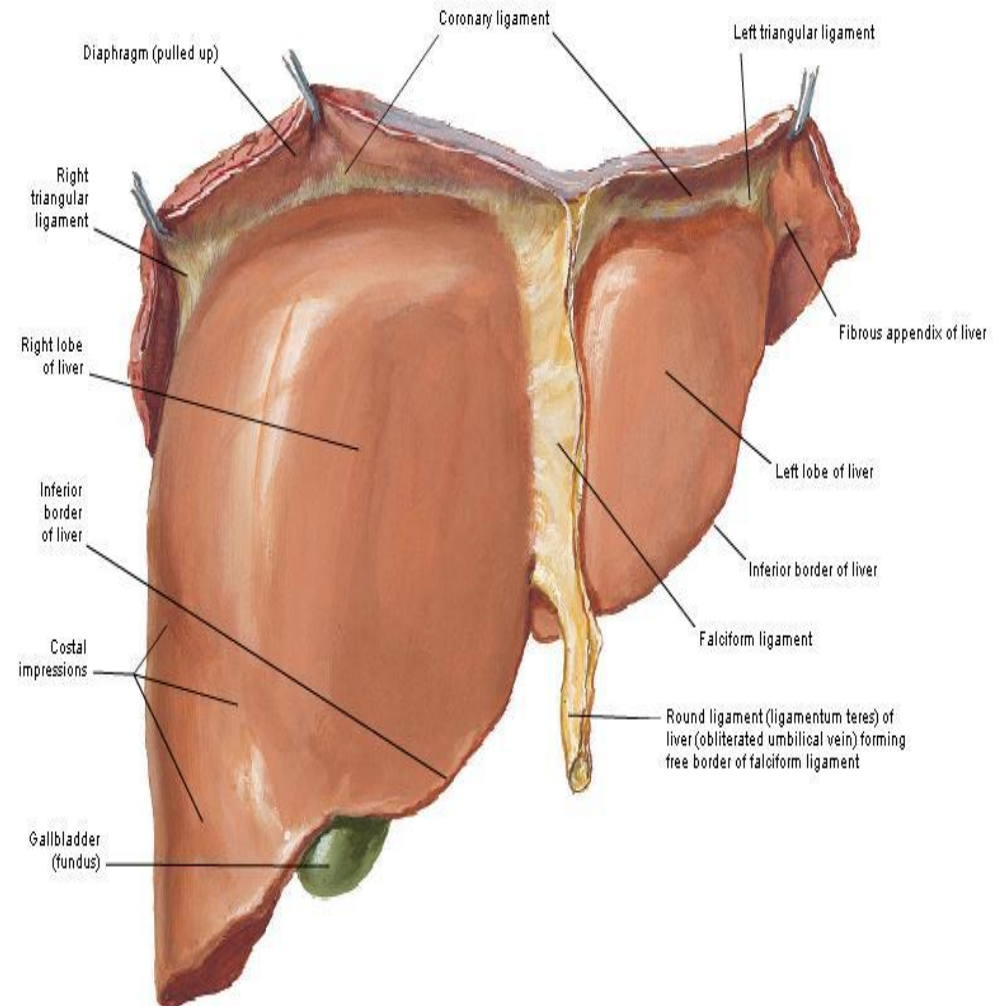
*Chp 84*

- Attached to anterior abdominal wall and separate the liver into 2 lobes .

- **Falciform ligament of liver**

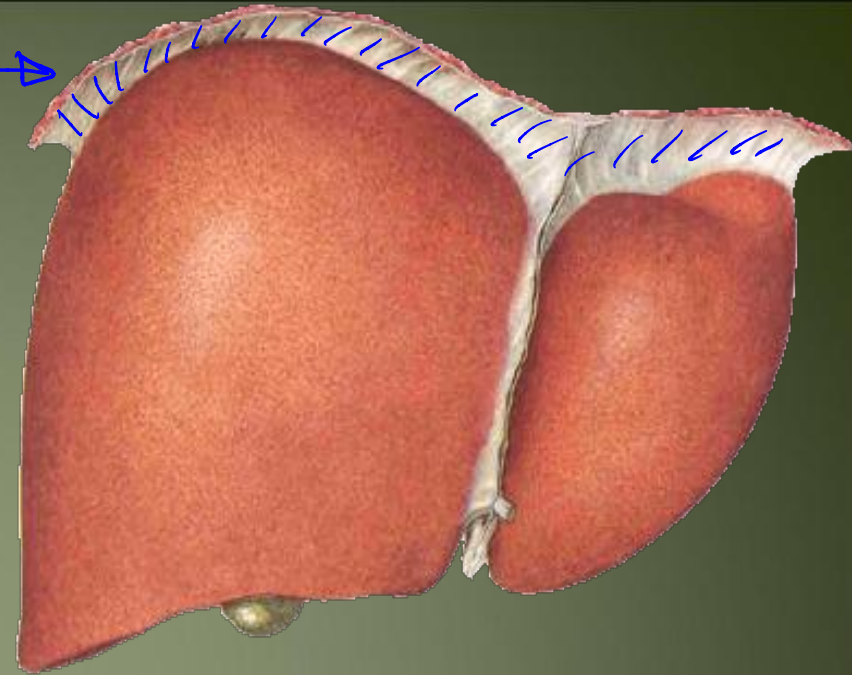
- Consists of double peritoneal layer
- Sickle shape
- Extends from anterior abdominal wall (umbilicus) to liver
- Free border of the ligament contains Ligamentum teres (obliterated umbilical vein)

Surfaces and Bed of Liver  
Anterior View

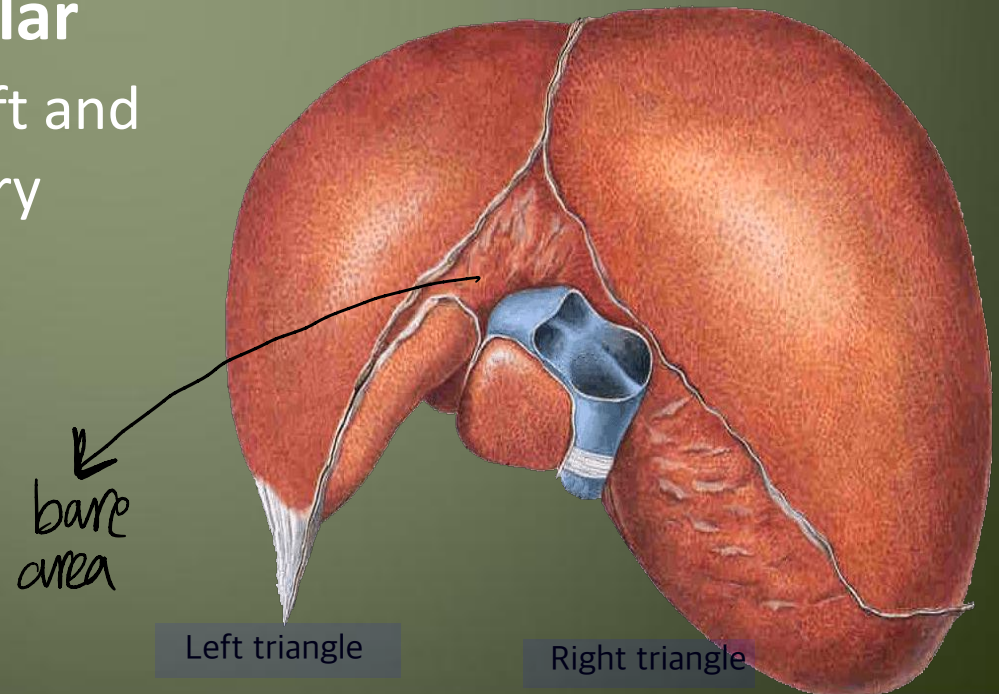


- **Coronary ligament**  
the area between upper and lower layer of the coronary ligament is the bare area of liver which contract with the diaphragm;

- Each one has anterior and posterior end .



- **Left and right triangular ligaments** formed by left and right extremity of coronary ligament



- **Hepatogastric ligament**
- **Hepatoduodenal ligament**



# The Ligamentum Venosum

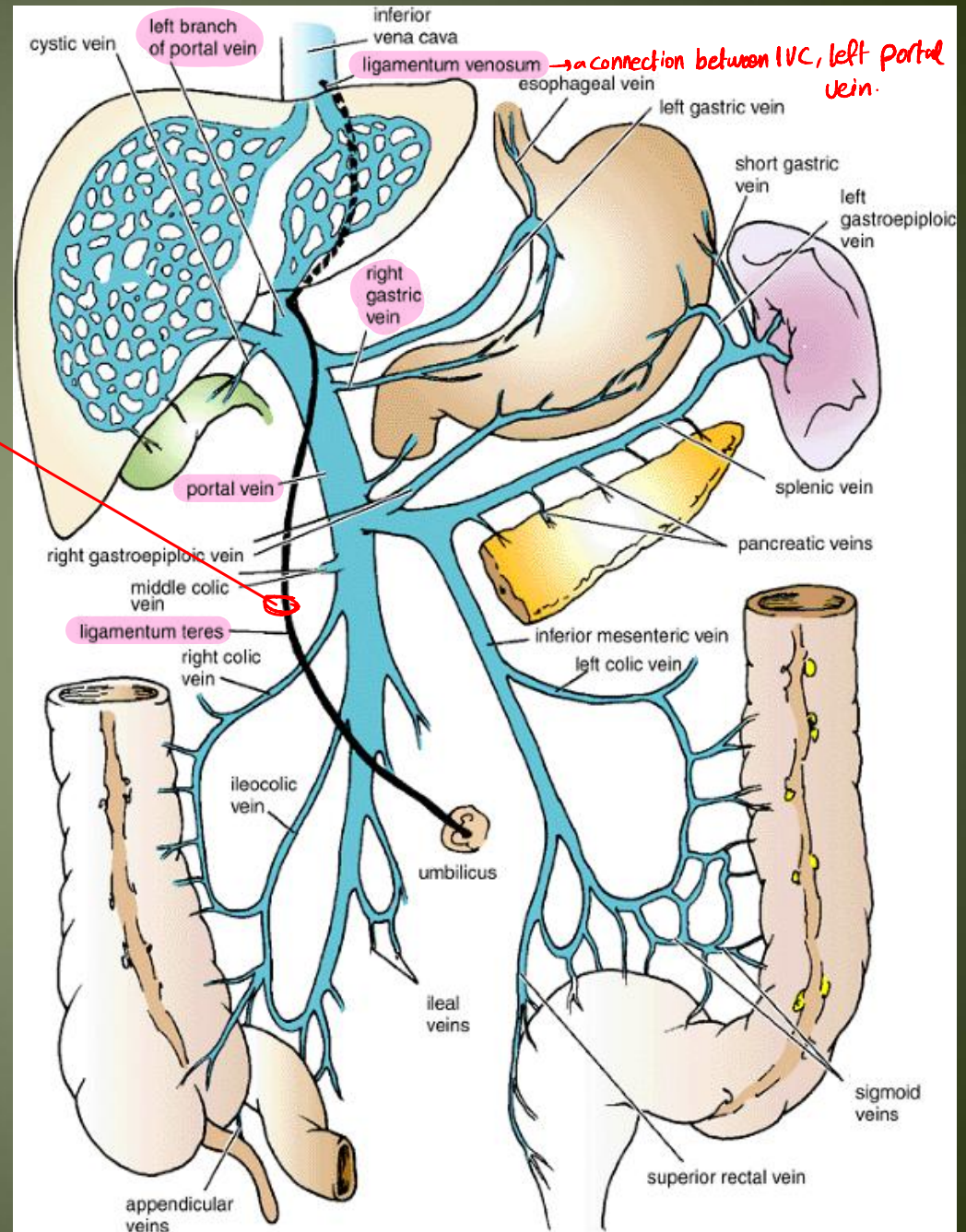
# Very important !!!

- Between umbilicus and left portal vein (umbilical vein → ligamentum teres)

-Fibrous band that is the remains of the ductus venosus

- Is attached to the left branch of the portal vein and ascends in a fissure on the visceral surface of the liver to be attached above to the inferior vena cava

- In embryonic development it is open, after delivery it converts into ligament The Ligamentum Venosum.





# LIVER Histology

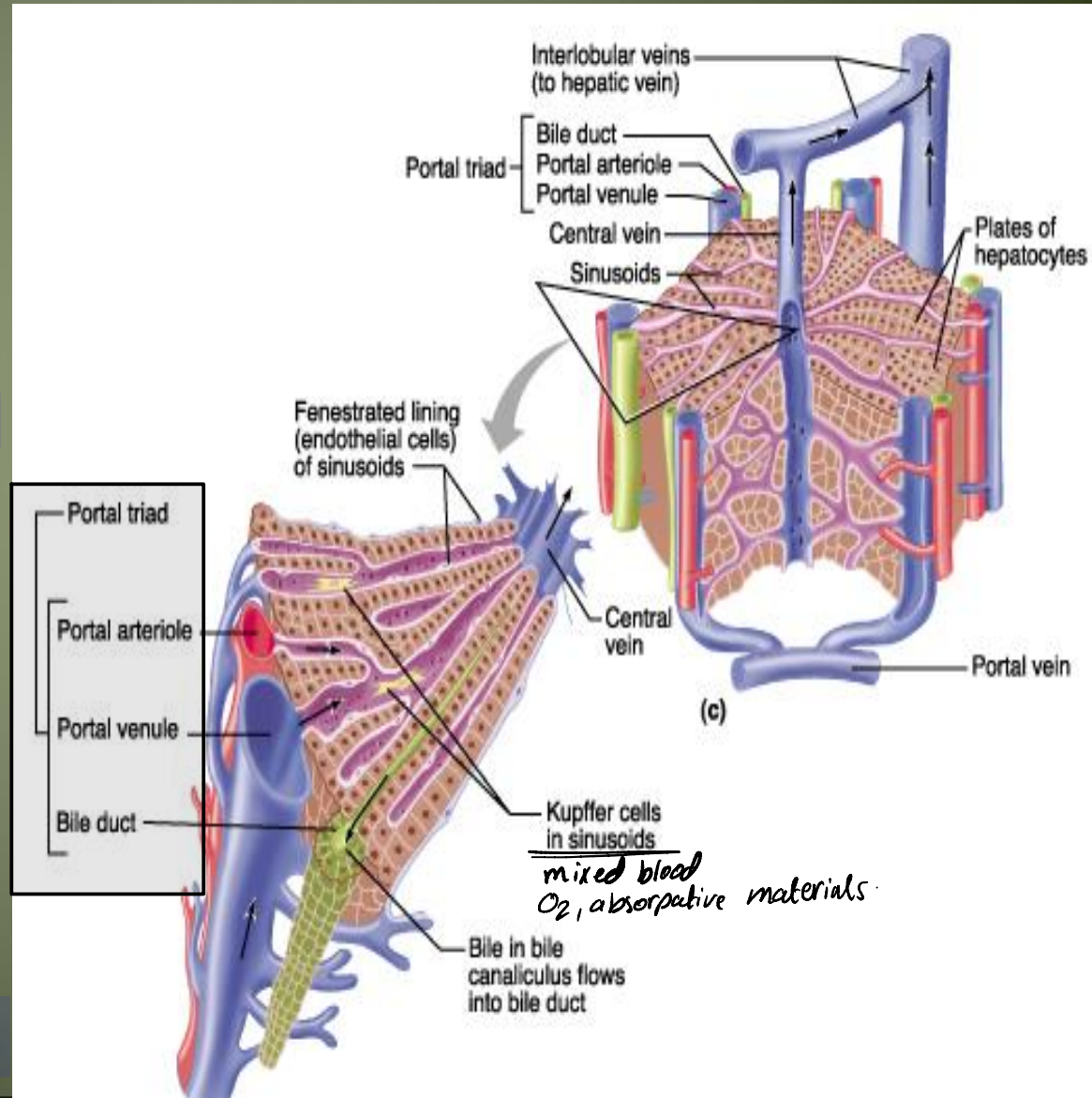
Waste products go to the central vein .

- lobules >> roughly **hexagonal** structures **consisting of** *سراسية* hepatocytes. Radiate outward from a central vein. *The venous drainage for each lobule.*

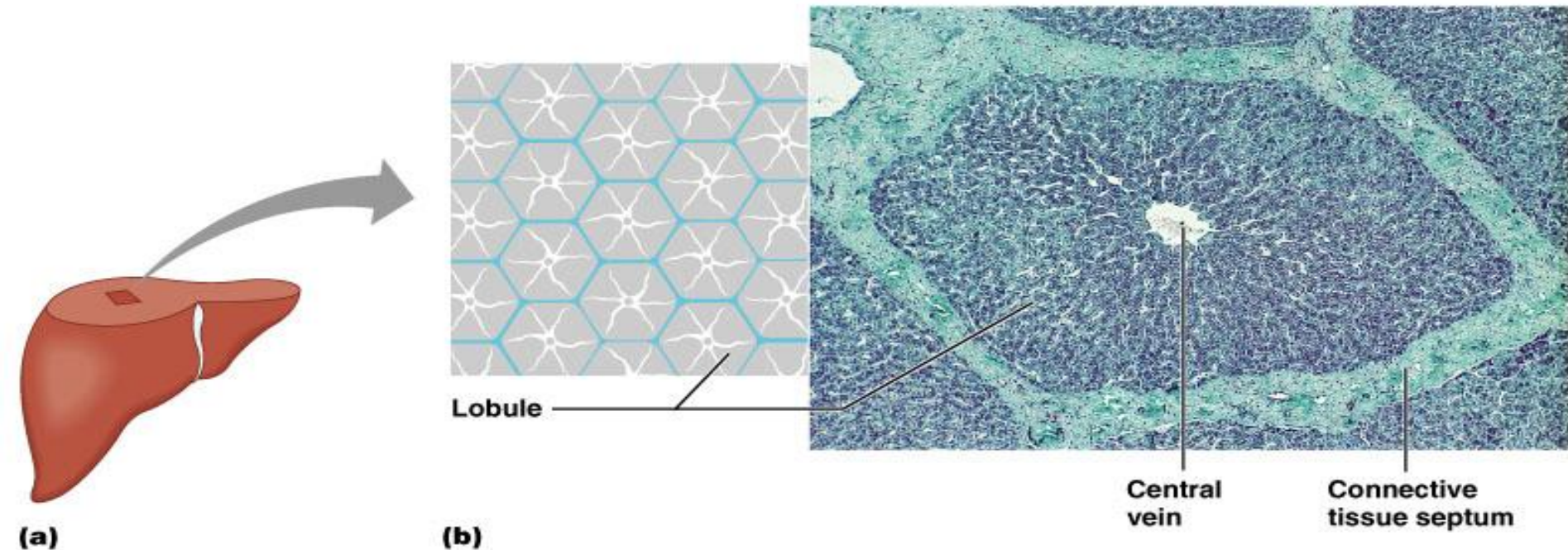
- At each of the six corners of a lobule is a portal triad (p.arteriole, p.venule & bile duct)

- Between the hepatocytes are the liver sinusoids.

- Blood spaces between hepatocytes  
It has mixed blood between portal and hepatic.

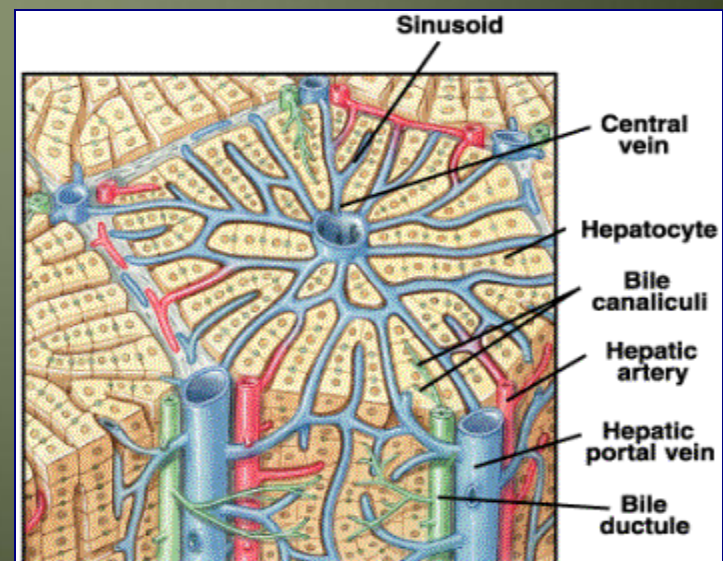


# Where do the two blood supplies mix?



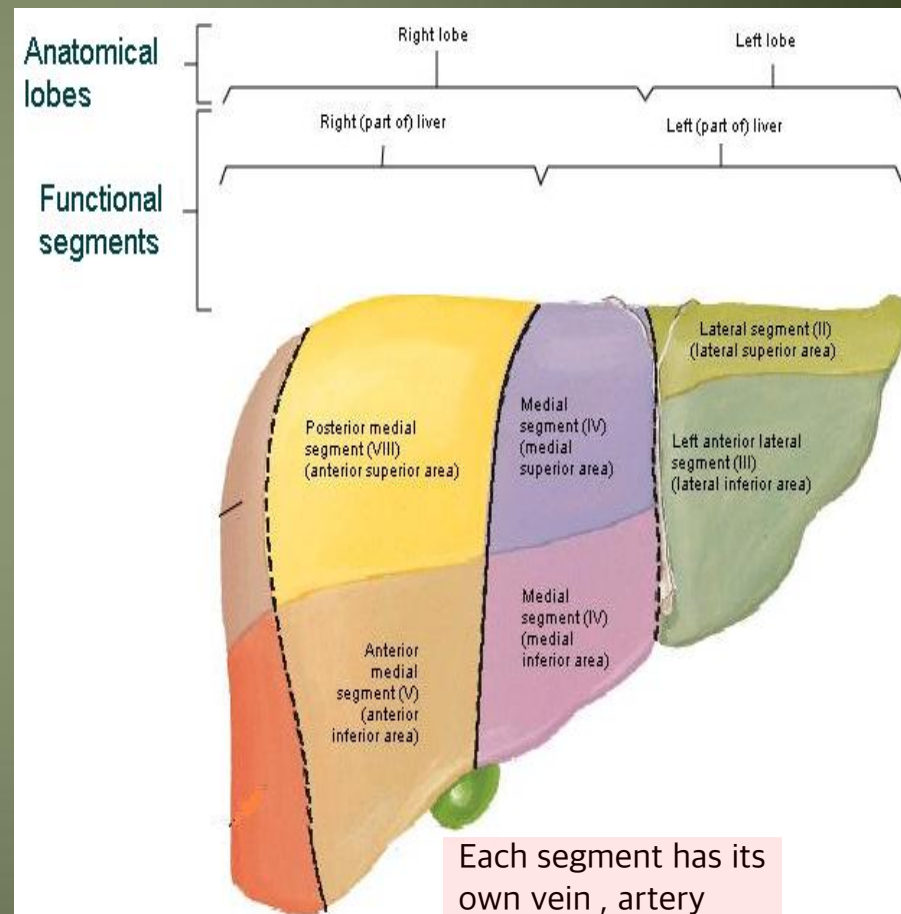
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- Liver surrounded by a thin capsule at portahepatic(it is thick)→Glisson's capsule invests the liver and send septa into liver subset subdivide the parenchyma into lobules



# Segmental anatomy of the liver

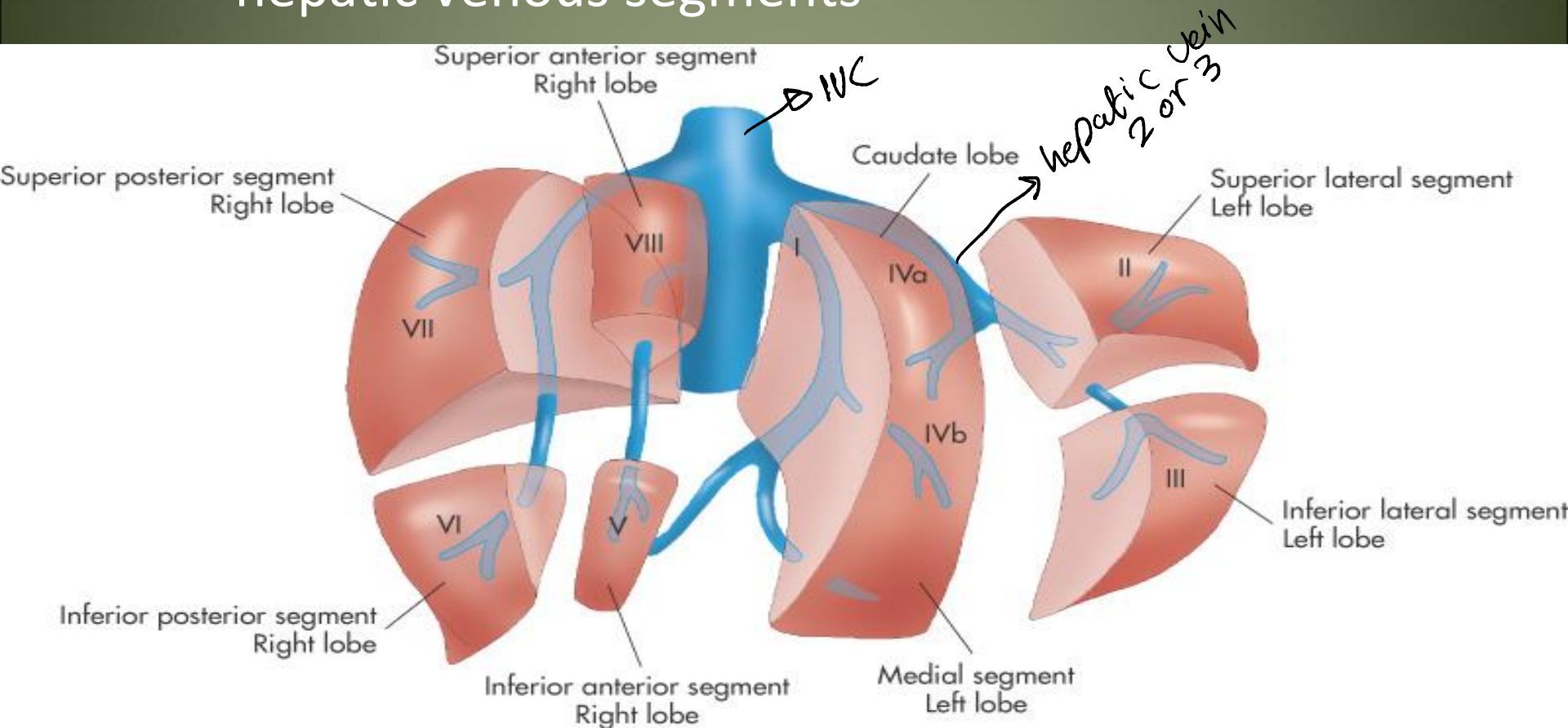
- Rt .& Lt. lobes anatomically no morphological significance. Separation by ligaments (Falciform, lig. Venosum & Lig.teres)
- True morphological and physiological division by a line extend from fossa of GD to fossa of I.V.C each has its own arterial blood supply, venous drainage and biliary drainage
- No anastomosis between divisions
- 3 major hepatic veins → Rt, Lt & central
- 8 segments based on hepatic and portal venous segments



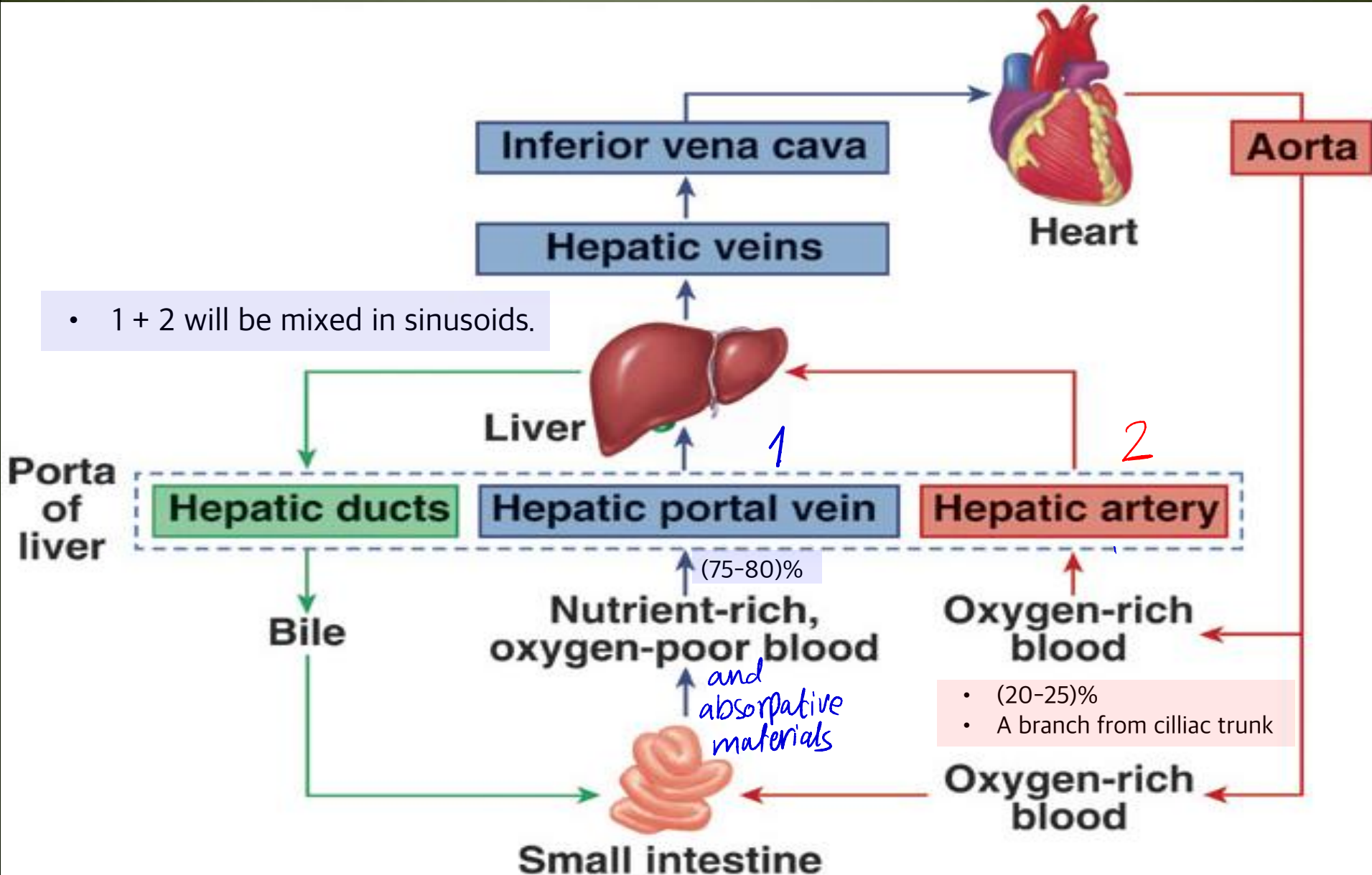
- Some diseases can affect the liver like cirrhosis, fibrosis .
- 1/8 of the liver is enough for the functions.
- But in case of infection, it will be a rapid spread of infection in all the liver .
- In case of cirrhosis , the patient will need a liver transplantation surgery .
- Liver transplantation depends on the segments ( the liver has 8 segments).
- 1 or 2 of them is enough for liver transplantation .

# Segmental anatomy of the liver

- Liver segments are based on the portal and hepatic venous segments



# Blood supply of the liver

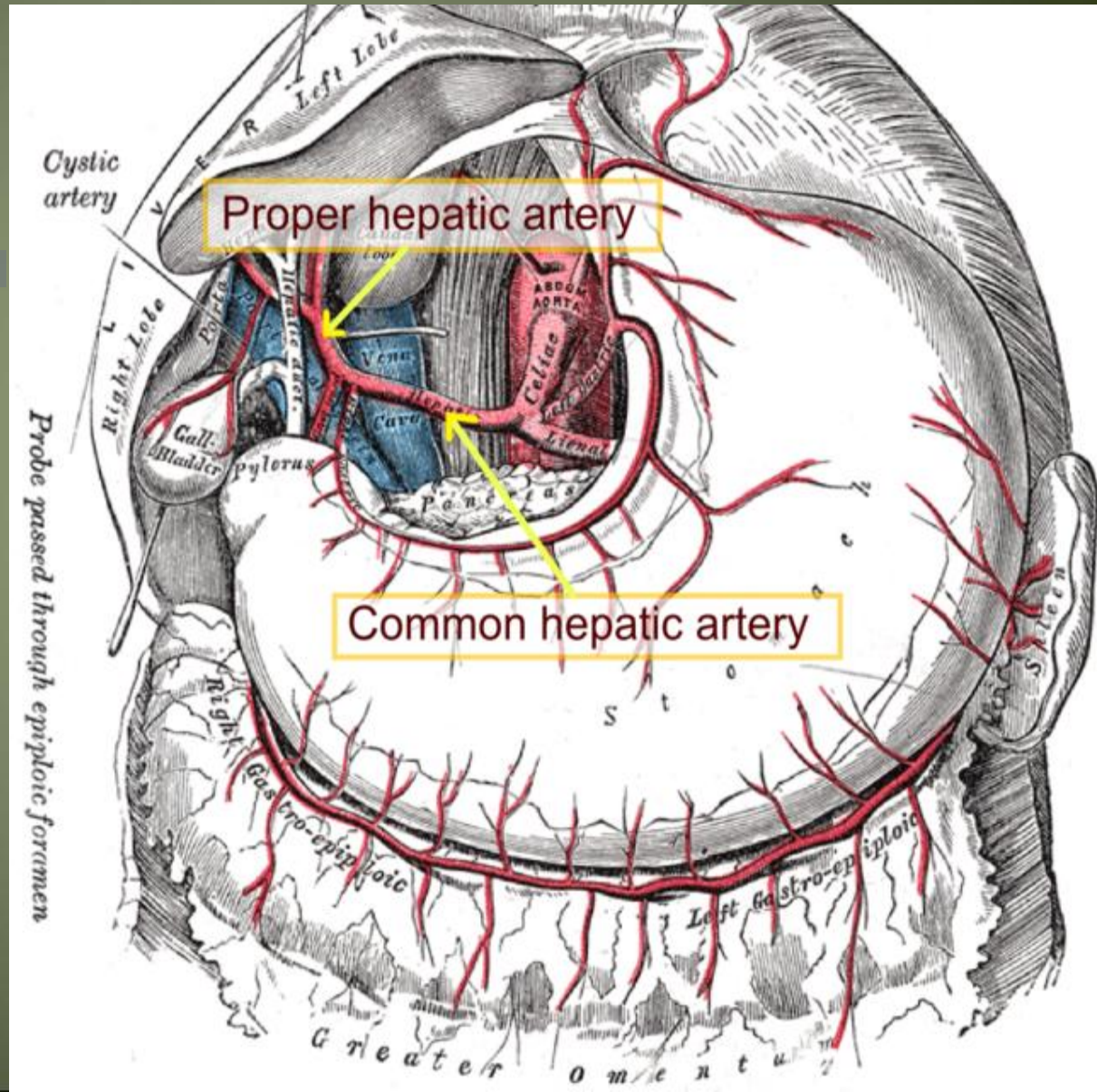


# Blood supply of the liver

- Proper 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.

Give cystic artery to the gallbladder

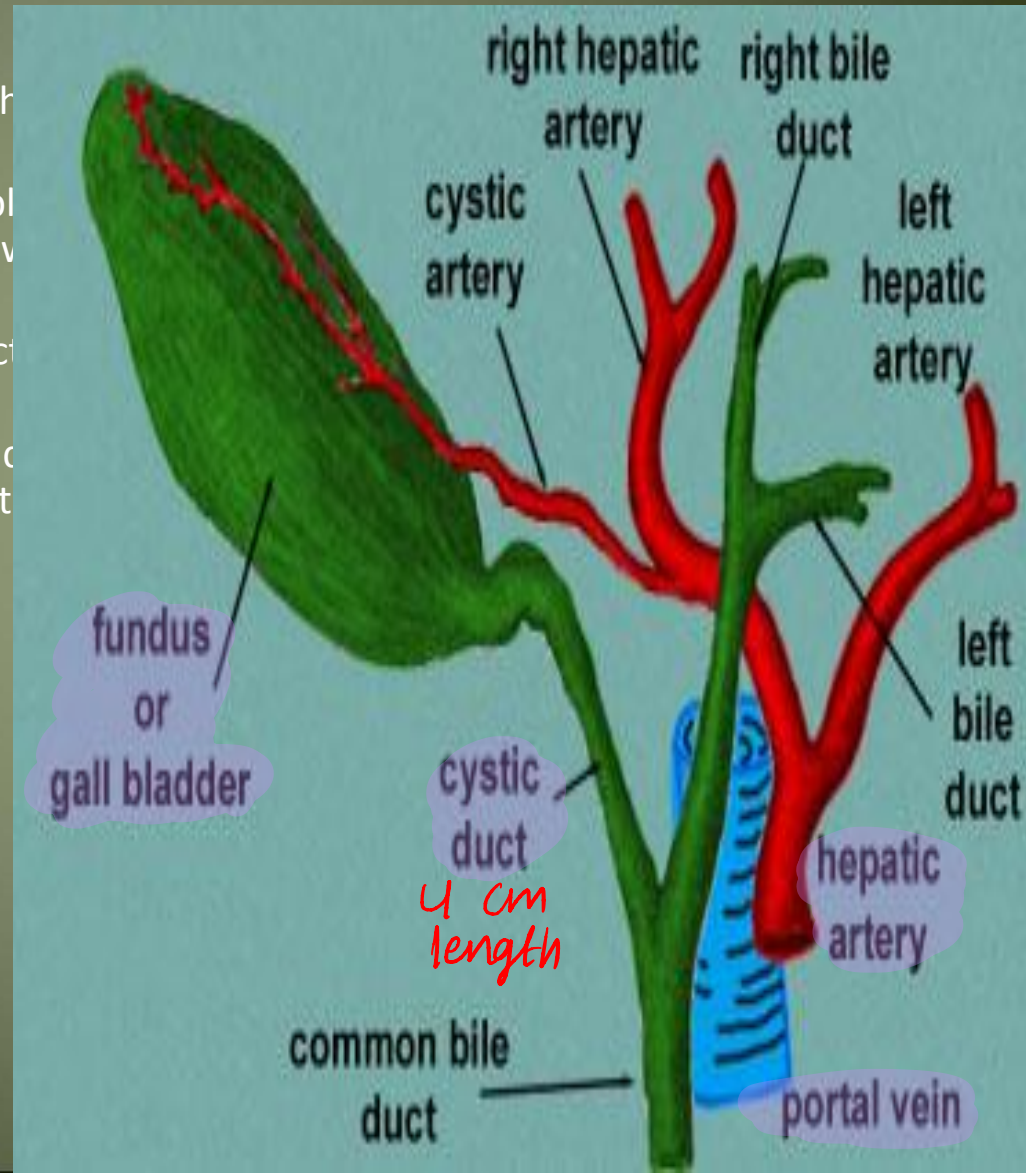
← concentration of bile.



# Blood Circulation through the Liver

- The blood vessels conveying blood to the liver (70%).
- The hepatic artery brings oxygenated blood to the liver, which is rich in the products of digestion, from the gastrointestinal tract.
- The arterial and venous blood is conducted to the liver sinusoids.
- The central veins drain into the right and left branches of the portal vein and open directly into the liver sinusoids.

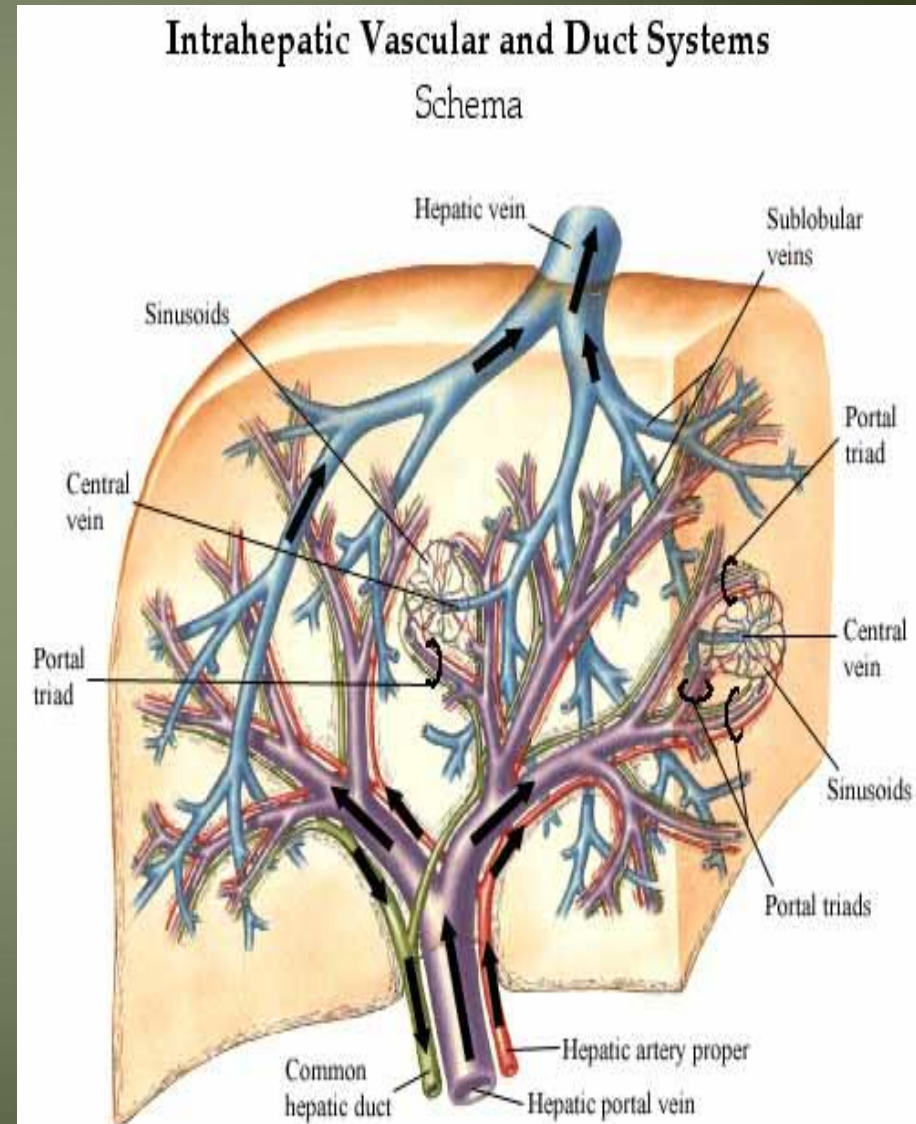
- Cystic duct will meet common hepatic duct and in porta hepatis it will form a common bile duct .
- In cholecystectomy( gallbladder removal surgery) , you make 2 ligation on the cystic duct and cut between them.
- After that you go to the artery ( cystic vessels) and make 2 ligations and cut between them ( no bleeding will occur due to the 2 ligations that you have made).





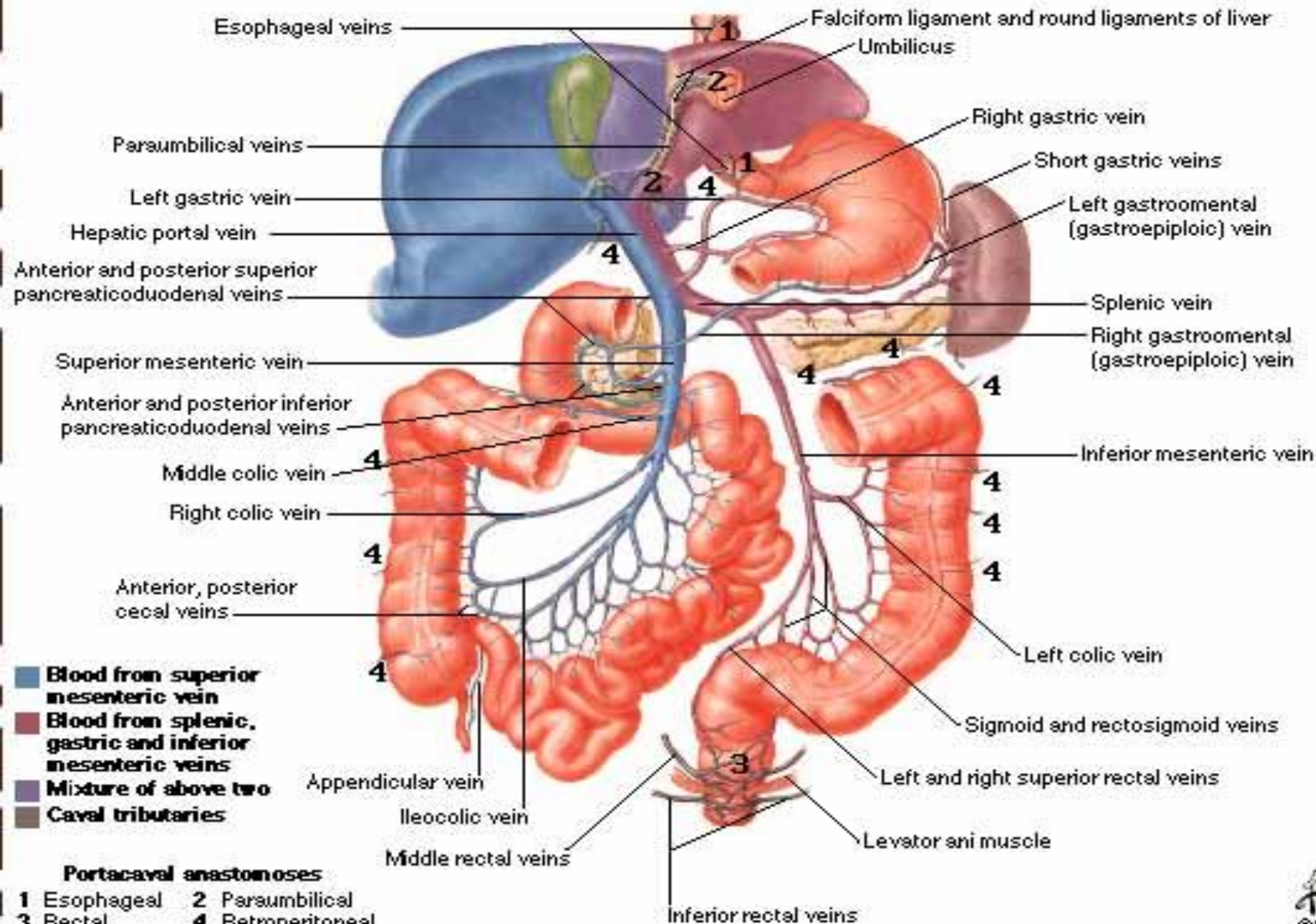
# Vein drainage of the liver

- The portal vein divides into right and left terminal branches that enter the porta hepatis behind the arteries.
- The hepatic veins (three or more) emerge from the posterior surface of the liver and drain into the inferior vena cava.



# Hepatic Portal Vein Tributaries

## Portocaval Anastomoses



# Lymphatic drainage of the liver

- Liver produce large amount of lymph~ one third – one half of total body lymph
- Lymph leave the liver and enters several lymph nod in porta hepatis → efferent vessels pass to celiac nods Then cisterna chyli in the abdominal aorta opening then thoracic duct
- A few vessels pass from the bare area of the liver through the diaphragm to the posterior Mediastinal lymph nodes.
- Nerve supply
  - Sympathetic → hepatic plexus>>> celiac plexuses → thoracic ganglion chain T1-T12
  - Parasympathetic → vagous nerve( anterior part)
  - Sympathetic and parasympathetic nerves form the celiac plexus.
  - The anterior vagal trunk gives rise to a large hepatic branch, which passes directly to the liver

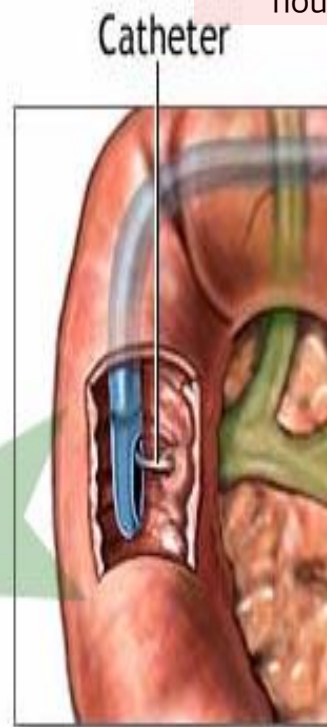
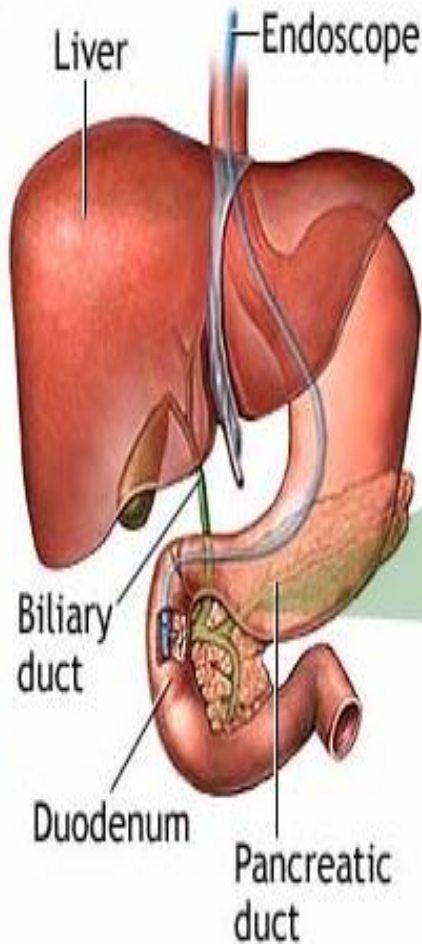
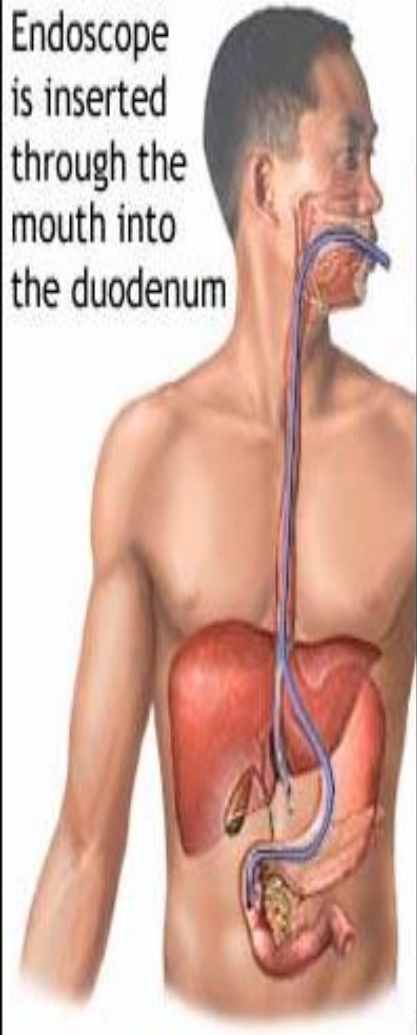
# Endoscopic retrograde cholangiopancreatography (ERCP)

- It is a technique that combines the use of endoscopy and fluoroscopy to diagnose and treat certain problems of the biliary or pancreatic ductal systems. Through the endoscope, the physician can see the inside of the stomach and duodenum, and inject dyes into the ducts in the biliary tree and pancreas so they can be seen on X-rays.
- ERCP is used primarily to diagnose and treat conditions of the bile ducts, including gallstones, inflammatory strictures (scars), leaks (from trauma and surgery), and cancer.

# ERCP

- Endoscope (retrogradely-start from the oral cavity and reaching the 2nd part of the duodenum and we cut the sphincter of oddi to enter common bile duct or the pancreatic duct- )go to the pancreas and common bile duct
- It's very easy procedure and the patient can leave the hospital after 6 hours

Endoscope is inserted through the mouth into the duodenum

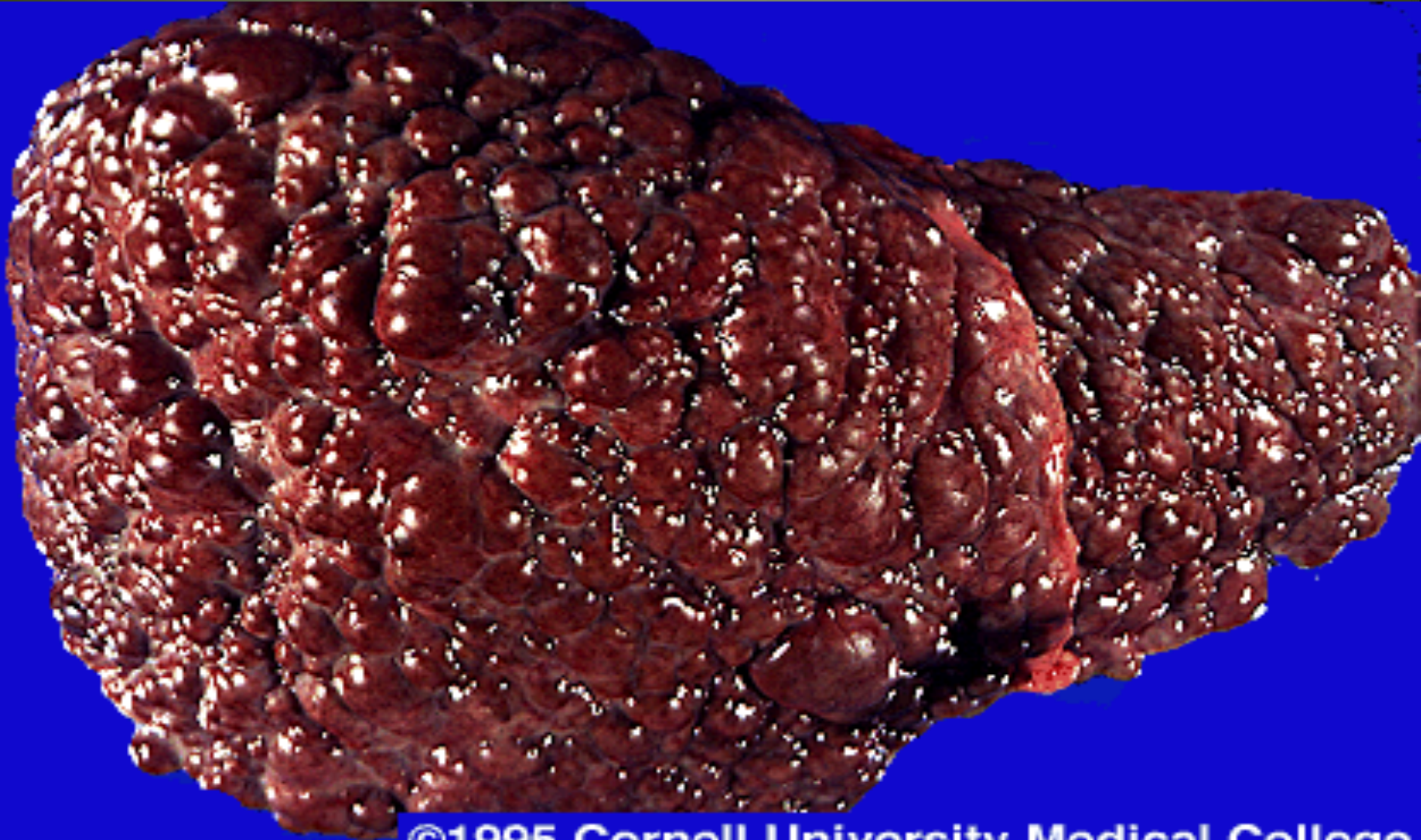


Dye is injected through a catheter into the pancreatic or biliary ducts



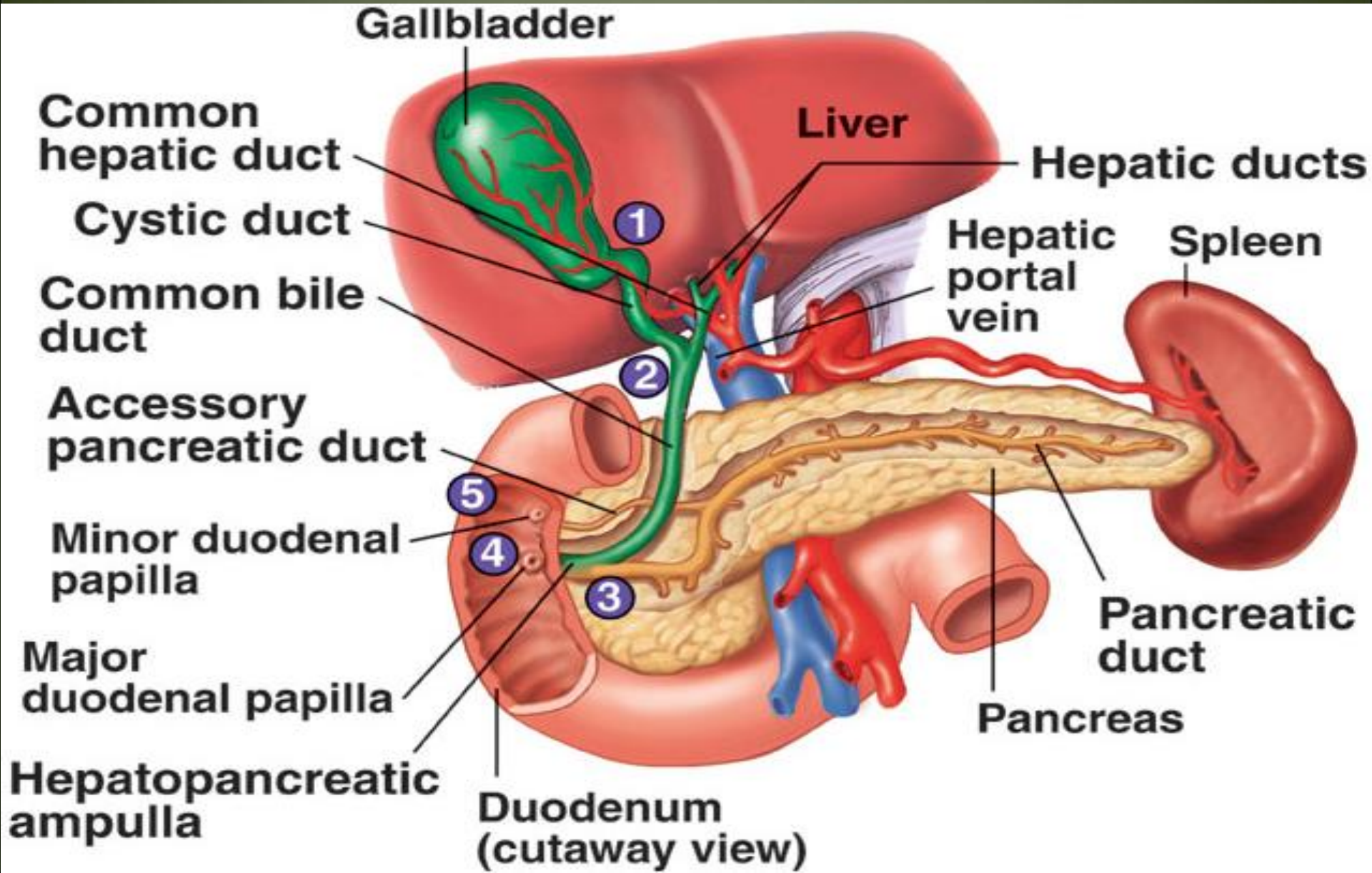
# Liver cirrhosis

Alcoholism is the main cause of cirrhosis

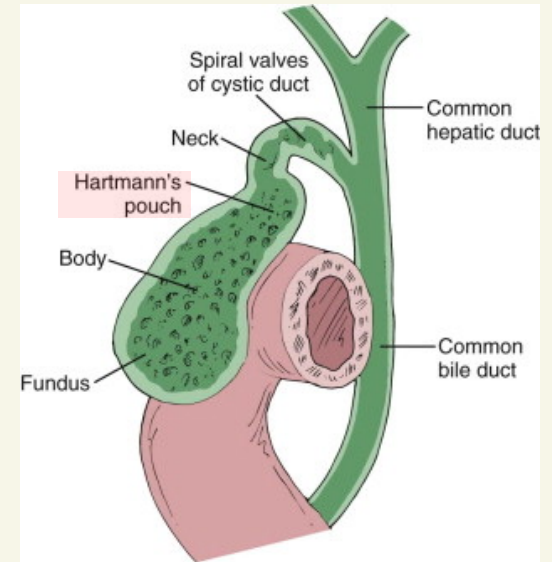


# GALLBLADDER

Concentration of bile and it is open to the second part of the duodenum



- The gallbladder is a sac located under the liver, a small, pear-shaped organ in your upper right abdomen , It stores and concentrates bile produced in the liver. Bile aids in the digestion of fat and is released from the gallbladder into the upper small intestine in response to food (especially fats). It has funds, body , neck and 4 cm cystic duct
- Hartmann's gallbladder pouch مثل كف اليد
- It's negativity is that it collects the bile secretions and if stasis occurs, stones will form. Like a single stone - it must be removed by a surgery-



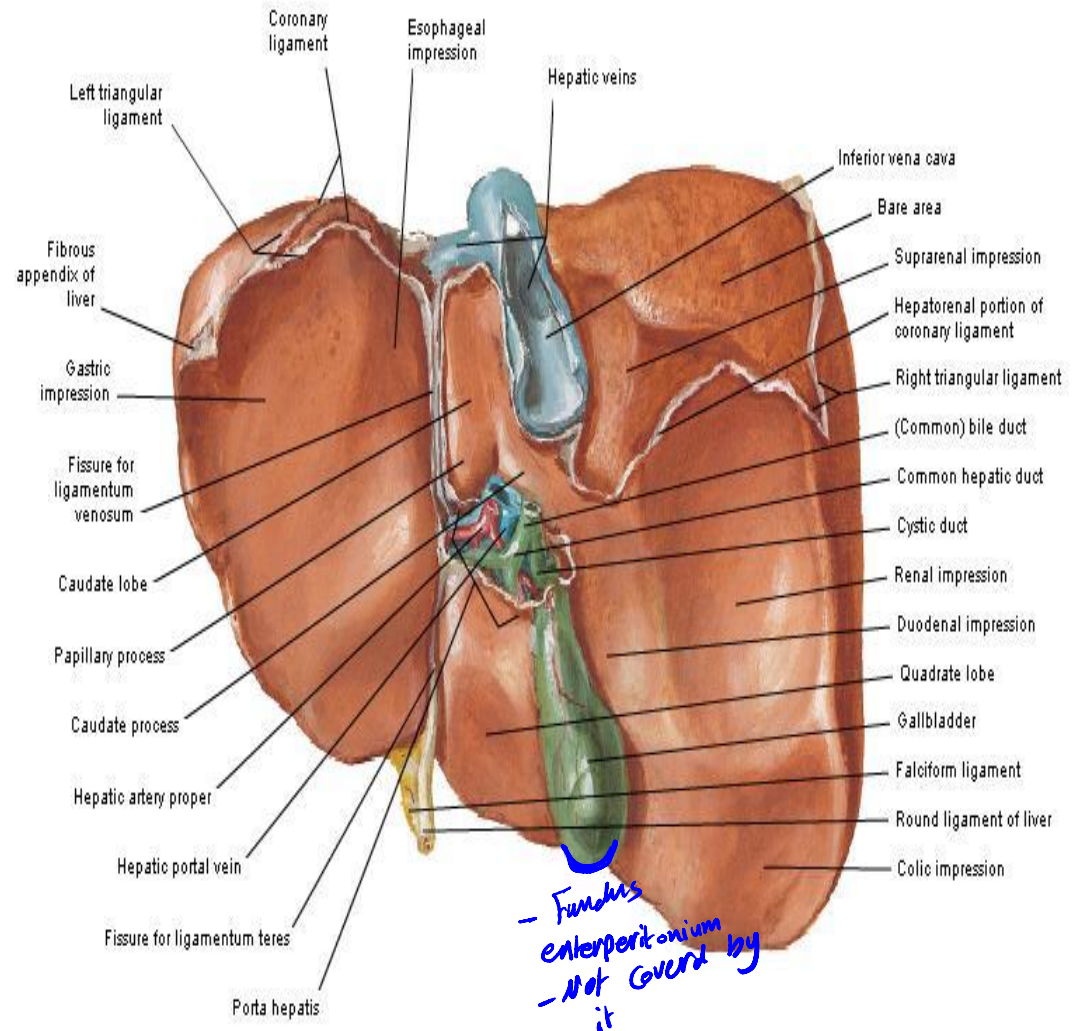


## Anatomical position of GB

- Epigastric - Right hypochondrium region
- At the tip of the 9<sup>th</sup> RT . C.C
- Green muscular organ
- Pear-shaped, hollow structure
- On inferior surface of liver
- Between quadrate and right lobes
- Has a short mesentery
- Capacity 40- 60 cc
- Body and neck
- Directed toward porta hepatis

## Surfaces and Bed of Liver

### Visceral Surface



# Structure of GB

## Fundus

- Ant: ant. abdominal wall
- Post. inf: transvers colon

## Body

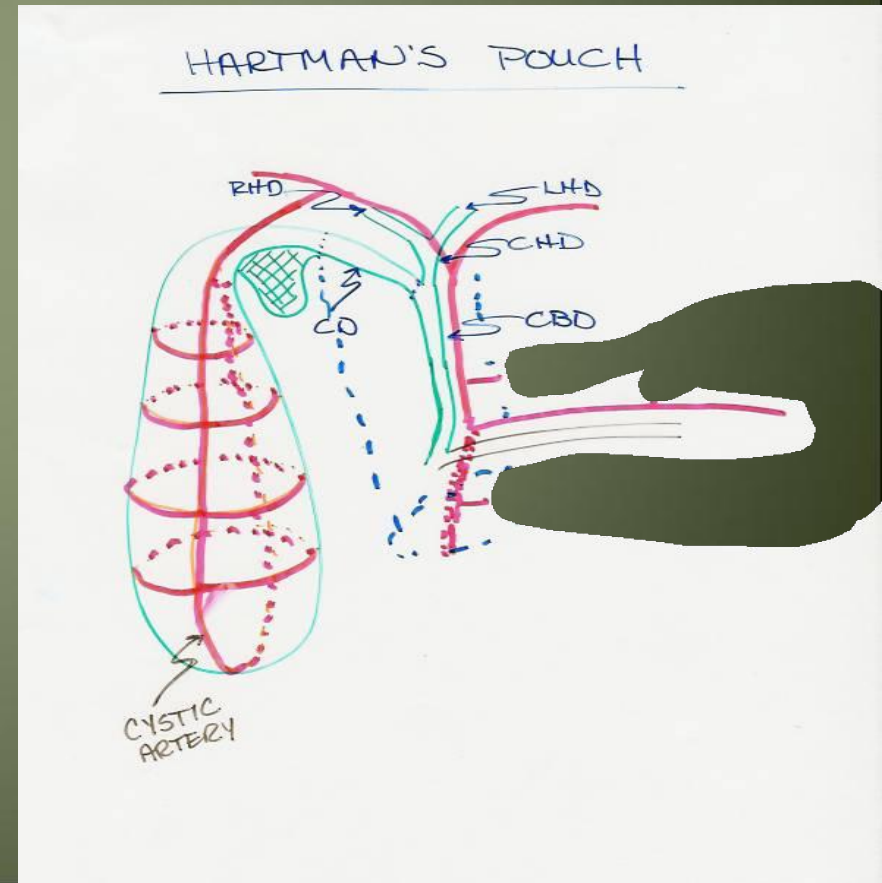
- sup: liver
- post. inf: Tr. colon. End of 1<sup>st</sup> part of duodenum ,  
begins of 2<sup>nd</sup> part of duodenum

## Neck

- Form the cystic duct, 4cm

## Hartmann's Pouch *downward direction.*

1. Lies between body and neck of gallbladder
2. A normal variation
3. May obscure cystic duct
4. If very large, may see cystic duct arising from pouch



# Gall Bladder

villus

mucosa

submucosa

muscularis

adventitia



# Gall Bladder H&E

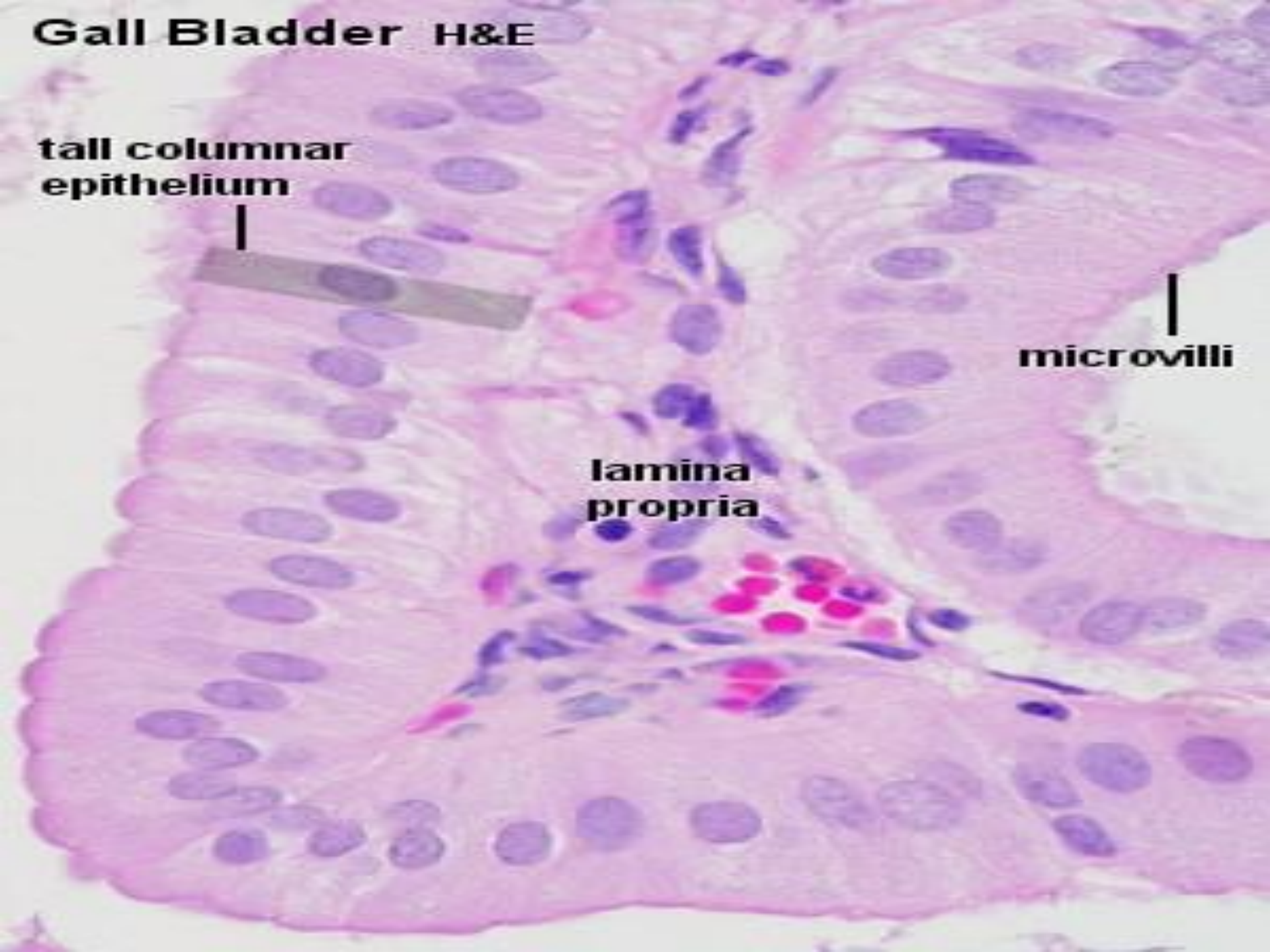
tall columnar  
epithelium



microvilli



lamina  
propria

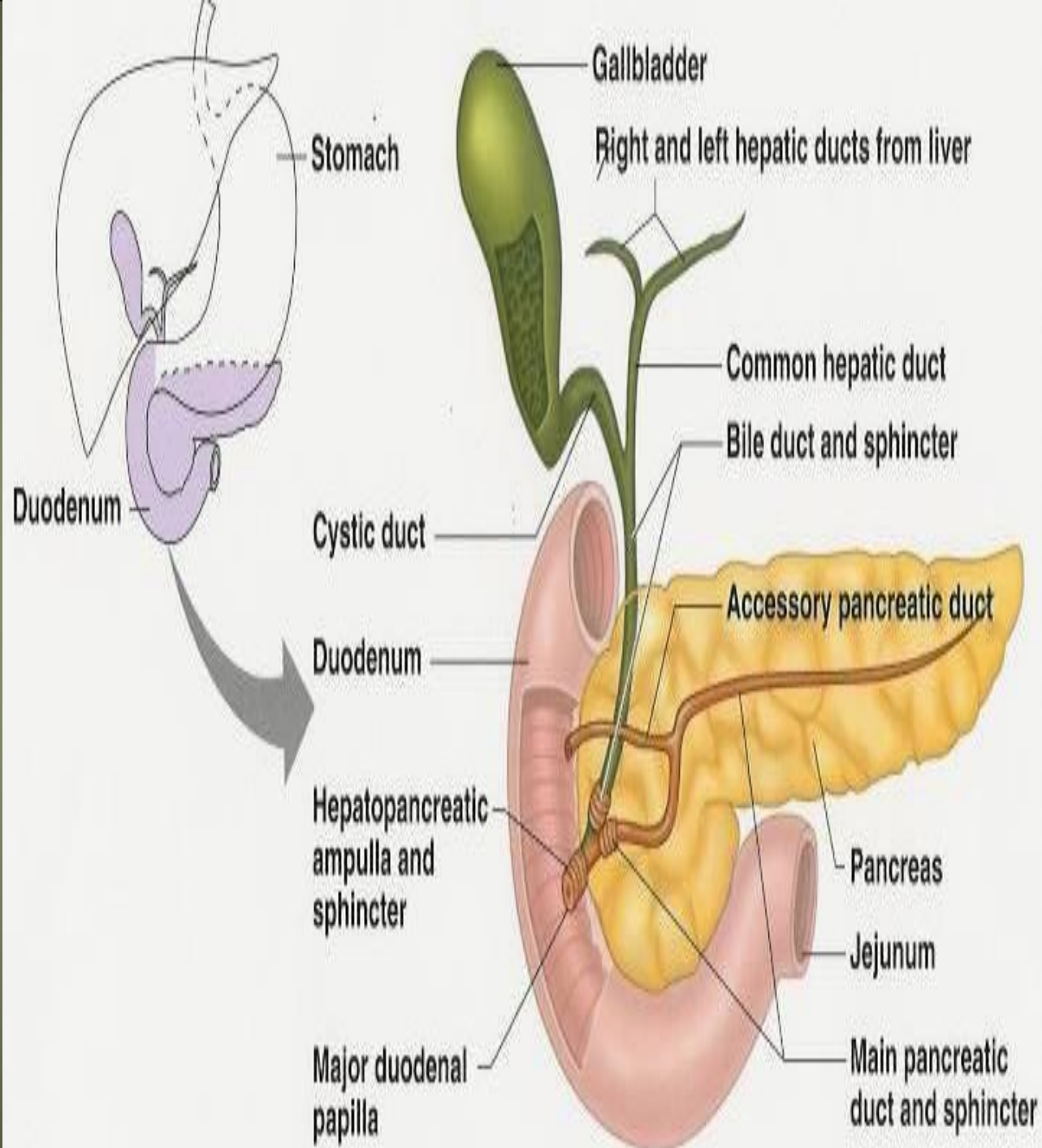


# Cystic duct

- It joins common hepatic duct

4 cm length

→ To form common bile duct

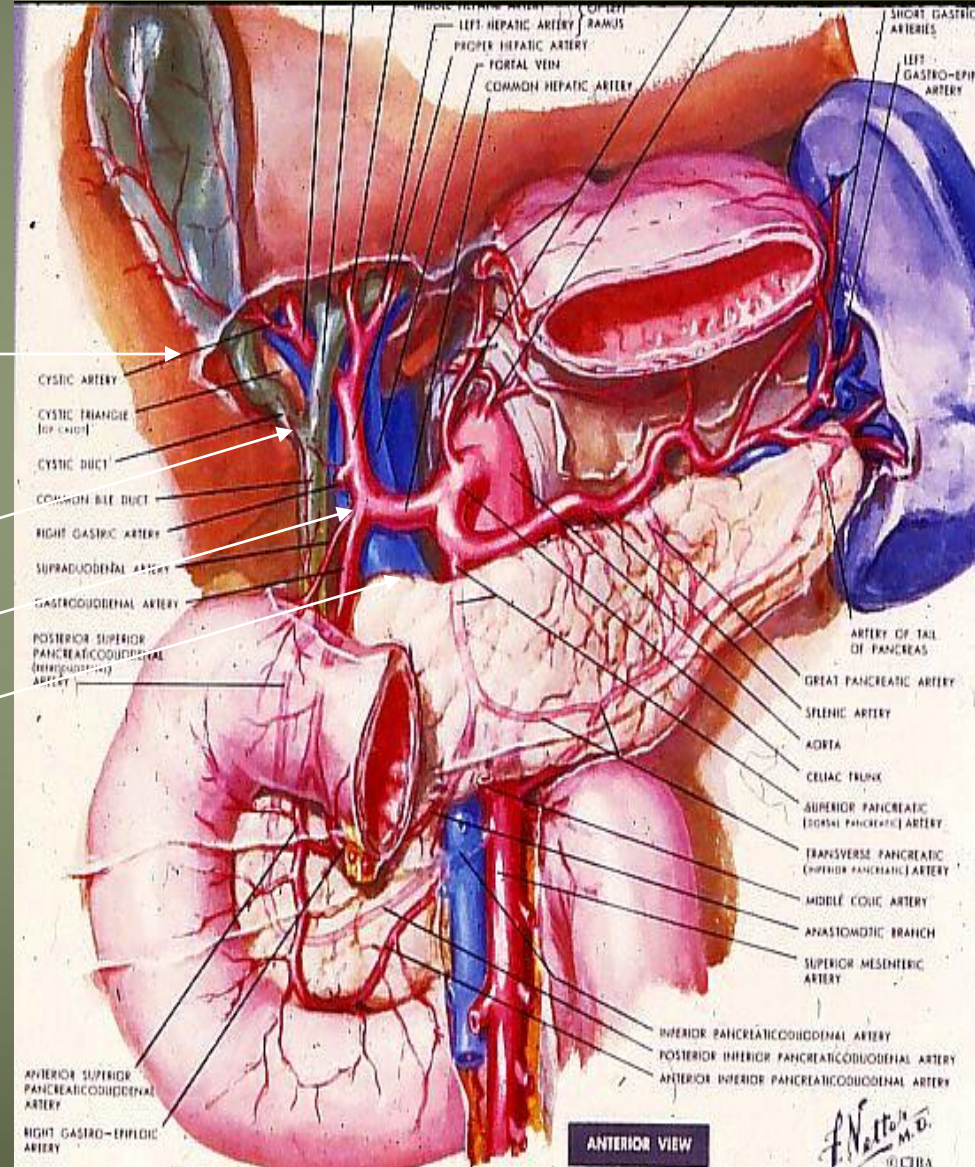


# Arterial Supply to the Gallbladder

- Cystic artery
- Right hepatic artery
- Proper hepatic artery
- Common hepatic artery

*From*

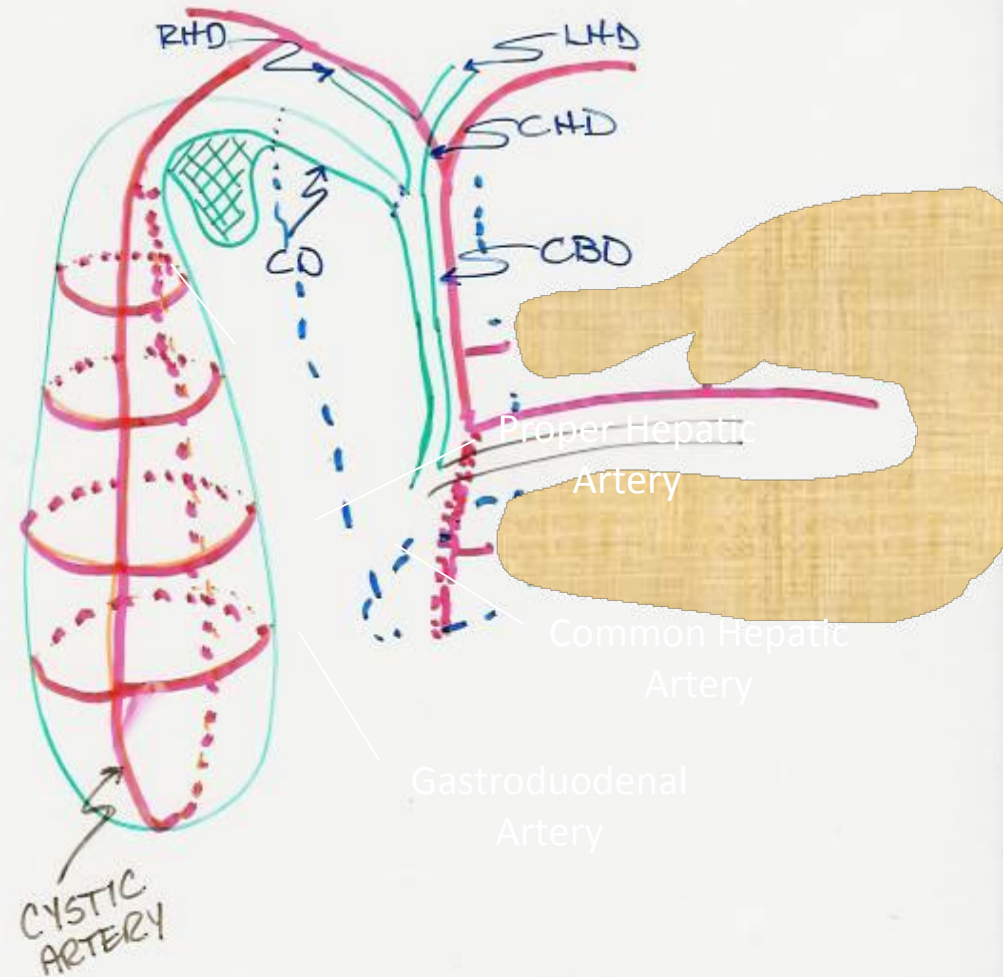
Cystic vein goes to the right border



# HARTMAN'S POUCH

## Blood supply of GB:

- Cystic artery → branch of Rt. Hepatic artery
- Cystic vein → end in portal vein
- Small branches (arteries and veins) run between liver and gall bladder



## Lymphatic drainage of GB

1. Terminate @ celiac nodes
2. Cystic node at neck of GB
  - a. Actually a hepatic node
  - b. Lies at junction of cystic & common hepatic ducts
3. Other lymph vessels also drain into hepatic nodes



# Nerve supply

- Sympathetic and parasympathetic from celiac plexus
- Parasympathetic ---- vagous nerve
- Hormone → cholecystokini → duodenum  
*stimulates it*

# Common bile duct

## Extra hepatic biliary system

Rt. hepatic duct

+

Lt hepatic duct

↓

Common hepatic duct

+

Cystic duct

↓

Common bile duct

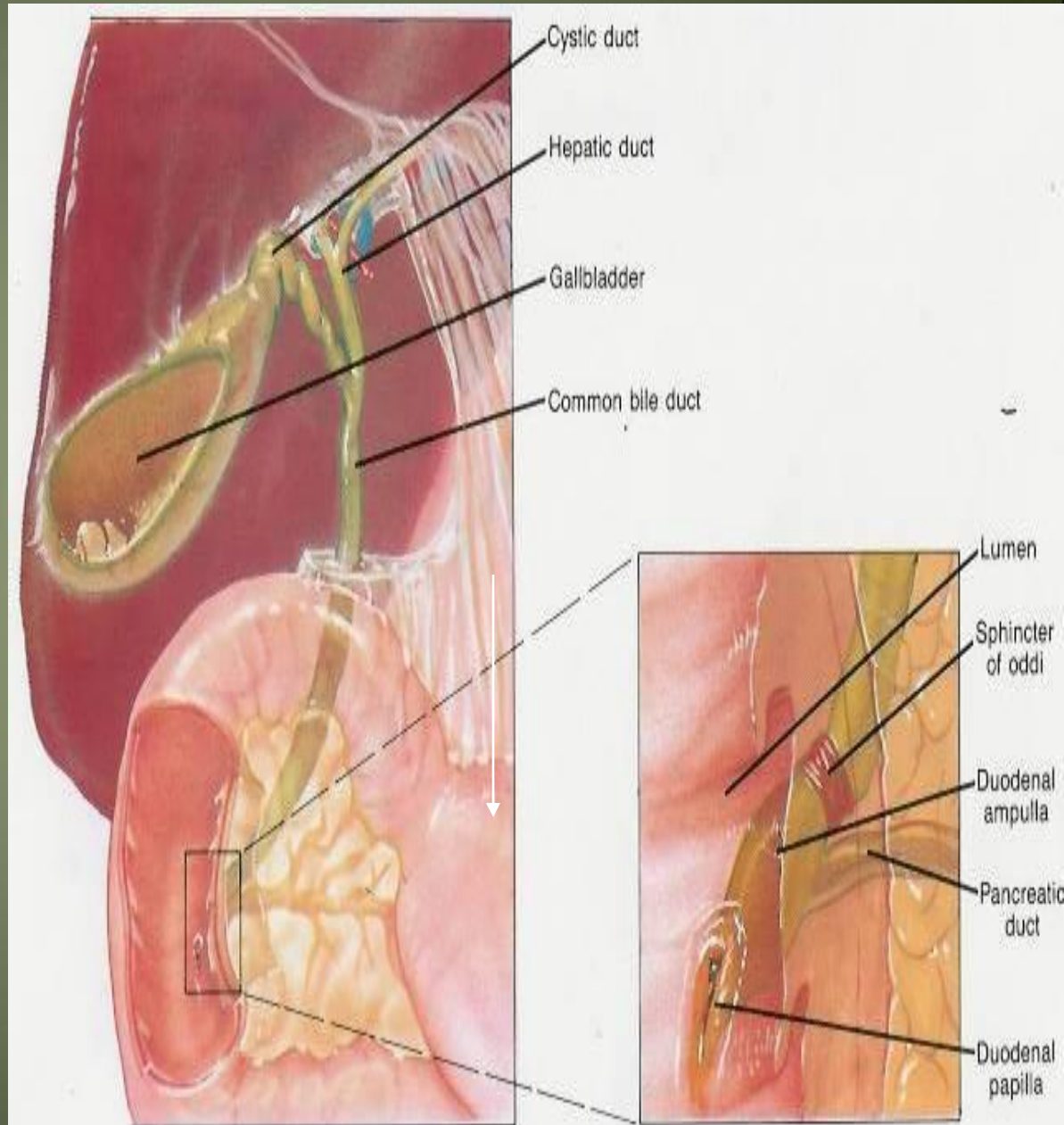
- 4cm

- Descend in free edge of lesser omentum

- Supra duodenal part

    Retro duodenal part

    Retro pancreatic part



# Bile duct..... parts and relations

-3 inc long

## -1<sup>st</sup> part

- Located in right free margin of lesser omentum
- in front of the opening into the lesser sac (Epiploic opening)
- Rt to hepatic artery and portal vein

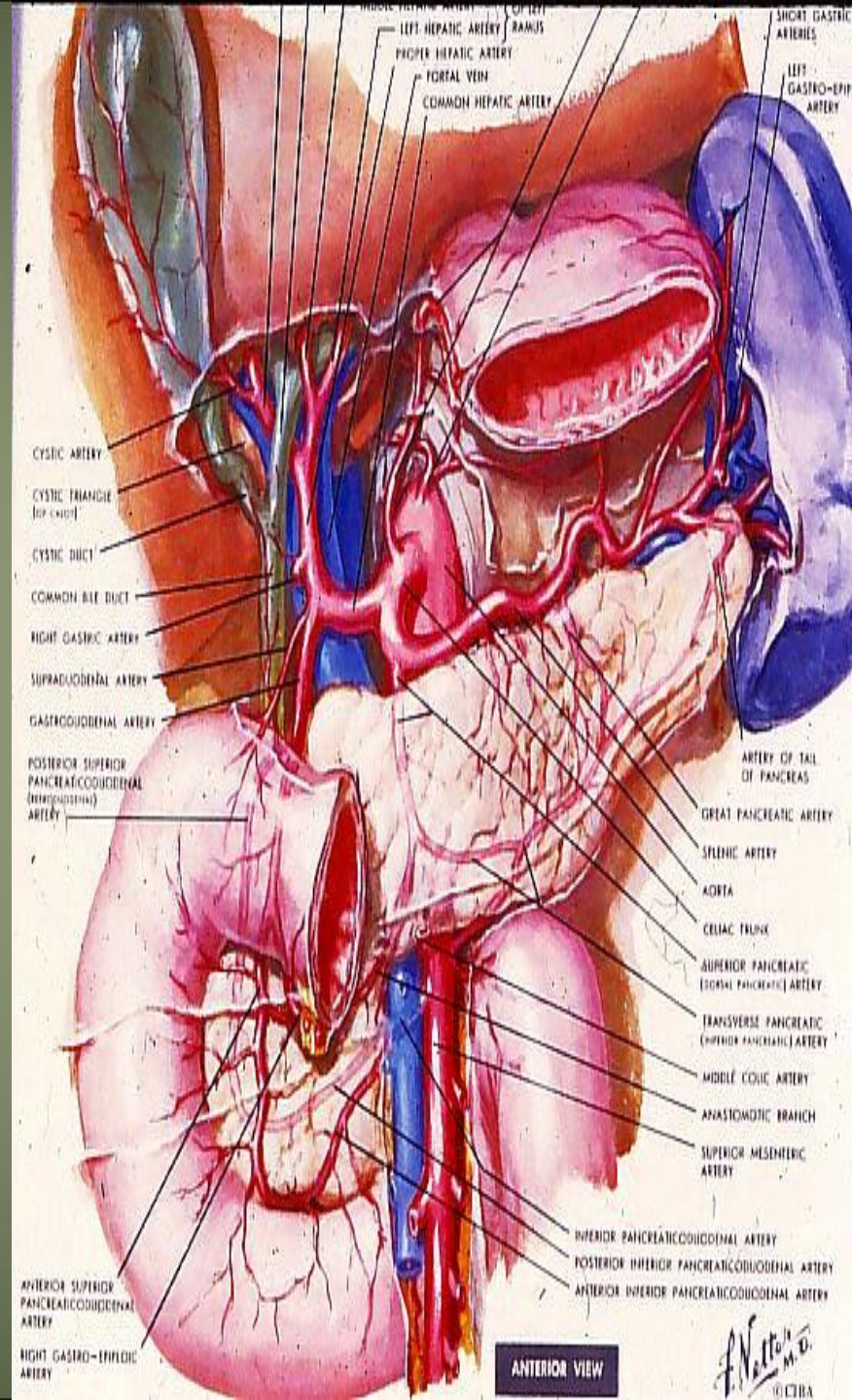
## - 2<sup>nd</sup> part

- Behind the 1<sup>st</sup> part of the duodenum
- Rt to the gastroduodenal artery

## -3 rd part

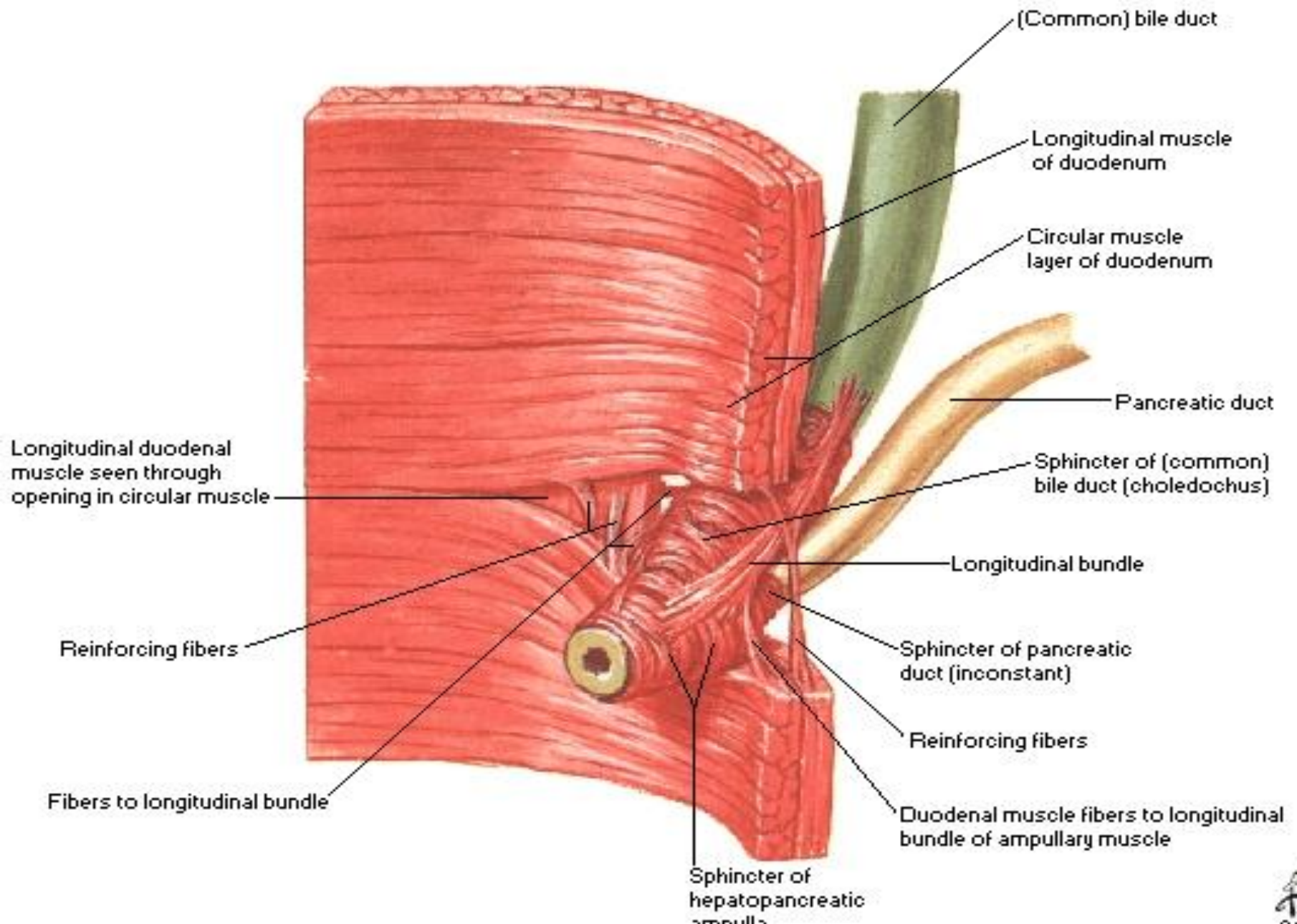
- Posterior surface of the head of the pancreas
- Contact with main pancreatic duct
- Related with IVC, gastroduodenal artery, portal vein

-End in the half second part of duodenum at ampulla of Vater

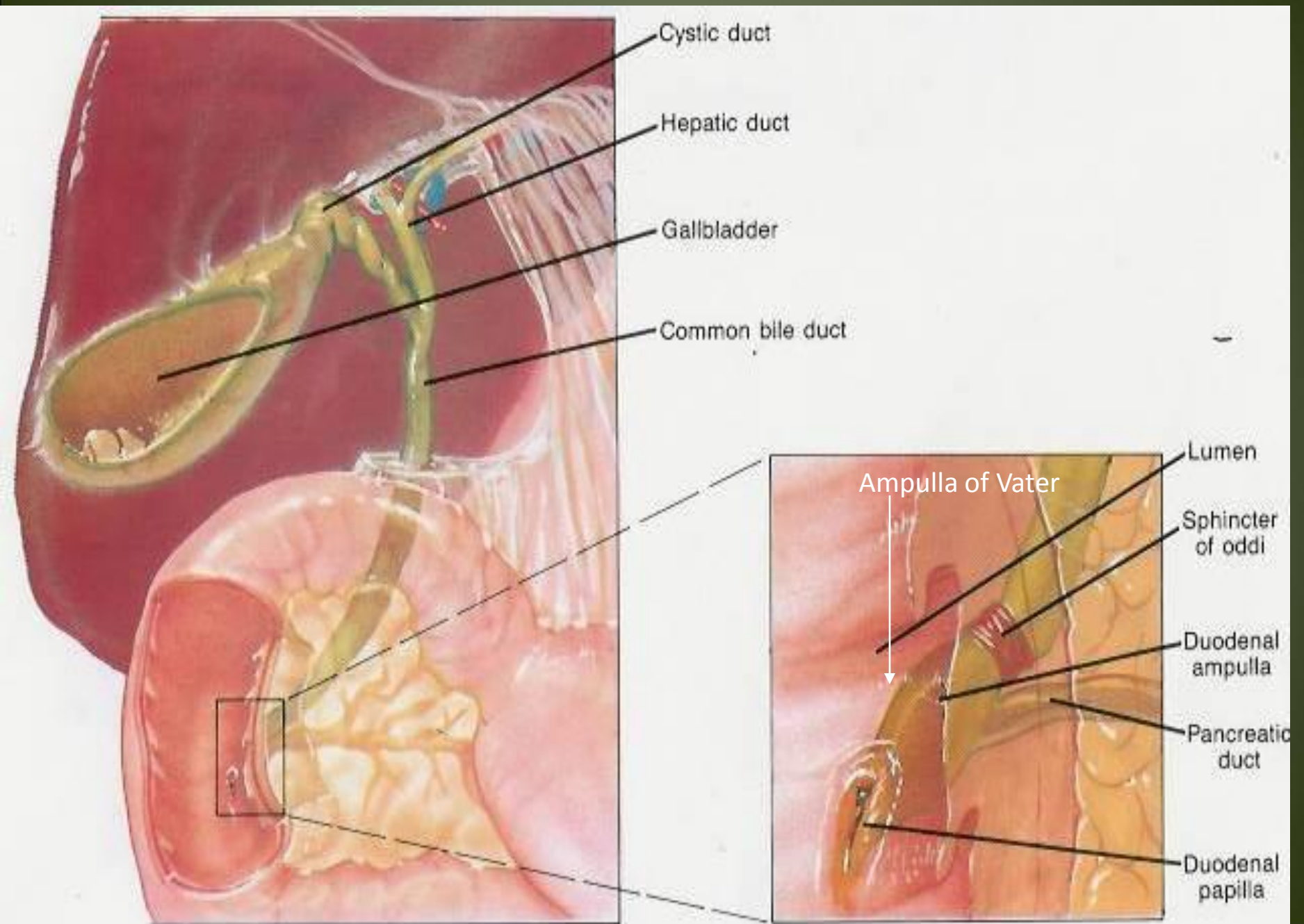


# Junction of Bile Duct and Duodenum

## Dissection



# Ampulla of Vater with CBD and Pancreatic Duct



# Hepaticopancreatic ampulla (Ampulla of Vater)



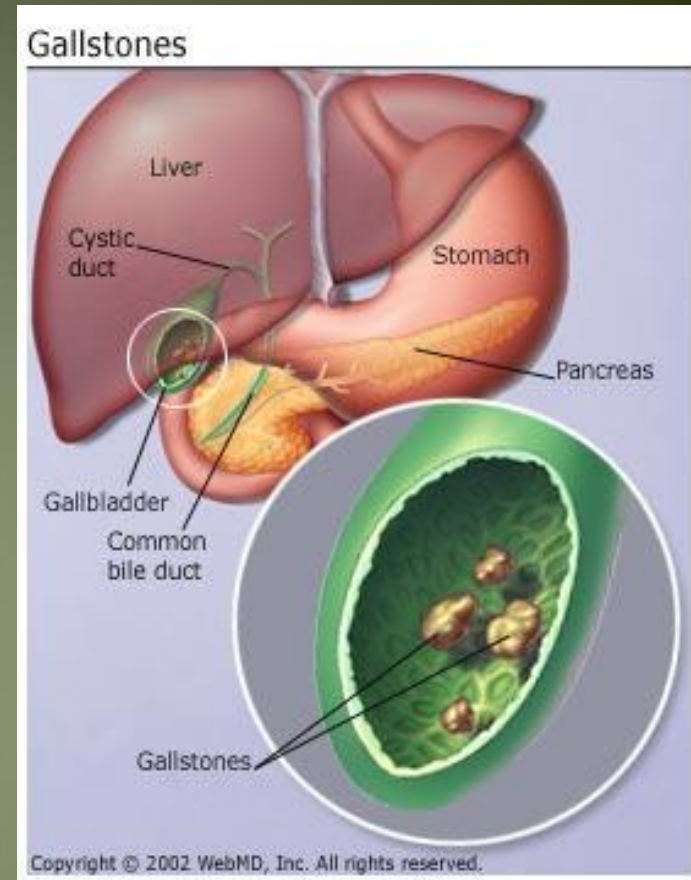
## Blood supply of CBD

### Small arteries supplying CBD

- a. Arise from cystic artery
- b. Posterior branch of superior pancreaticoduodenal artery

# What is bile?

- Bile composed of water, ions, bile acids, organic molecules (including cholesterol, phospholipids, bilirubin)
- Gallstones are mostly cholesterol
- Acids and salts emulsify fats for absorption across wall of small intestines into lacteal lymph capillaries (review)
- Contains waste products from RBC breakdown and other metabolic processing (color of feces from bilirubin in bile)(review)
- Ions buffer chyme from stomach (review)

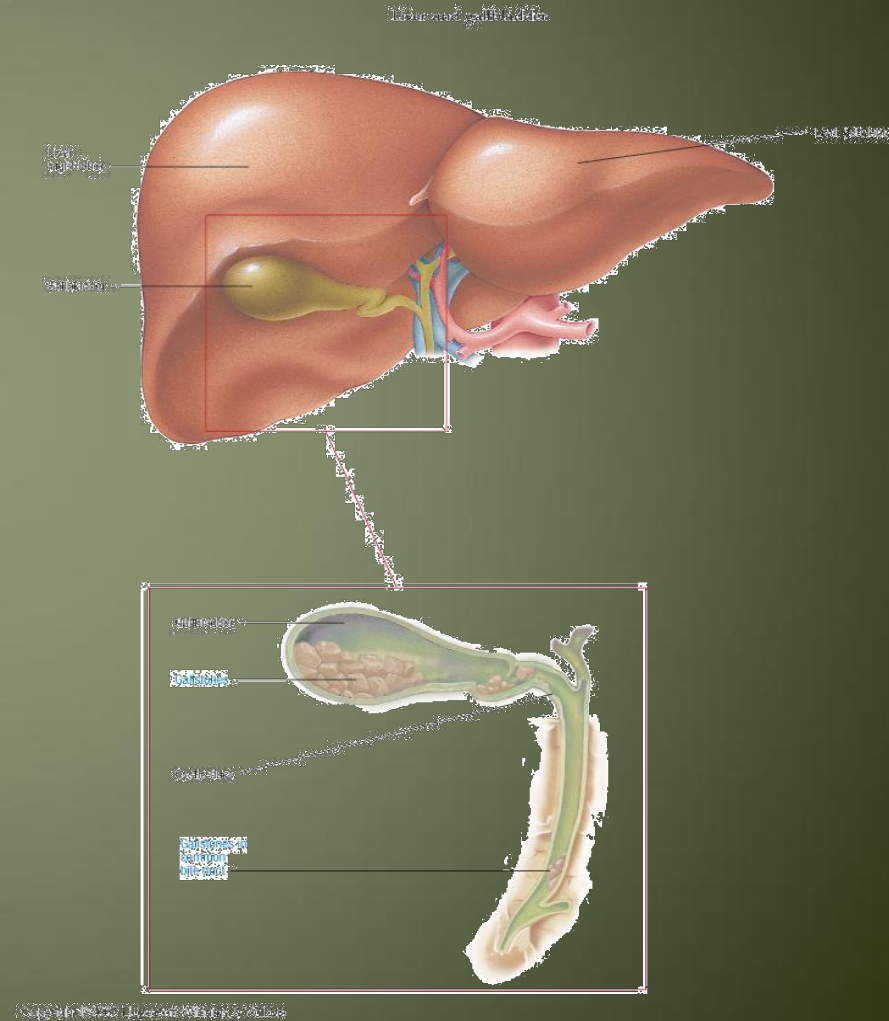




# Cholelithiasis

Stones in gallbladder must be removed to avoid cancer

- GB shows likely sites of stone formation/deposition
- Gangrene of gallbladder is rare
- Stone in C.B.D obstruct jaundice & pancreatitis



# Gallbladder Diseases

## 1- Cholelithiasis & Cholecystitis

Cholecystitis = inflammation of GB

Cholelithiasis = Stone(s) in GB

## 2- Obstructive jaundice: liver patterns

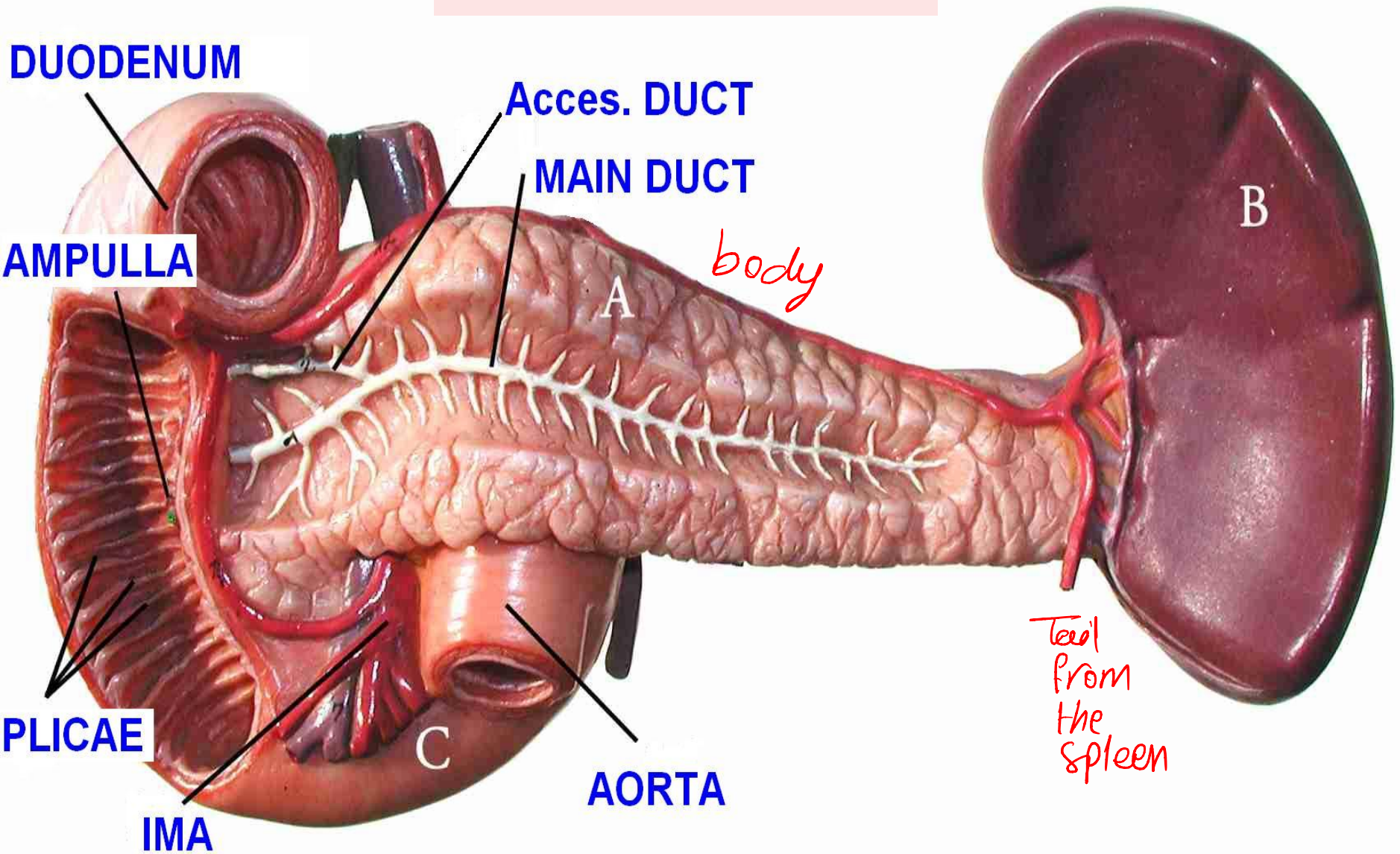
## 3- Gangrene of gall bladder rare

## 4- Congenital defects

# PANCREAS

*Mixed gland*

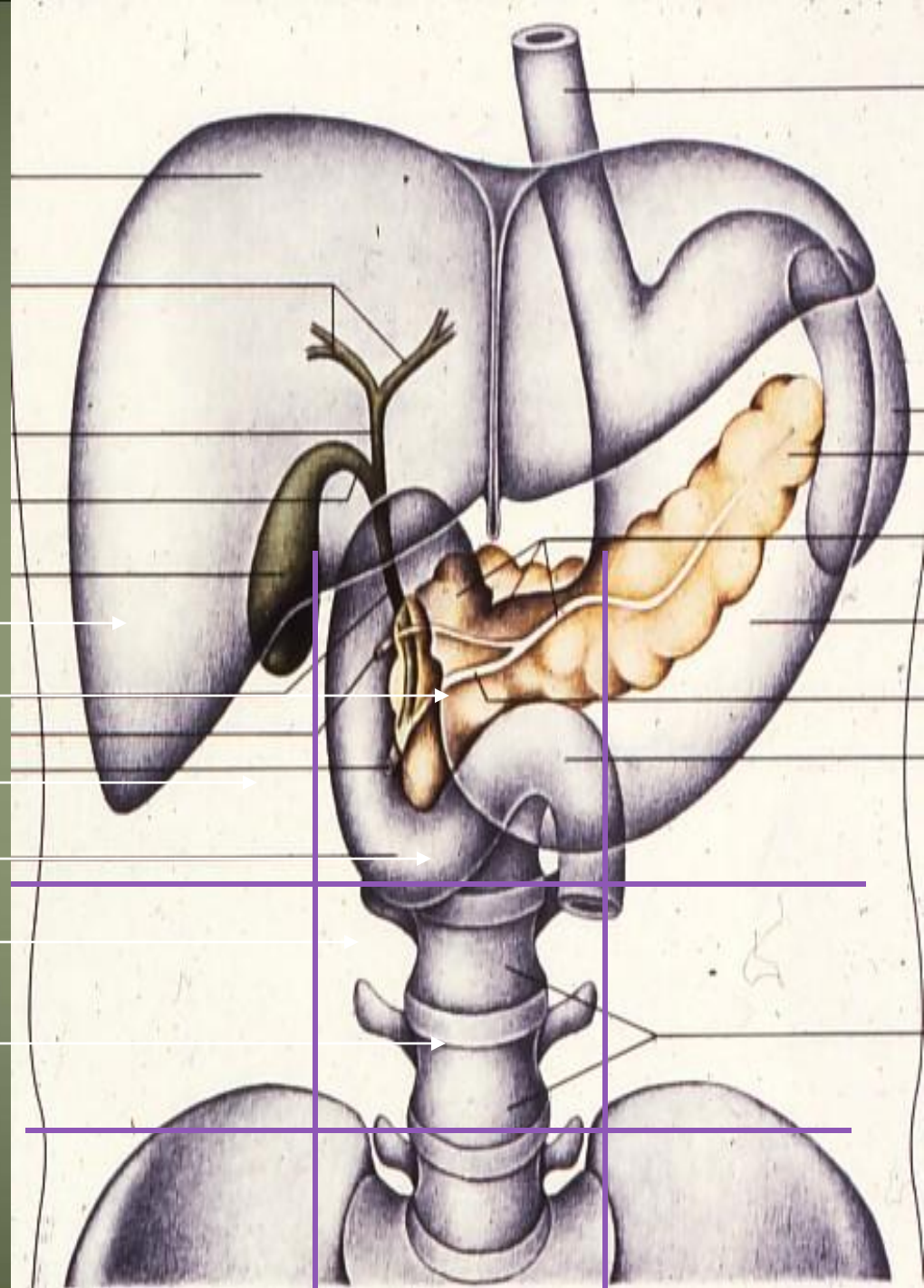
Retroperitoneum organ in epigastric region



# Anatomical position

- Epigastric
- left upper hypochondrium region

- Right lobe of liver
- Falciform ligament
- Gallbladder
- Pancreas
- Duodenum
- L-3



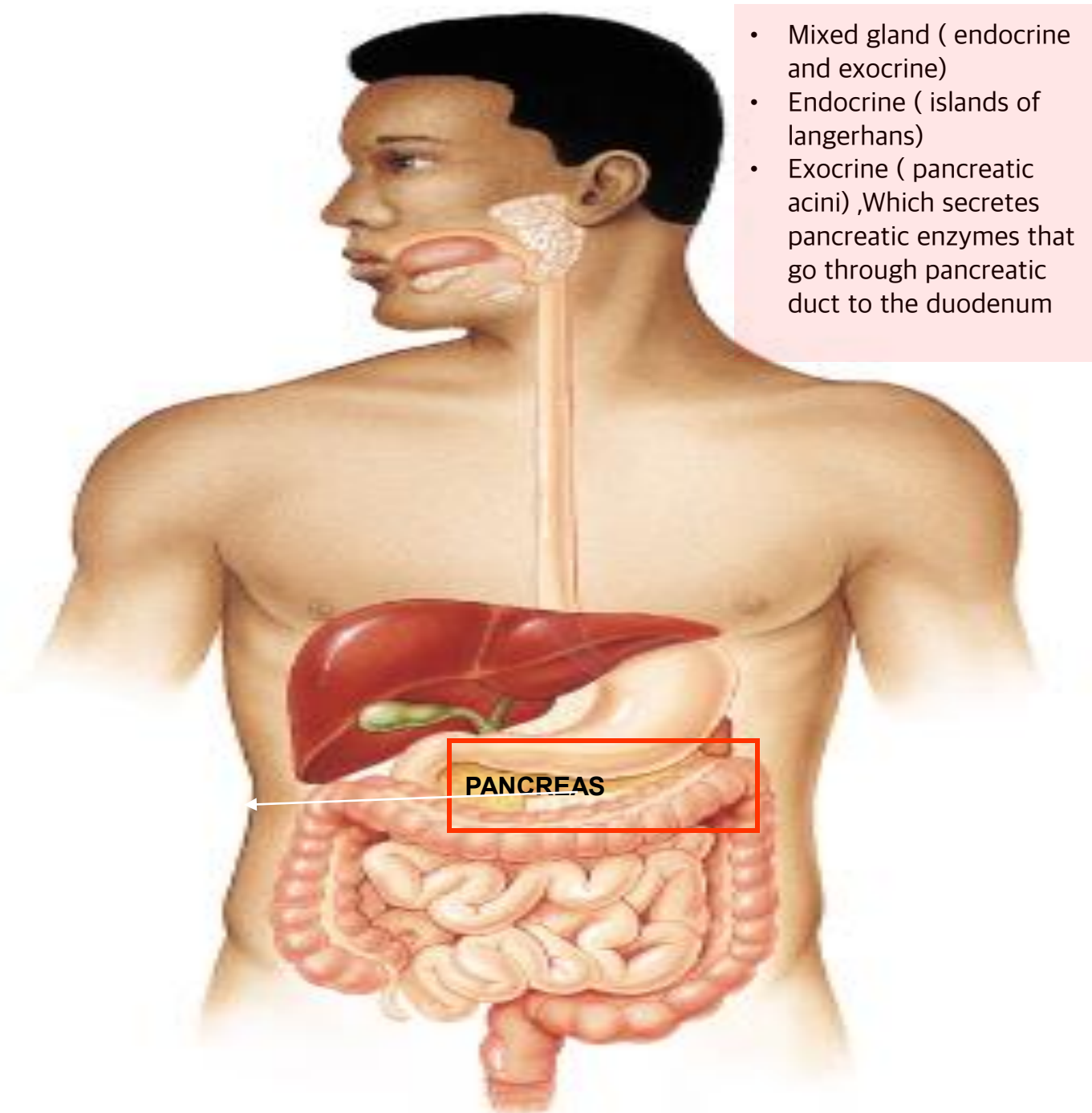
## Common relation

### Anterior

- Transverse colon
- Transvers mesocolon
- Lesser sac
- Stomach

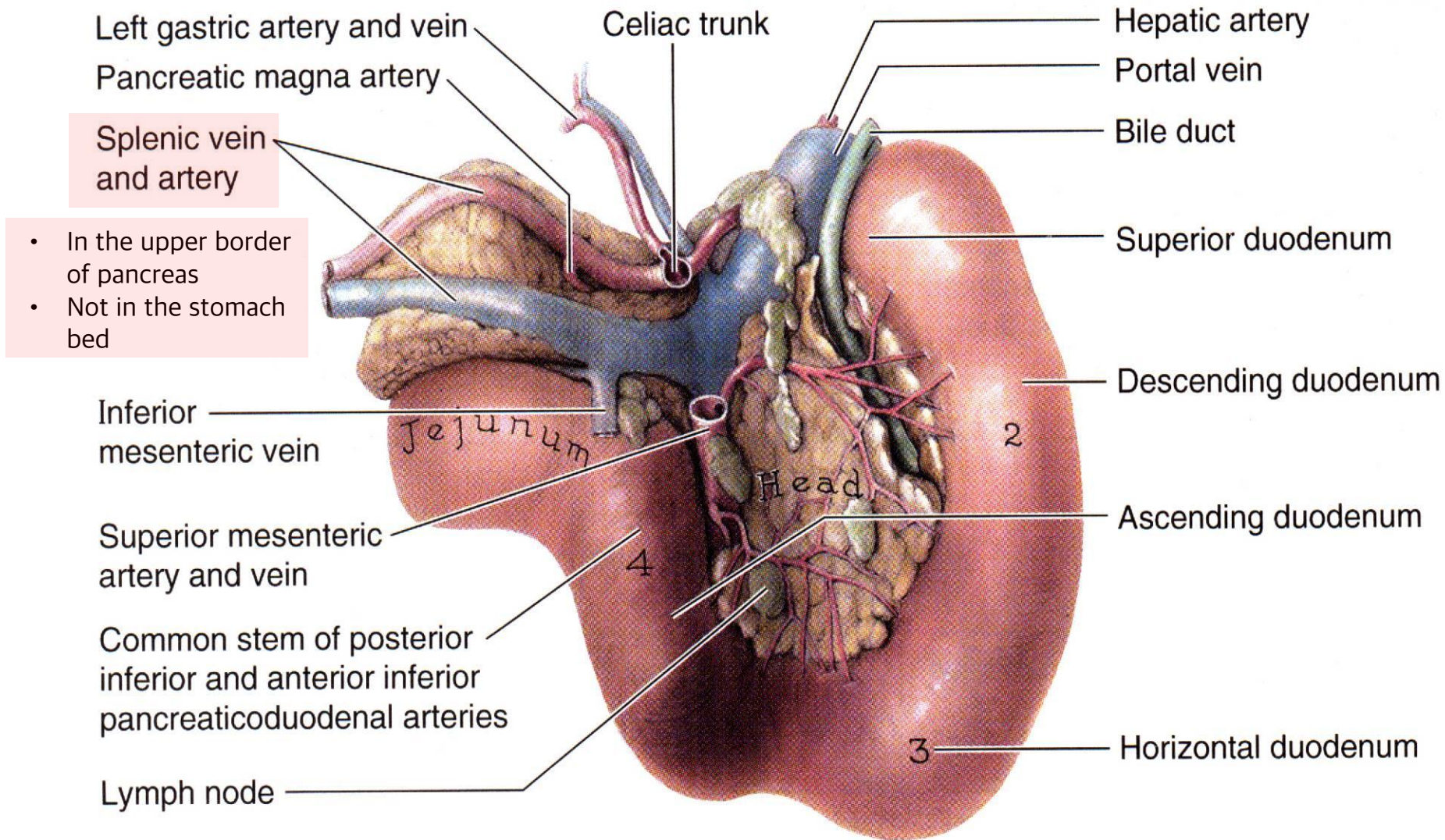
### -Posterior

- Bile duct
- Portal vein
- Splenic vein
- IVC
- Aorta
- origin of Sup.mesentric.a
- Lt.Psoas muscle
- Lt.Suuprarenal gland
- Left kidney
- Hilum of the spleen



- Mixed gland ( endocrine and exocrine)
- Endocrine ( islands of langerhans)
- Exocrine ( pancreatic acini) ,Which secretes pancreatic enzymes that go through pancreatic duct to the duodenum

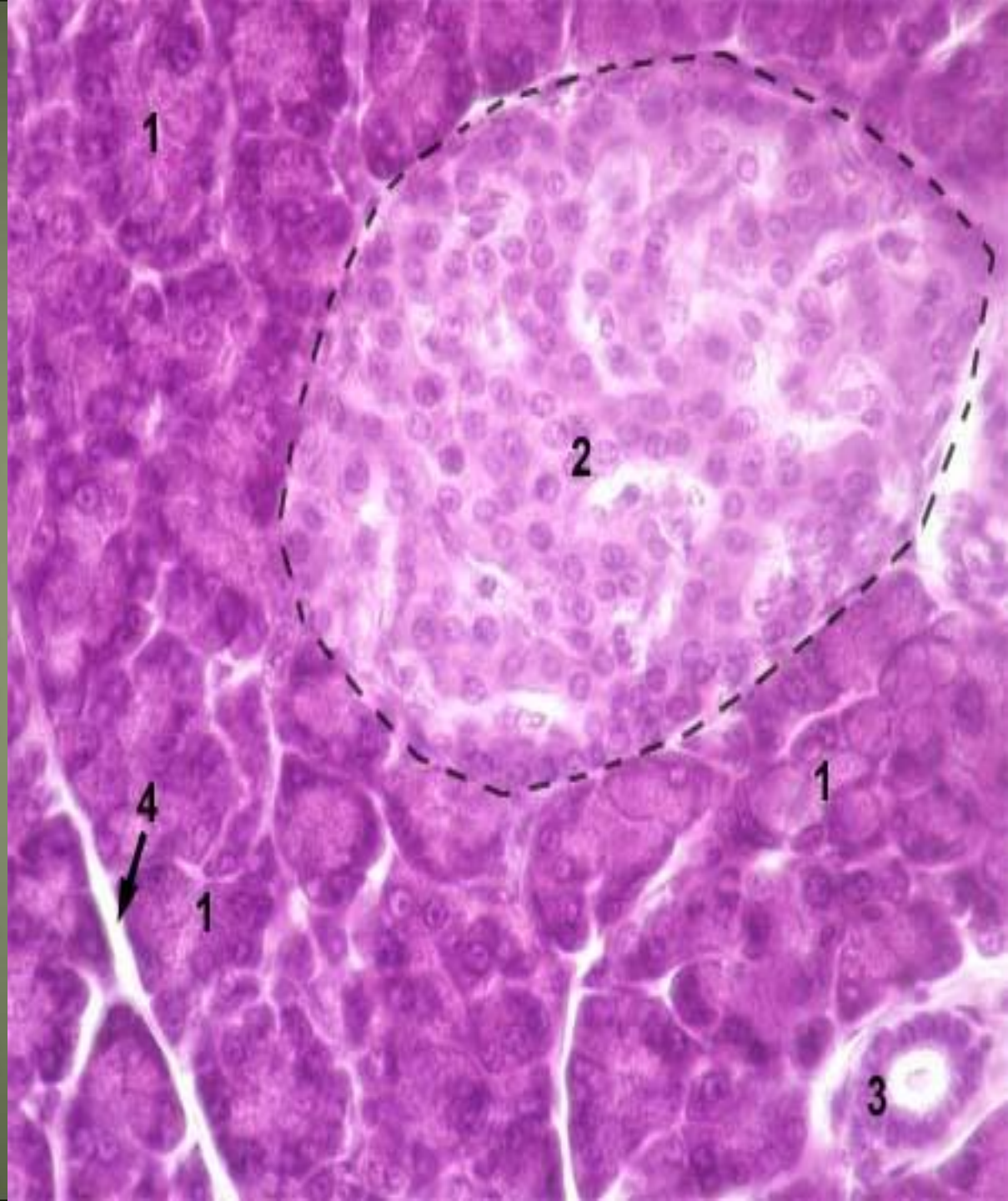
# Posterior view of duodenum/pancreas



## Histology of pancreas

Exocrine part → Pancreatic juice

Endocrine part → Insulin, glucagon and somatostatin

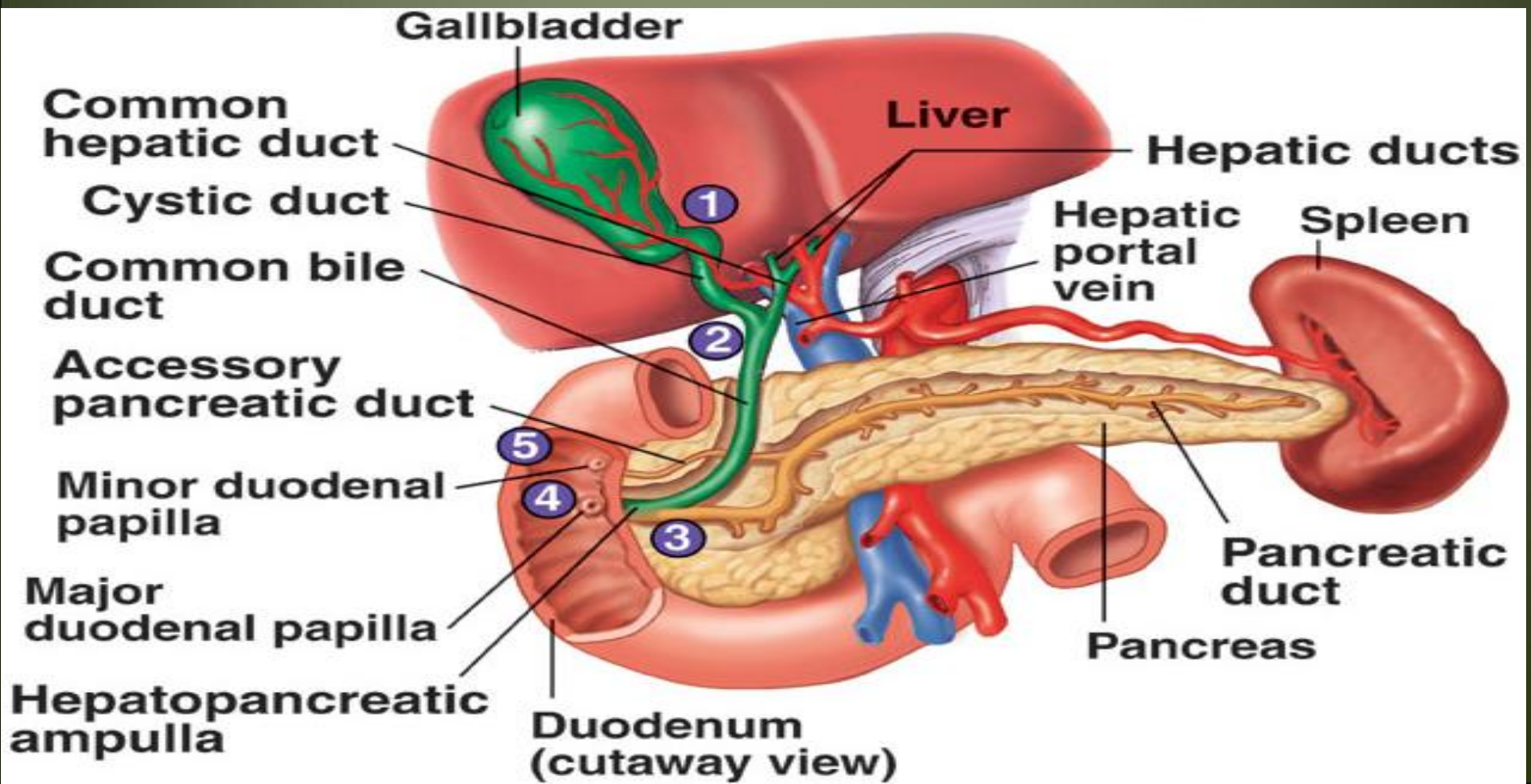


# *Parts of the pancreas*



**Parts**

- Head
- Neck
- body
- Tail

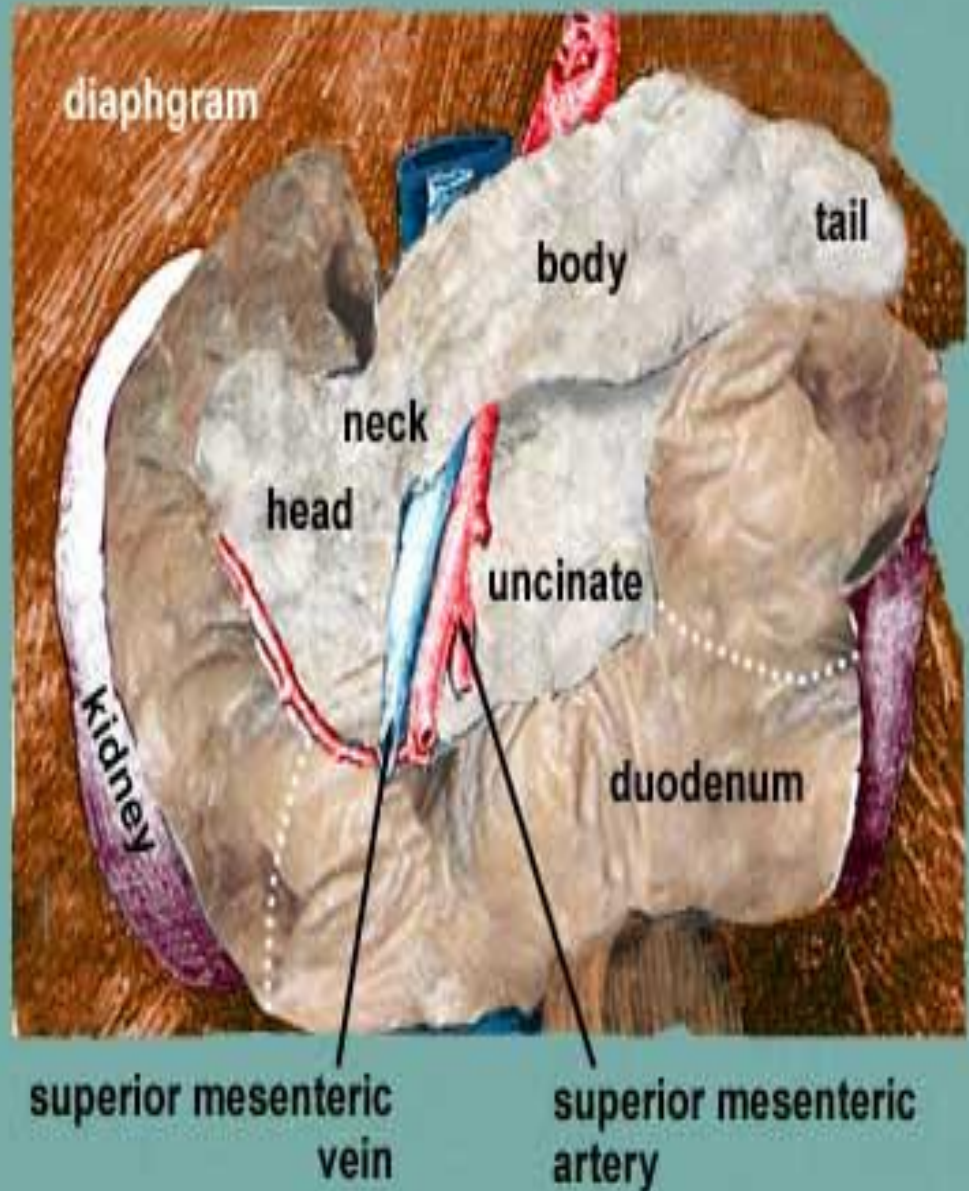


# The head

- It is disc shaped
- lies within the concavity of the duodenum
- A part of the head extends to the left behind the superior mesenteric vessels and is called the **Uncinate process.**

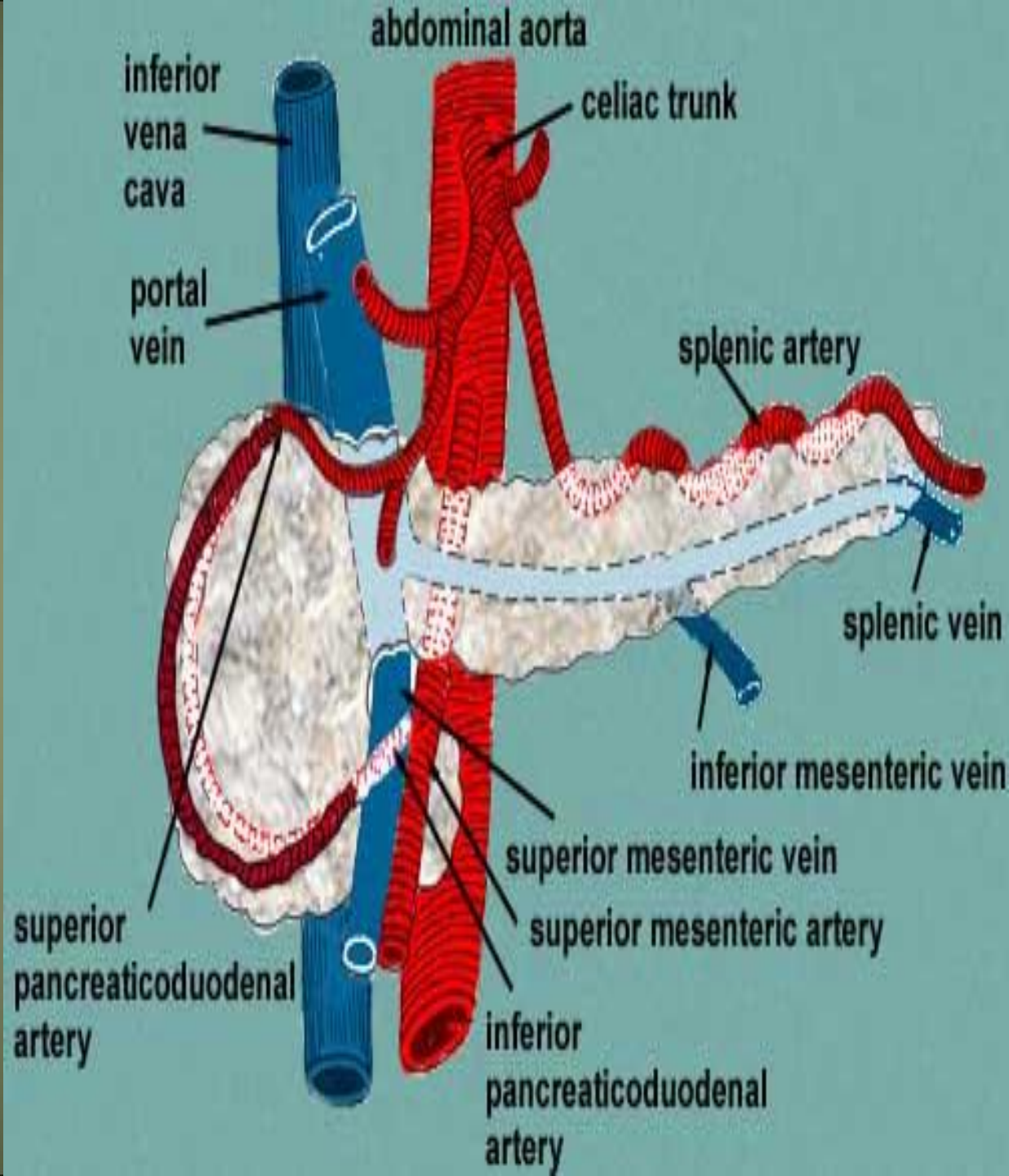
Common bile duct crosses it

Cancer head of pancreas cause obstructive jaundice because it closes common bile duct



# The neck

- It is the constricted portion of the pancreas
- connects the head to the body.
- It lies in front of the beginning of **the portal vein** the origin of the



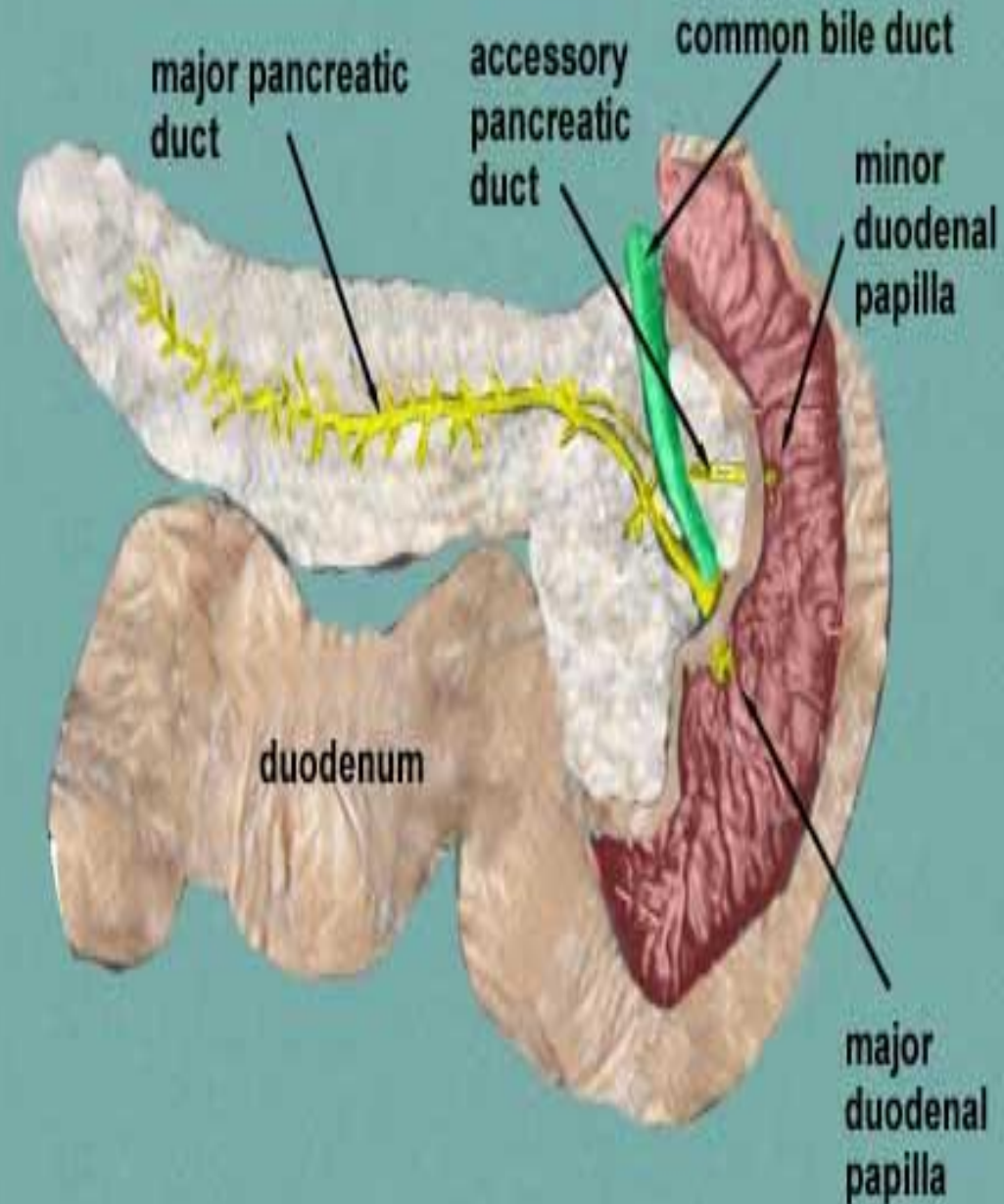
# The body

- Runs upward and to the left across the midline
- It is somewhat triangular in cross section.

If you take a cross section you will see three borders upper border ( on the splenic artery) , anterior border ( came to it the mesocolon or attached at it ) posterior ( related to posterior abdominal wall).

3 surfaces

- 1- anterior ( in the stomach bed)
- 2- posterior ( attached to posterior abdominal wall )
- 3- inferior ( related with the greater sac of peritoneum)



# Body of pancreas...cont

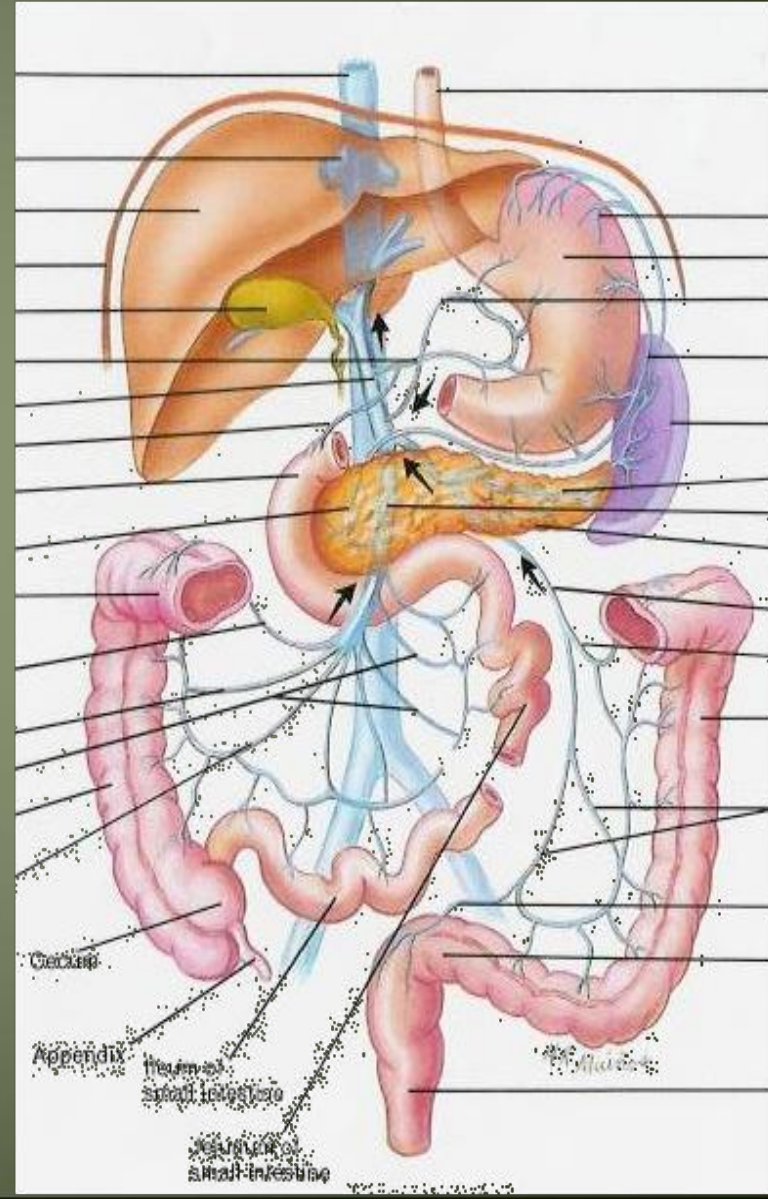
- Three surfaces: **anterior, posterior, and inferior.**
- Three borders: **ant ,post & inf**

## The anterior surface

1- Covered by peritoneum of post. Wall of lesser sac

2- **Tuber omental :**

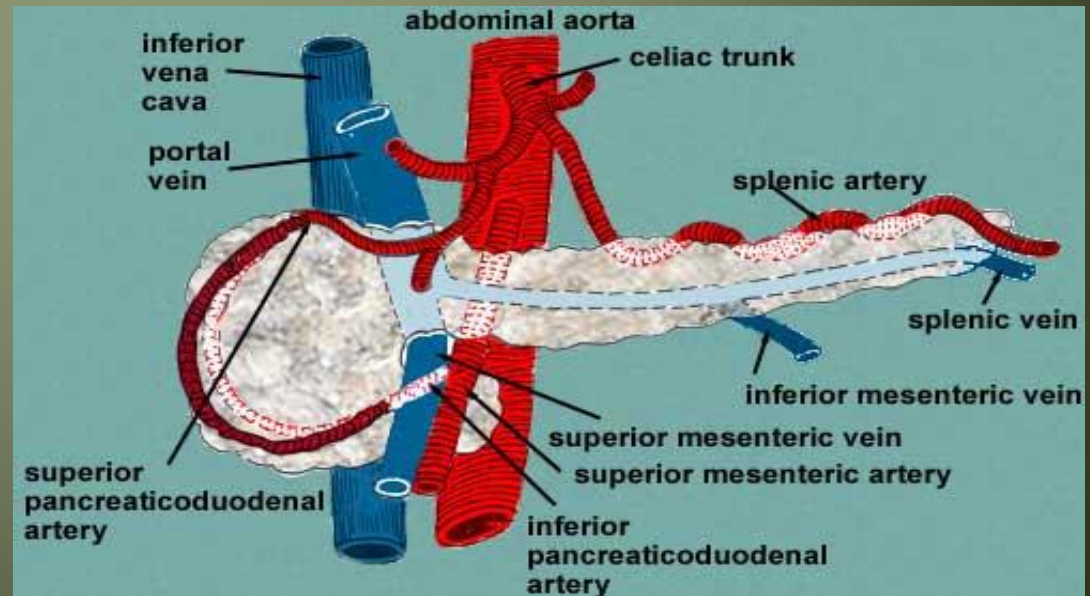
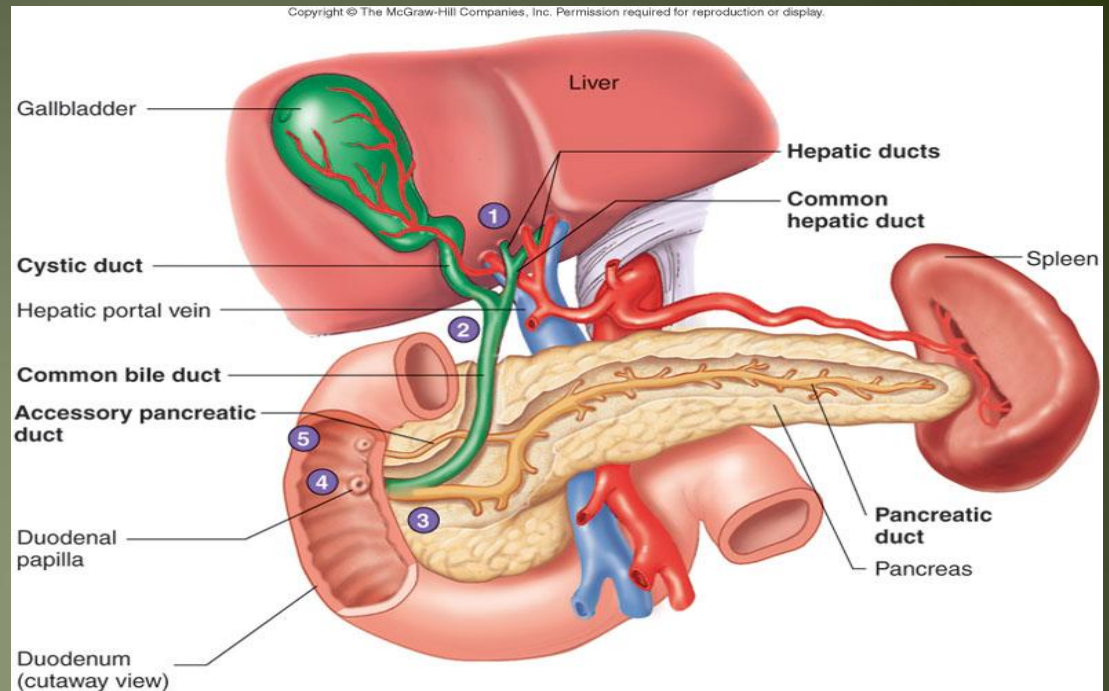
*where the ant. surface of pancreas join the neck*



## Body of pancreas...cont

### The posterior surface

- devoid of peritoneum
- in contact with
  - 1- the aorta
  - 2- the splenic vein
  - 3- the left kidney and its vessels
  - 4- the left suprarenal gland
  - 5- the origin of the superior mesenteric artery
  - 6- and the crura of the diaphragm.



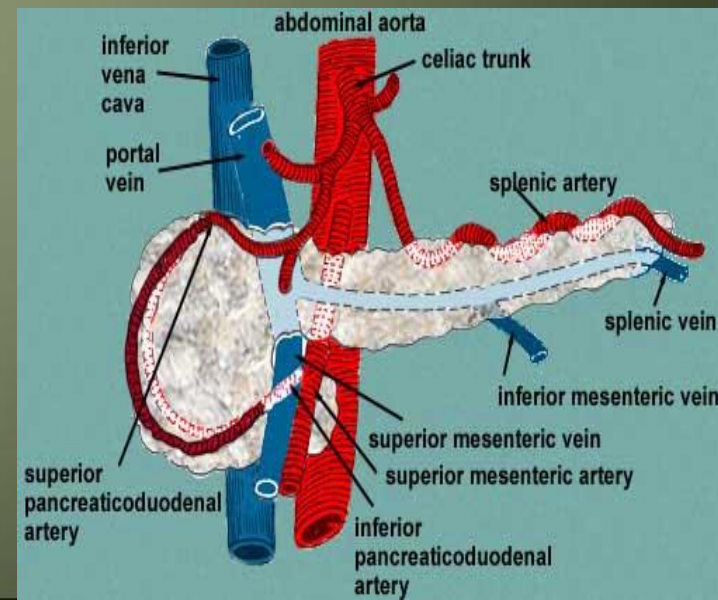
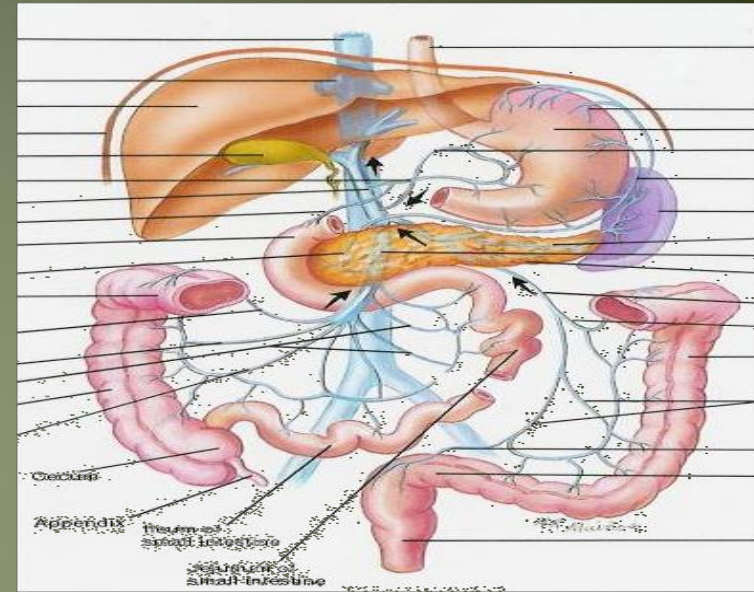
# Body of pancreas...cont

- **The inferior surface**

- Narrow on the right but broader on the left
- Covered by peritoneum of greater omentum
- lies upon the duodenojejunal flexure
- Some coils of the jejunum
- its left extremity rests on the left colic flexure

- **The superior border**

- Blunt and flat to the right;
- Narrow and sharp to the left near the tail
- It commences on the right in the omental tuberosity
- In relation with
  - 1- The celiac artery
  - 2- Hepatic artery
  - 3- The splenic artery runs toward the left in a groove along this border.



# Body of pancreas...cont

## The anterior border

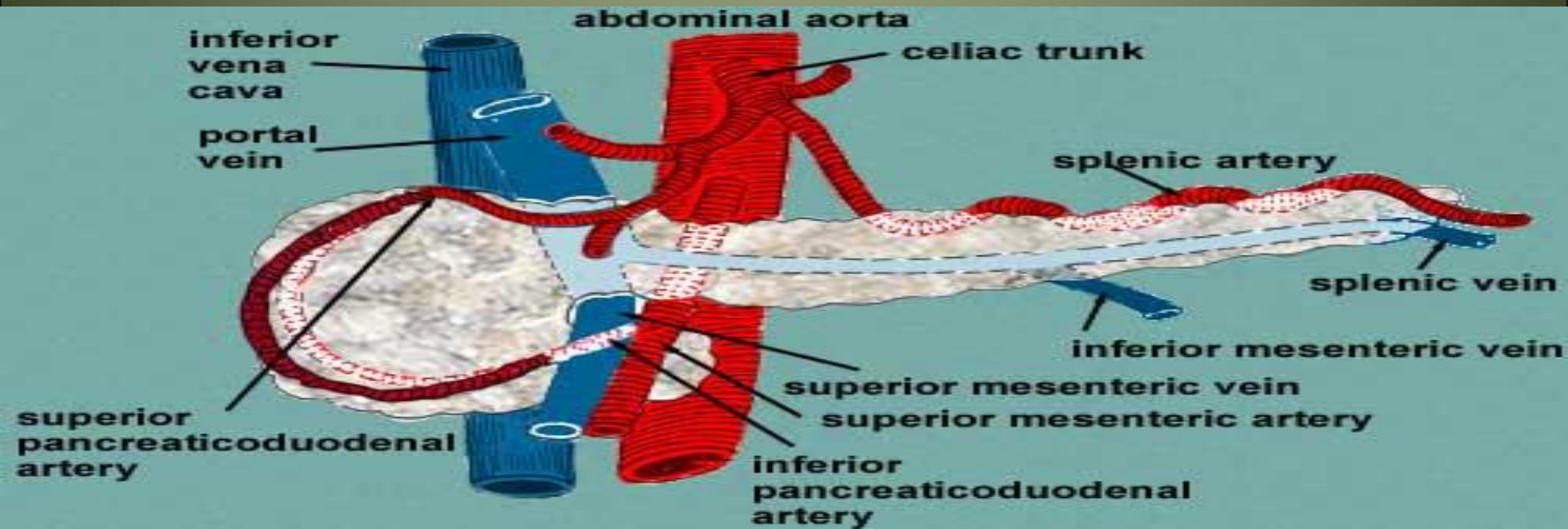
- separates the anterior surface from the inferior surface
- along this border the two layers of the transverse mesocolon diverge from one another; one passing upward over the anterior surface, the other backward over the inferior surface.



# Body of pancreas

## The inferior border

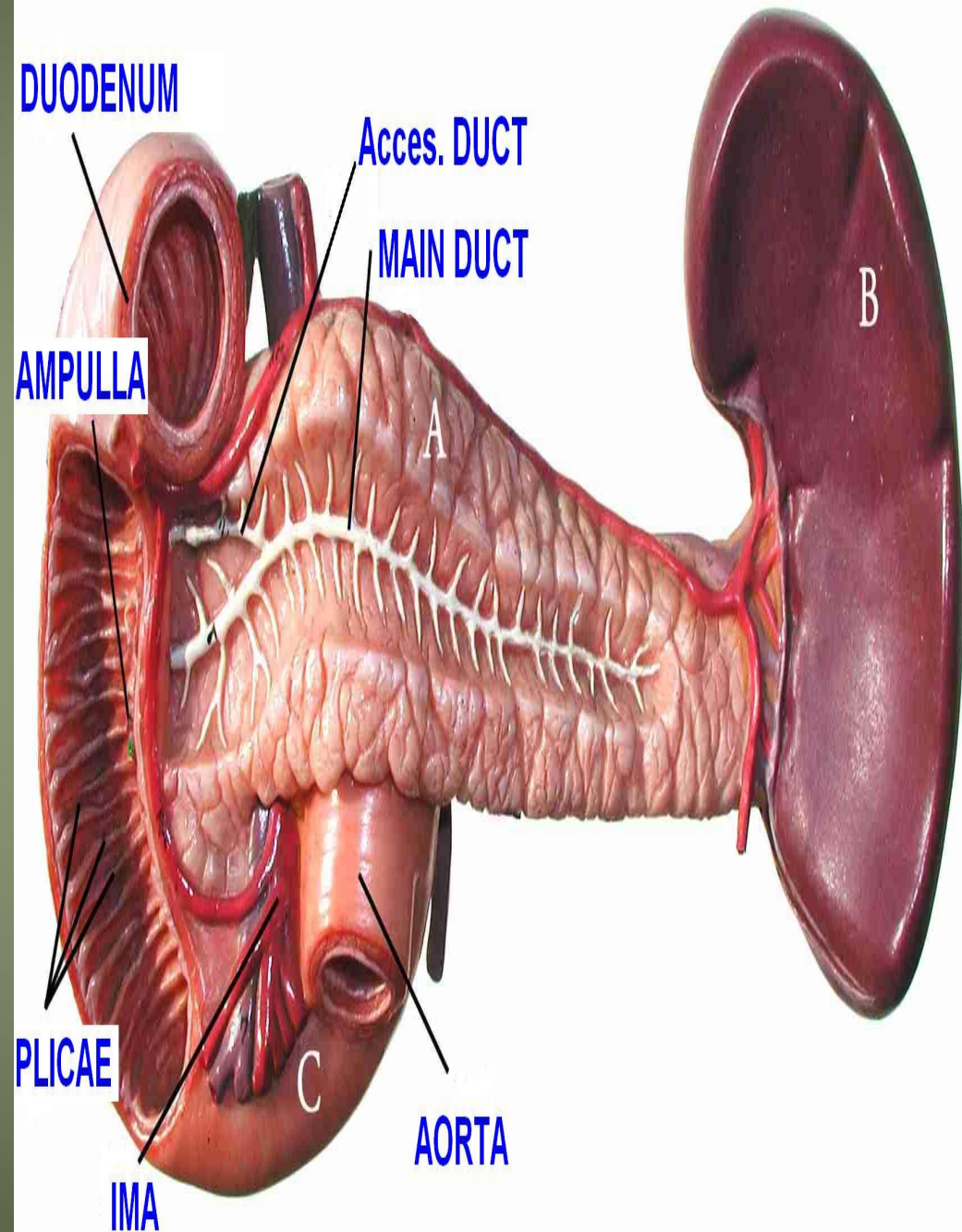
- separates the posterior from the inferior surface
- the superior mesenteric vessels emerge under its right extremity.



# The Tail

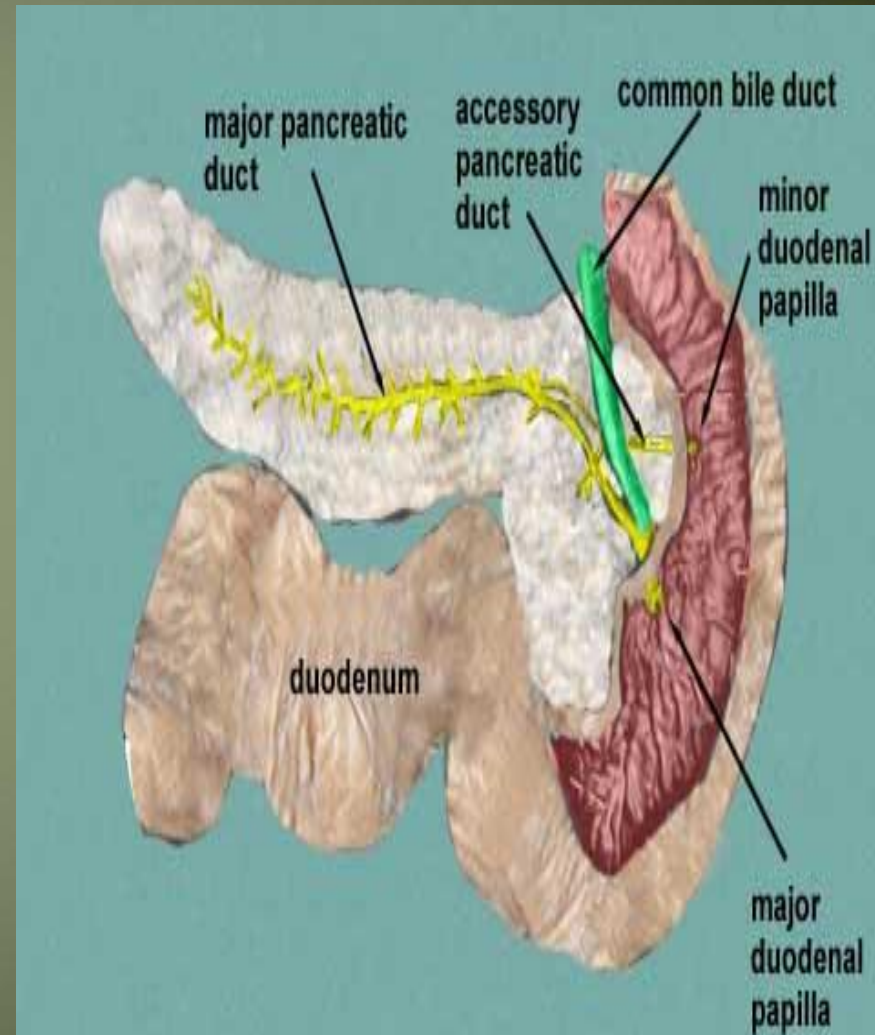
Endocrine part mainly

- Passes forward in the **splenicorenal** ligament and comes in contact with the hilum of the spleen



# Pancreatic ducts

- **The main duct**
  - Begins in the tail and runs the length of the gland
  - Receiving numerous tributaries on the way .
  - It opens into the second part of the duodenum at about its middle with the bile duct on the **major duodenal papilla**
- **Accessory duct**
  - When present, drains the upper part of the head
  - Then opens into the duodenum a short distance above the main duct on the minor duodenal papilla .
  - The accessory duct frequently communicates with the main duct



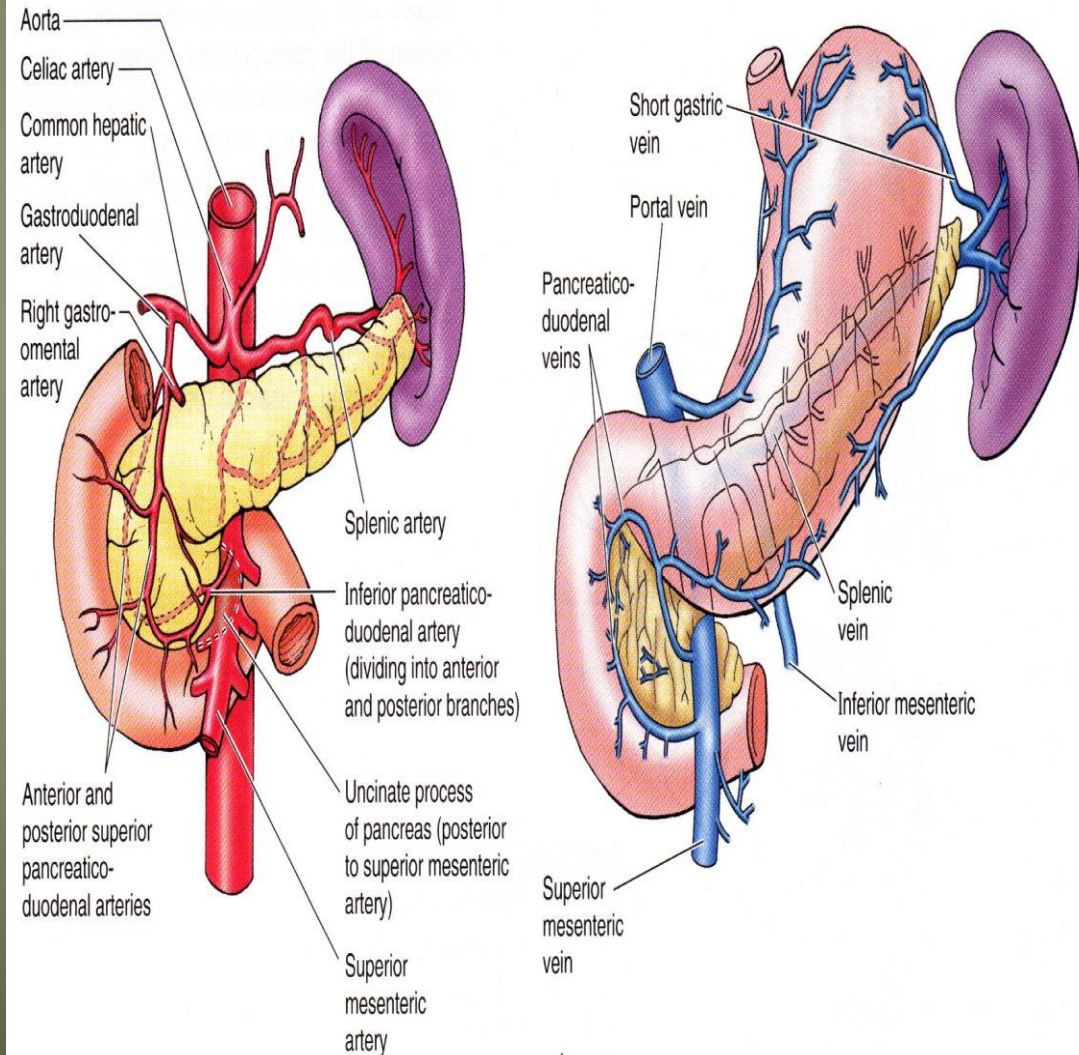
# Blood Supply of pancreas

## Arteries

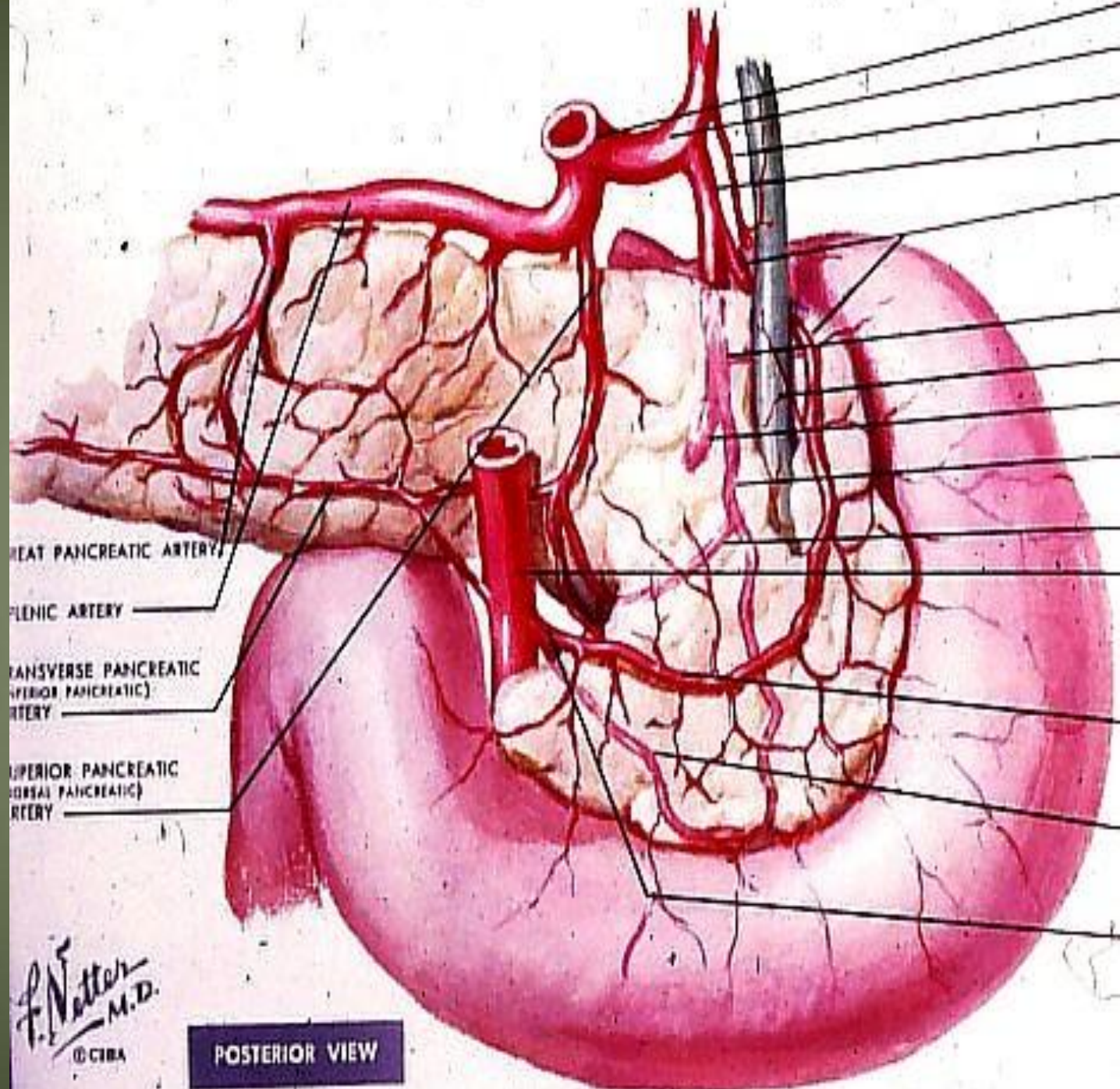
- The splenic.a
  - The superior pancreaticoduodenal .a
  - Inferior pancreaticoduodenal arteries.a
- From superior mesenteric artery

## Veins

- The corresponding veins drain into the portal system.

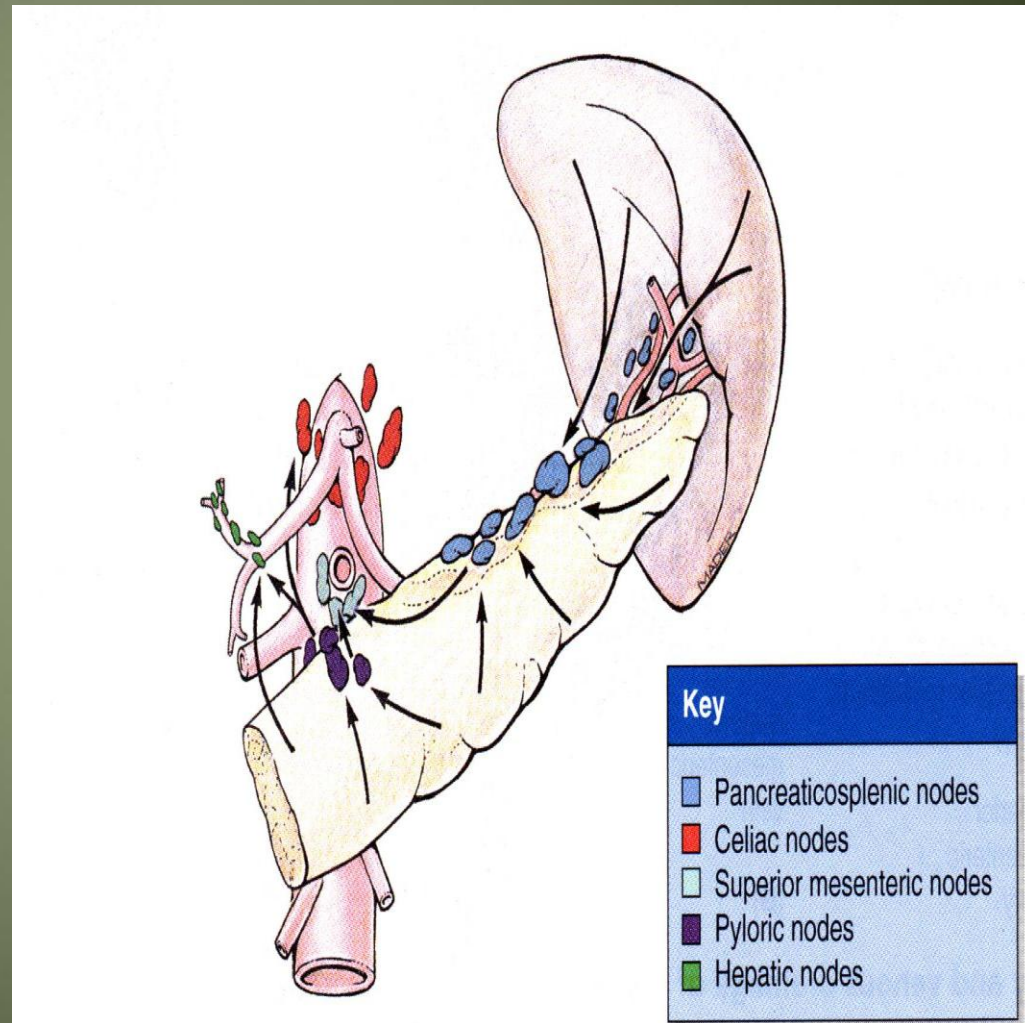


pancreaticoduodenal artery and its branches



# Lymphatic drainage of pancreas

- Lymph nodes are situated along the arteries that supply the gland.
- The efferent vessels ultimately drain into the **celiac** and **superior mesenteric lymph nodes**.



# Nerve supply

From celiac ganglia

- Sympathetic and parasympathetic chain
- Parasympathetic = vagus nerve

# Congenital defects of pancreas

- **Annular Pancreas** (pancreas encircles duodenum) (rare)
- **Ectopic Pancreas** (very common)= Outside the gastrointestinal tract



# Clinical notes

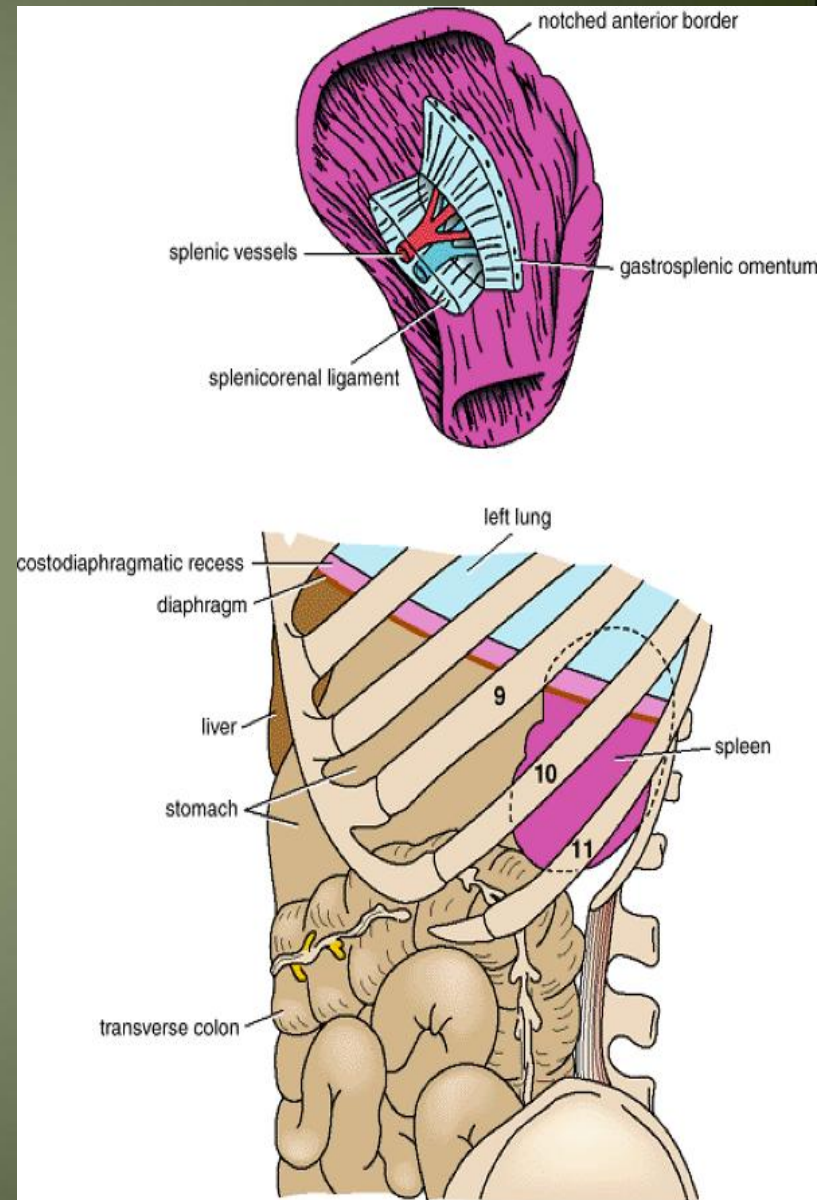
- Cancer head of pancreas → Obstruction jaundices
- Cancer body of pancreas → pressure → I.V.C & portal vein
- Acute pancreatitis= inflammation of pancreas

*Spleen*

# Spleen

## Location and Description

- it is reddish & oval shaped
- the largest single mass of lymphoid tissue in the body.
- and
- has a notched anterior border.
- **location:**
  - Lt hypochondrium
  - It lies just beneath the left half of the diaphragm
  - under the 9th, 10th, and 11th ribs.
  - Its long axis parallel to the 10th rib
  - Medial end is 4 cm away from mid line post
  - Lat.end is in left mid axillary line



# Spleen

- **Peritoneum**

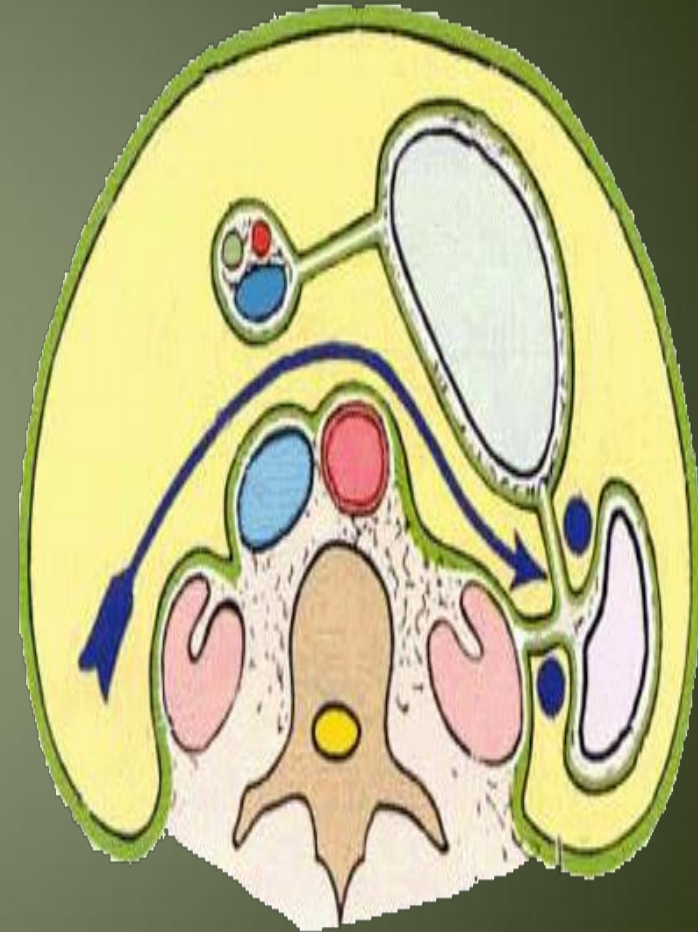
- The spleen is completely covered with peritoneum → **intraperitoneal** organ

- **Two ligaments**

- 1- **the gastrosplenic omentum**

(ligament) → between the spleen & the greater curvature of the stomach (carrying the short gastric and left gastroepiploic vessels)

- 2- **splenicorenal ligament** → between spleen & kidney (carrying the splenic vessels and the tail of the pancreas).



# Spleen.....cont

## Size

- 1 inch thick
- 3 inch broad
- 5 inch long

## Weight

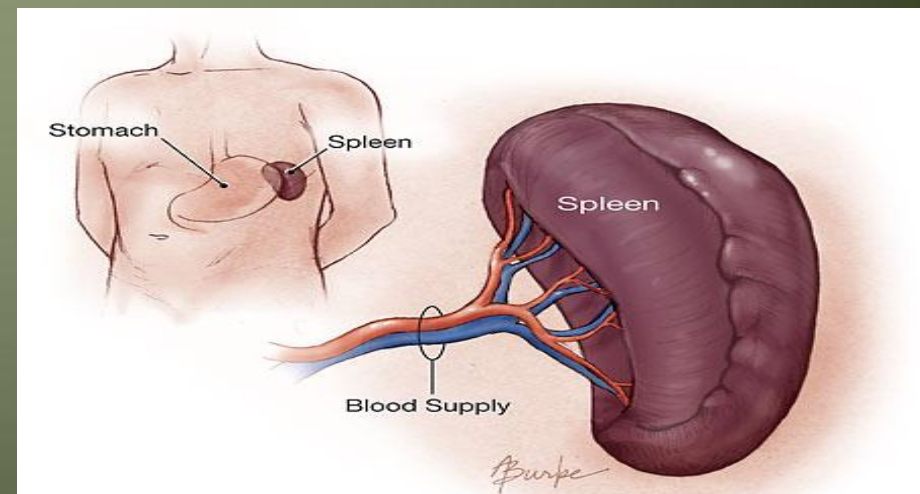
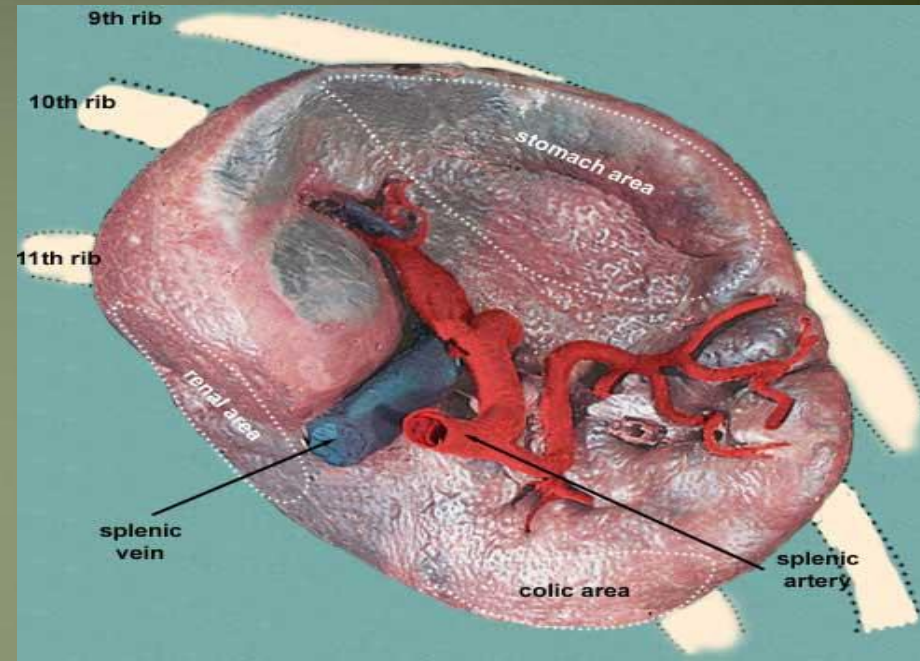
- 7 ounce

## Shape → variable

- 2 ends
- 2 borders
- 2 surfaces

## Notched

- Due to lobulation in embryo



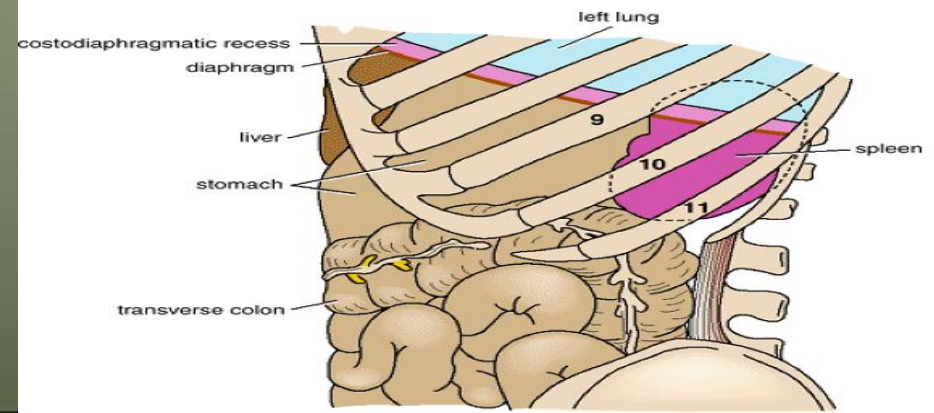
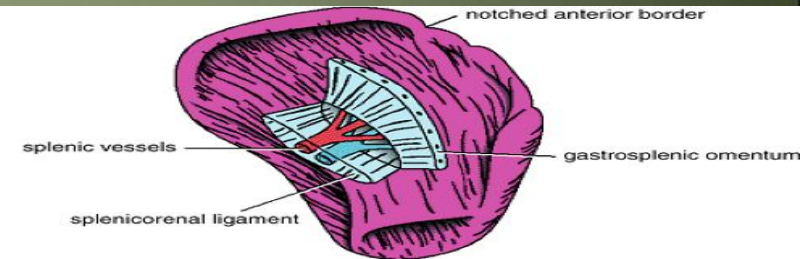
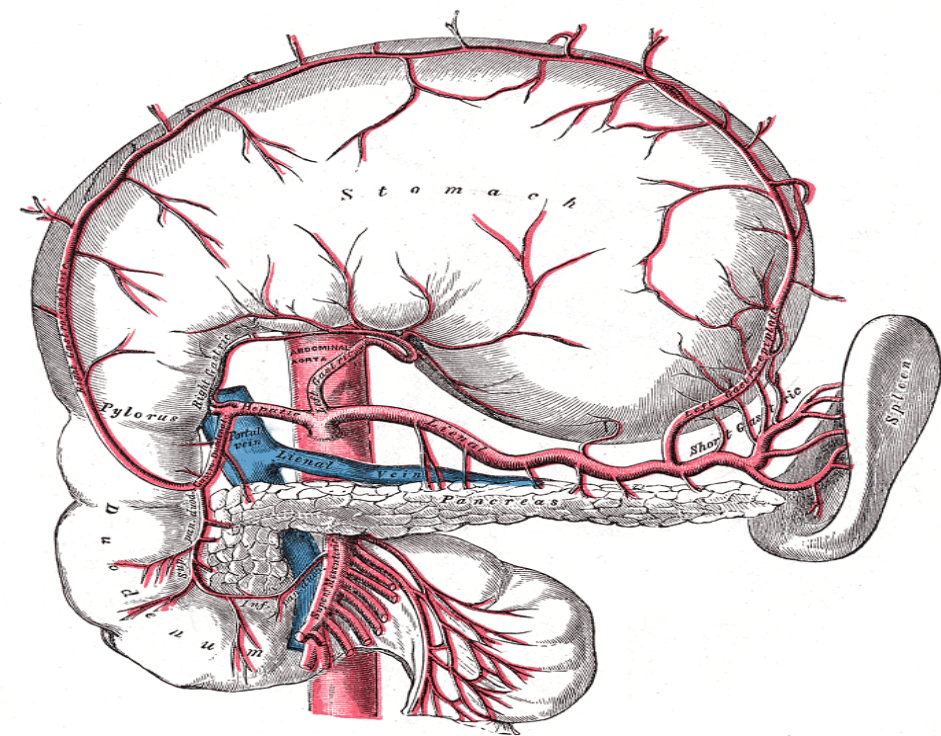
# Surfaces of spleen

## 2 surfaces

- Diaphragmatic surface
- Visceral surface

## 1- Diaphragmatic surface

- Has Post- lat. relation
- Convex
- Smooth
- Diaphragm separates it from
  - Pleura & lung
  - Ribs 9,10 ,11



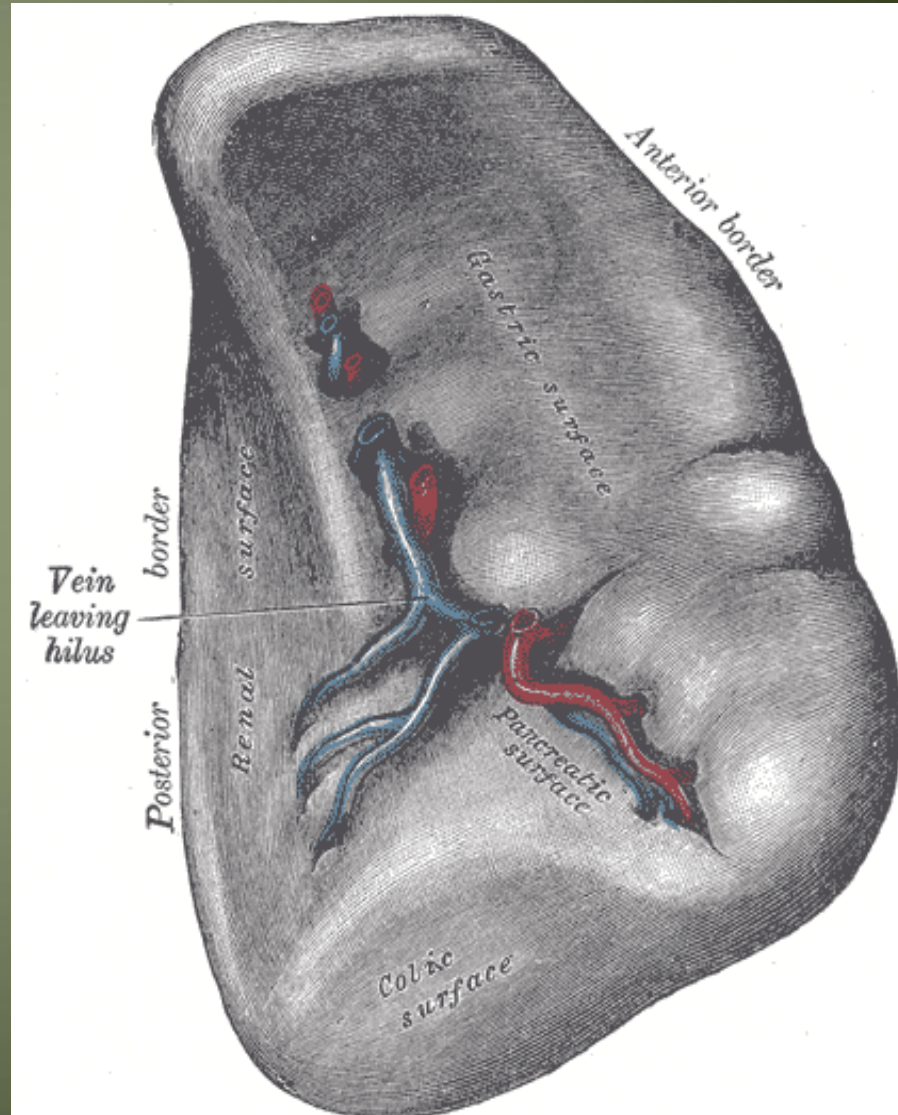
# Spleen.....cont

## 2- Visceral surface

- Has Ant- med. Relations
- It is divided by a ridge into
  - 1- An anterior or gastric
  - 2- A posterior or renal portion.

## Lower extremity has

- Colic surface
- Pancreatic surface



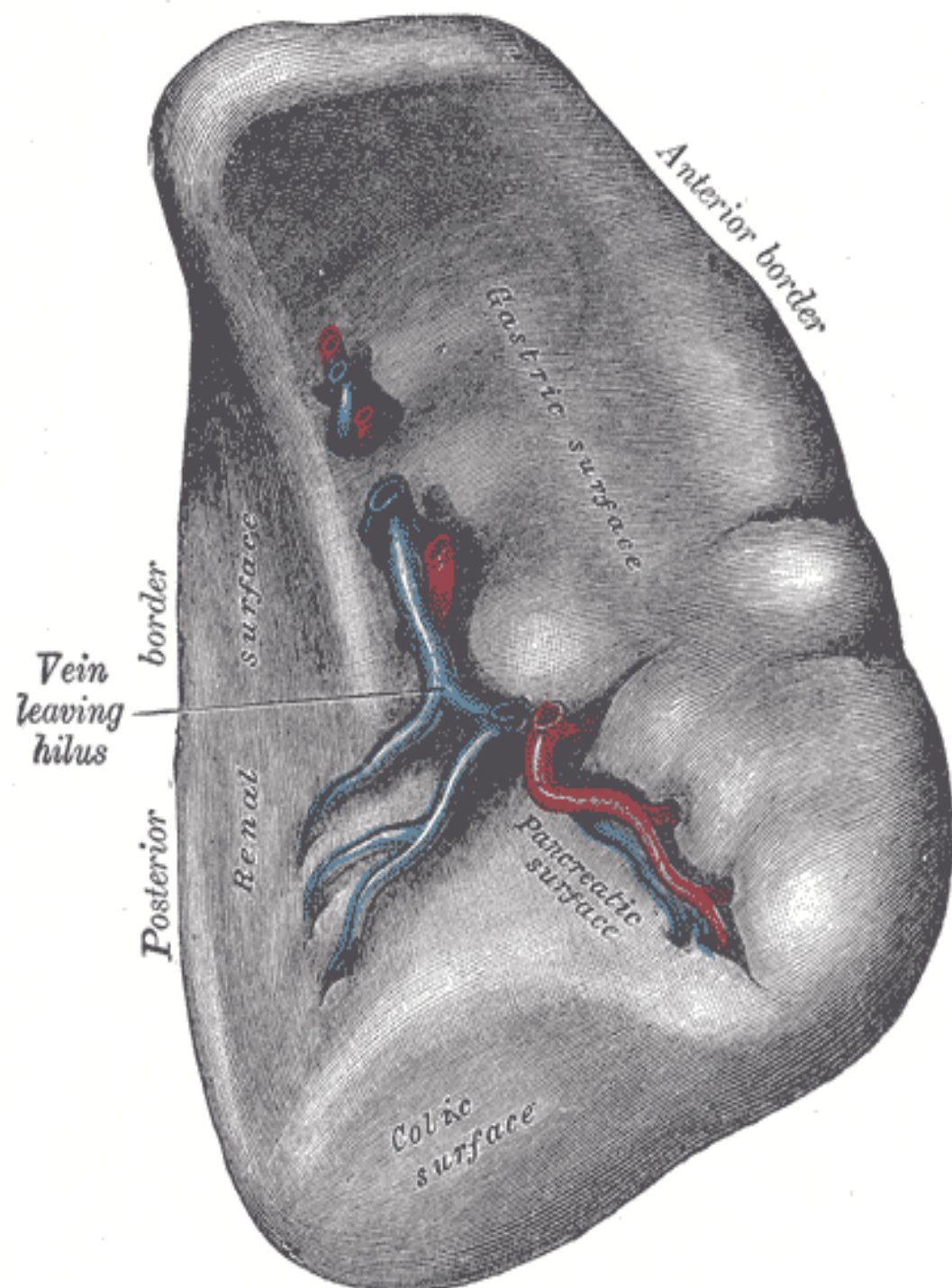
# Spleen.....cont

## Gastric surface

- Extends forward, upward, and medialward
- Broad and concave
- Related to stomach

## Renal surface

- Directed medialward and downward.
- It is somewhat flattened
- Related to Lt.kidney





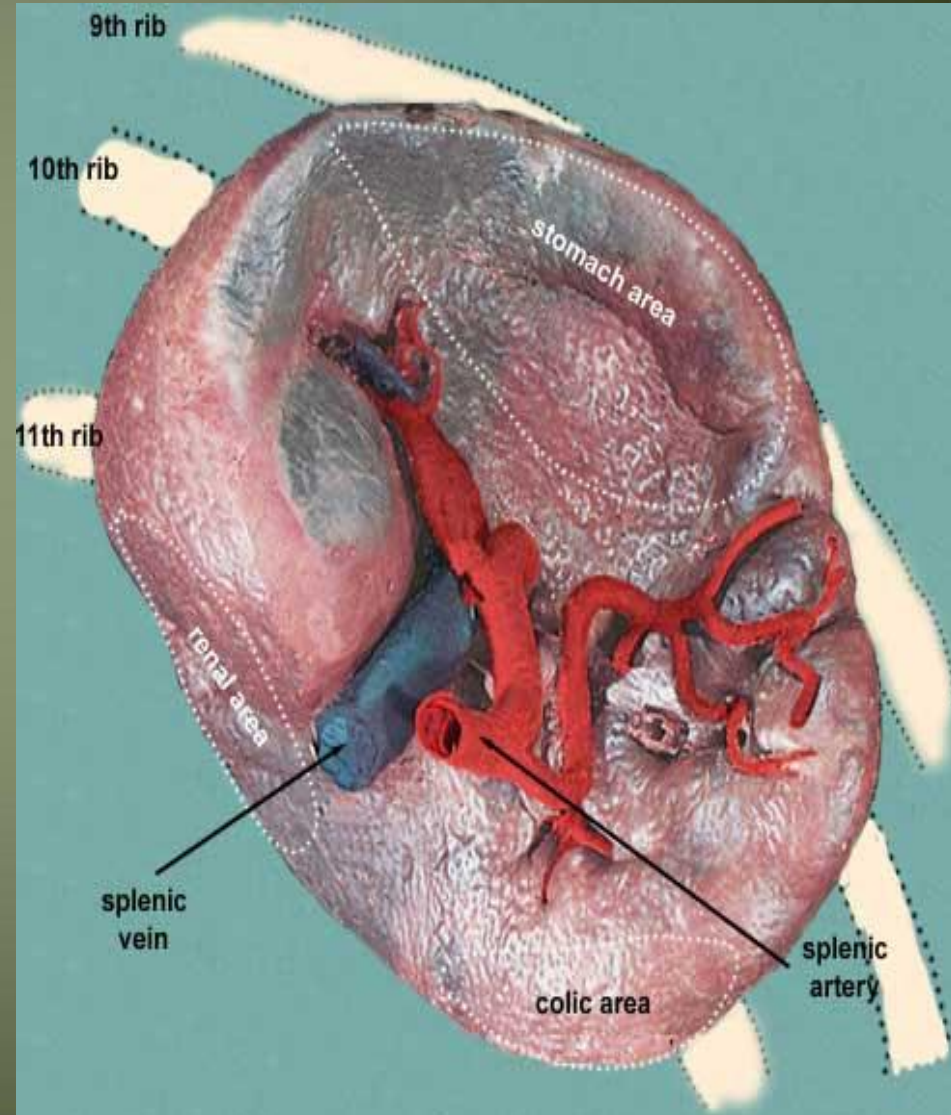
# Spleen.....cont

## The lower extremity or **colic surface**

- It is flat
- Triangular in shape
- Rests upon the left flexure of the colon and the phrenicocolic ligament, and is generally in contact with the tail of the pancreas(**pancreatic surface**)

# Spleen...cont

- Hilum of spleen
  - Splenic . A → ant
  - Splenic . v → post
  - Tail of pancreas

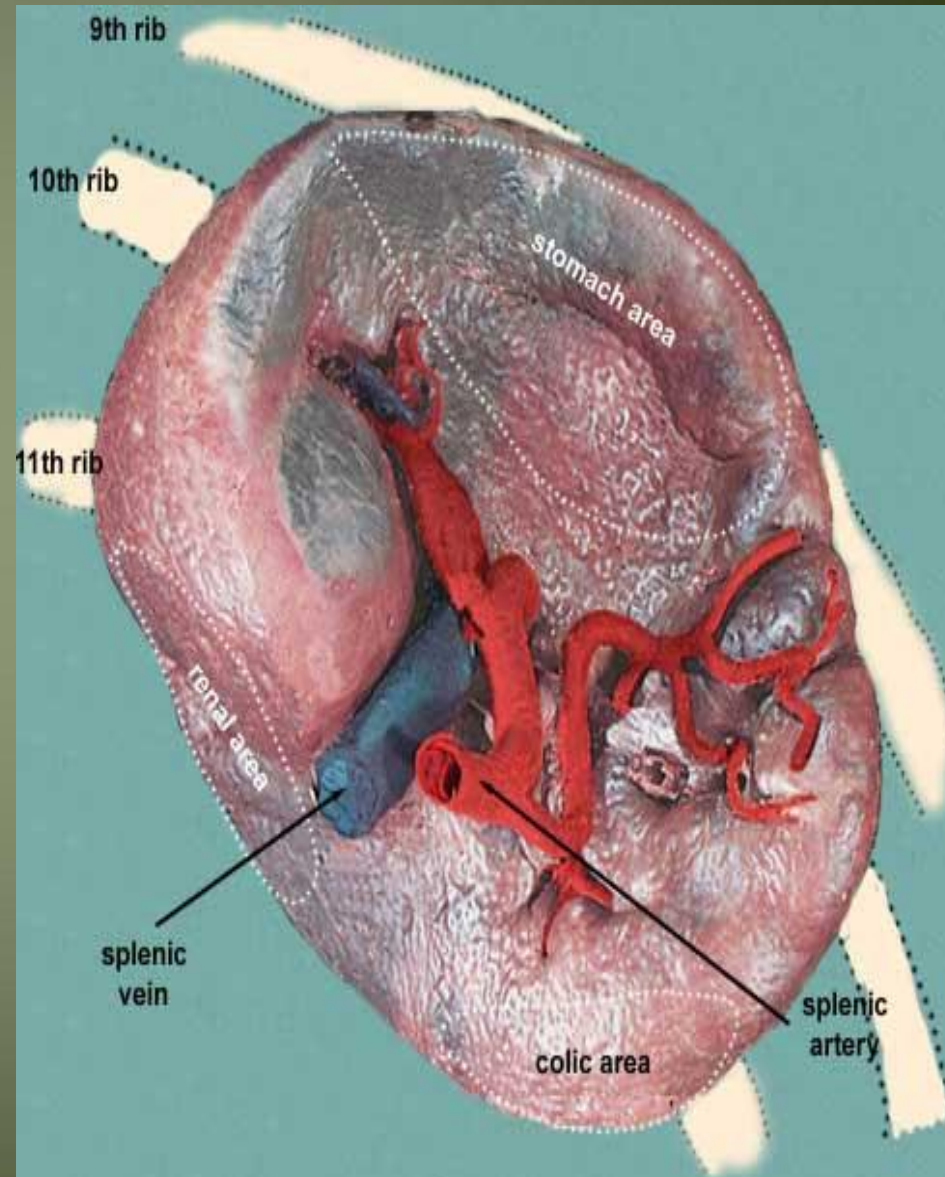


# Spleen..cont

- Borders of spleen

- 1- sup. Border

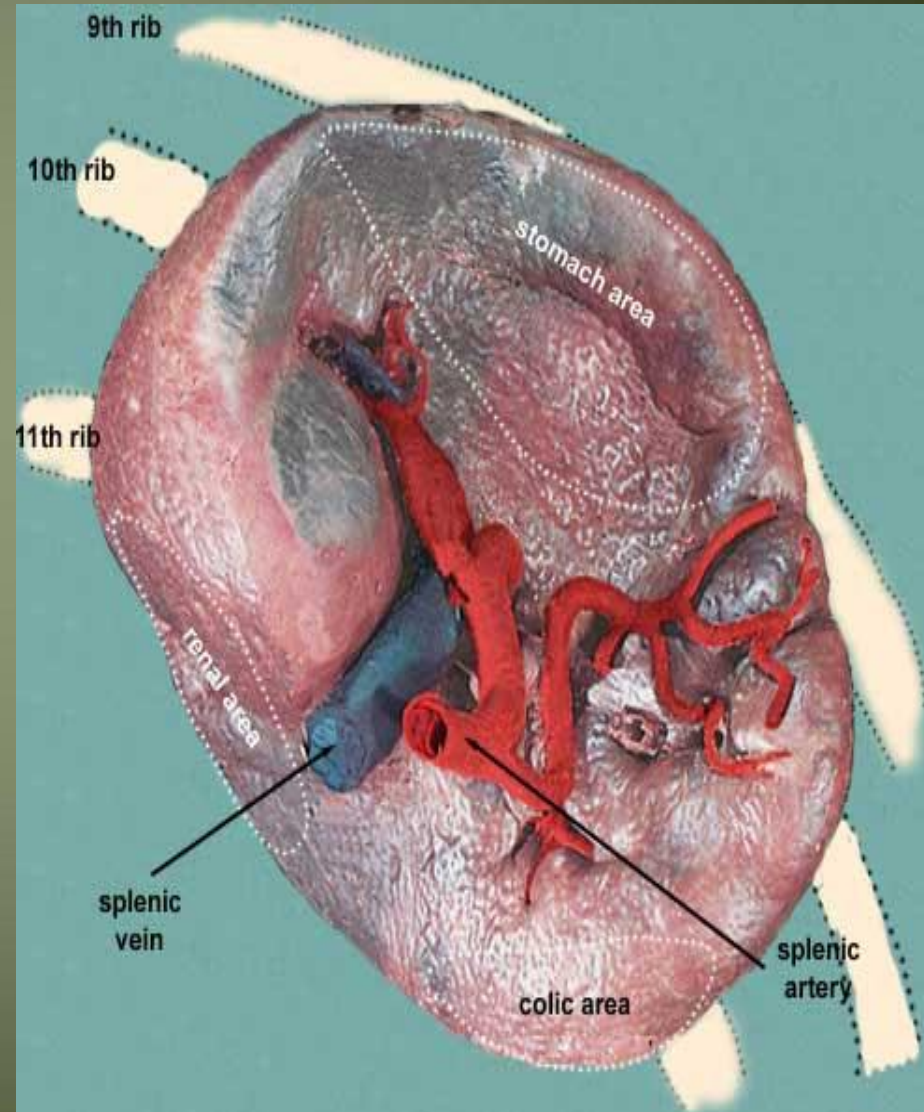
- It is free
- Sharp
- Thin
- Often notched (sup. notch), especially below
- It separates the diaphragmatic surface from the gastric surface



# Spleen.....cont

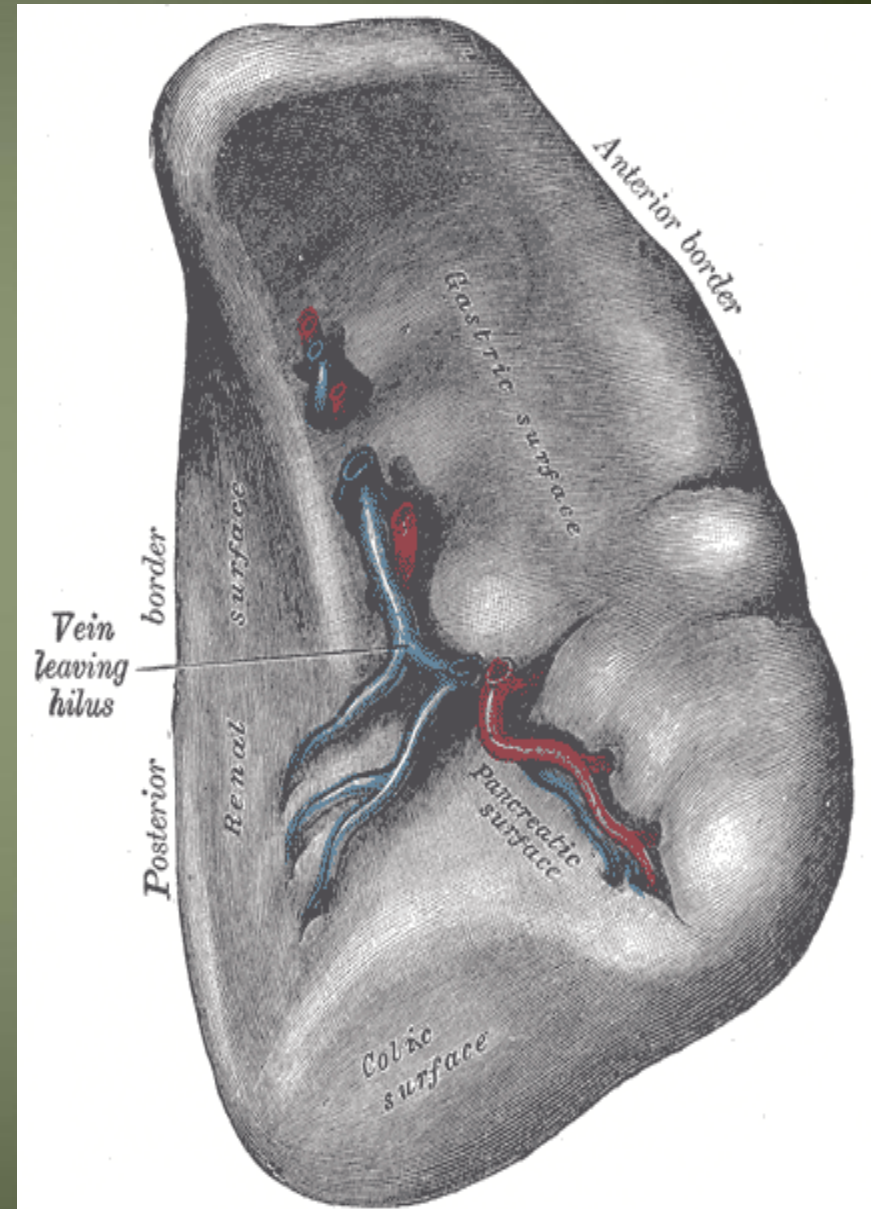
## 2- inferior border

- More rounded and blunter
- Separates the renal from the diaphragmatic surface;
- It corresponds to the lower border of the eleventh rib
- lies between the diaphragm and left kidney. The



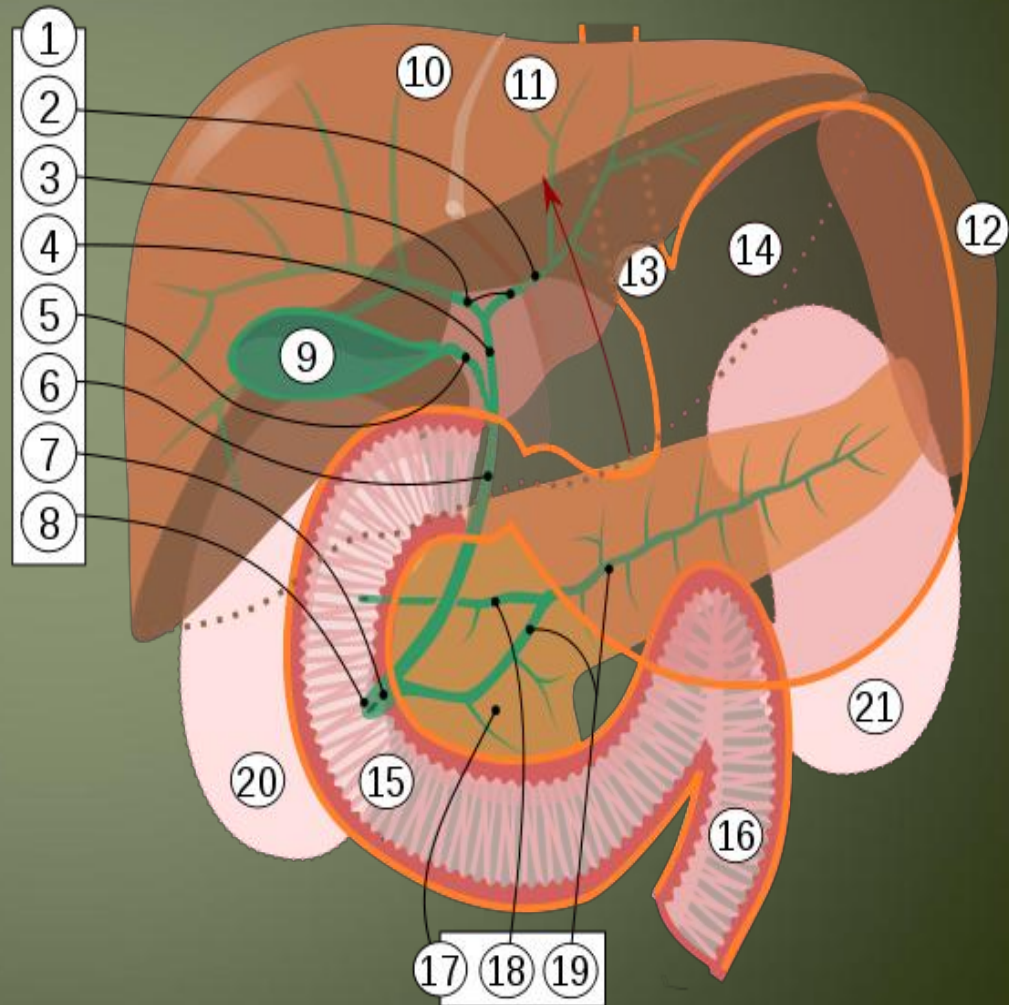
# Spleen...cont

- Intermediate margin is the ridge which separates the renal and gastric surfaces.
- Internal border separates the diaphragmatic from the colic surface.



# Spleen...cont

- 2 Ends
- **Med.end** → sup & back
- 4cm away from mid line post
- **Lat.end** → in left mid axillary line



# Blood supply

- The large splenic artery is the largest branch of the celiac artery.
- It has a tortuous course
- It runs along the upper border of the pancreas
- The splenic artery then divides into about six branches, which enter the spleen at the hilum

# Blood supply of spleen

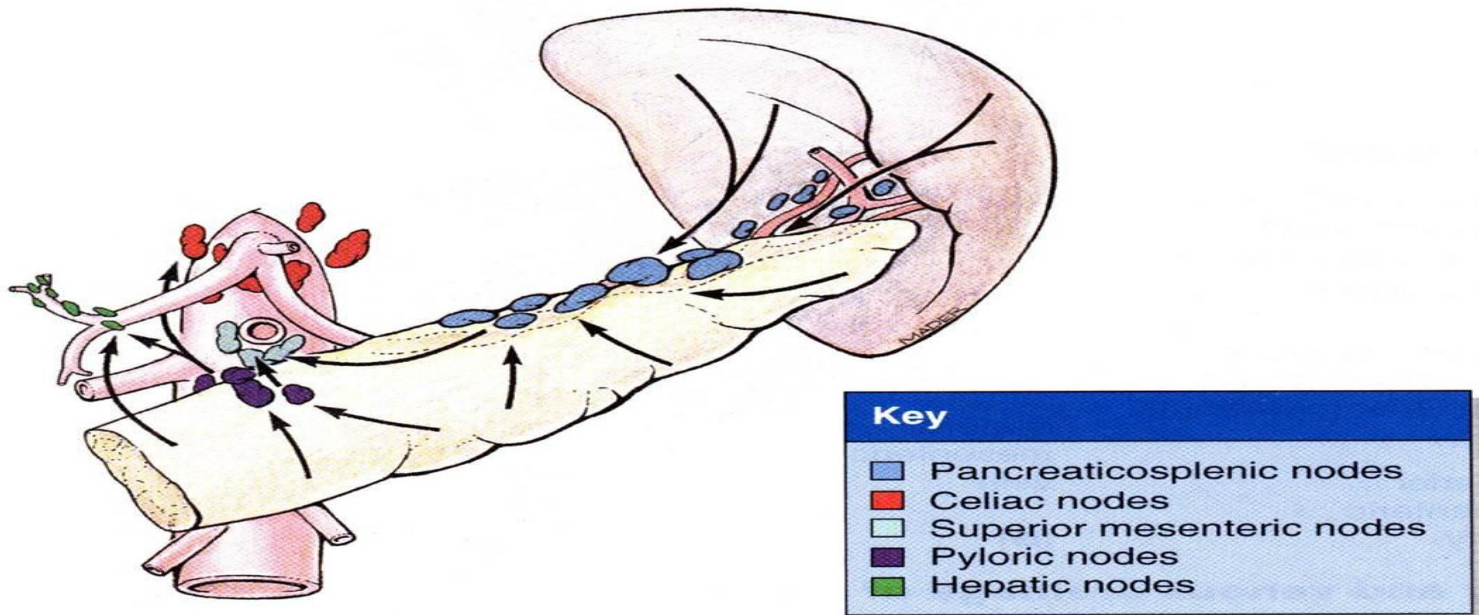
- Veins

- The splenic vein leaves the hilum and runs behind the tail and the body of the pancreas.
- Behind the neck of the pancreas, the splenic vein joins the superior mesenteric vein to form **the portal vein.**



# Lymphatic Drainage of spleen

- The lymph vessels emerge from the hilum and pass through a few lymph nodes along the course of the splenic artery and then drain into the celiac nodes.



# Nerve Supply of spleen

- The nerves accompany the splenic artery and are derived from the celiac plexus.

Thank you