Module: Gastro-Intestinal Tract (GIT)

Semester: 4

Session: 6 **L 2**

Lecture Duration: 1h.

Lecture Title:

Liver ,biliary tree and pancreas

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ore detailed instructions, any question, or you have a case you need help in, please post to the group of session

Objectives:

11. Describe the gross anatomy of liver ,gall bladder and pancreas and relate it to their respective functions
12. Outline relevant anatomical and physiological information that enables you to understand the symptoms associated with pancreatic and gall bladder diseases
13. Identify and describe the position of
    1. Falciform Ligament, lig - teres , coronary lig , Rt and LT triangular lig , and bare area of the liver
    2. Rt ,Lt , caudate and quadrate lobes of the liver
    3. Structures within porta hepatis
    4. Relations between liver and IVC
    5. Gall bladder and cystic duct
    6. Portal vein and its main tributaries
    7. Pancreas ,spleen and associated BV
14. Explain the importance of Helicobacter pylori in causing chronic gastritis and modifying gastric physiology

Functions of liver :

Lo11

Liver is a dual organ having both secretory and excretory functions.

- **Metabolic** activities necessary for homeostasis, nutrition and immune defence.
- **Defensive and detoxification functions**
- **Synthesis**
- **Secretion , excretion ,storage**
- **Heat production**
- **Hemopoietic function**
- **Hemolytic function**
- **Inactivation of hormones and drugs**

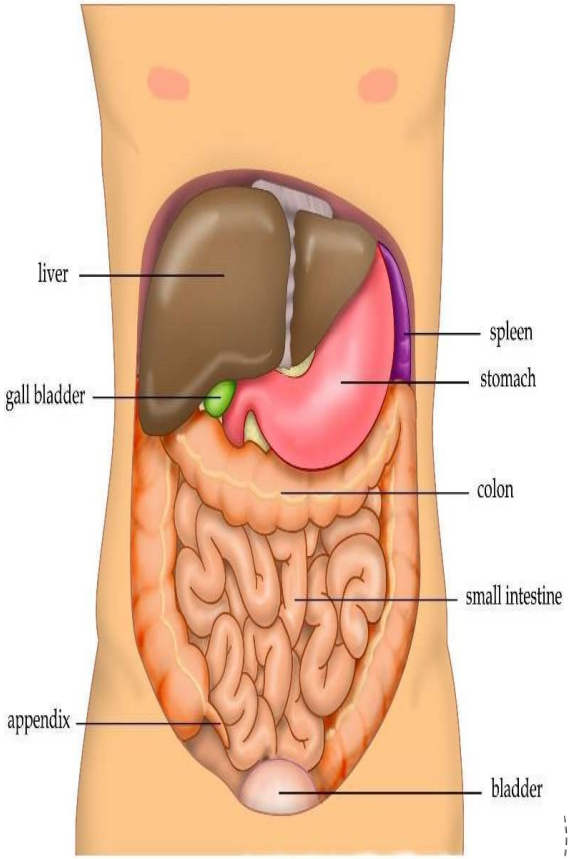
Anatomy of liver :

LO11

- It is the **largest** gland in the body, weighing about 1.5 kg in human.

- **It occupies most of the right hypochondrium and epigastrium frequently extend to to Lt hypochondrium**
- **Wadge shape structure**

- The liver **capsule** plays an important part in maintaining the integrity of its shape.
- **N:**
- **Once the capsule is lacerated, the liver tissue is easily parted and provides only limited support for surgical sutures.**
- N:
- These features, in combination with its exceptional vascular supply, make the liver prone to potentially lethal injuries if it is split open.



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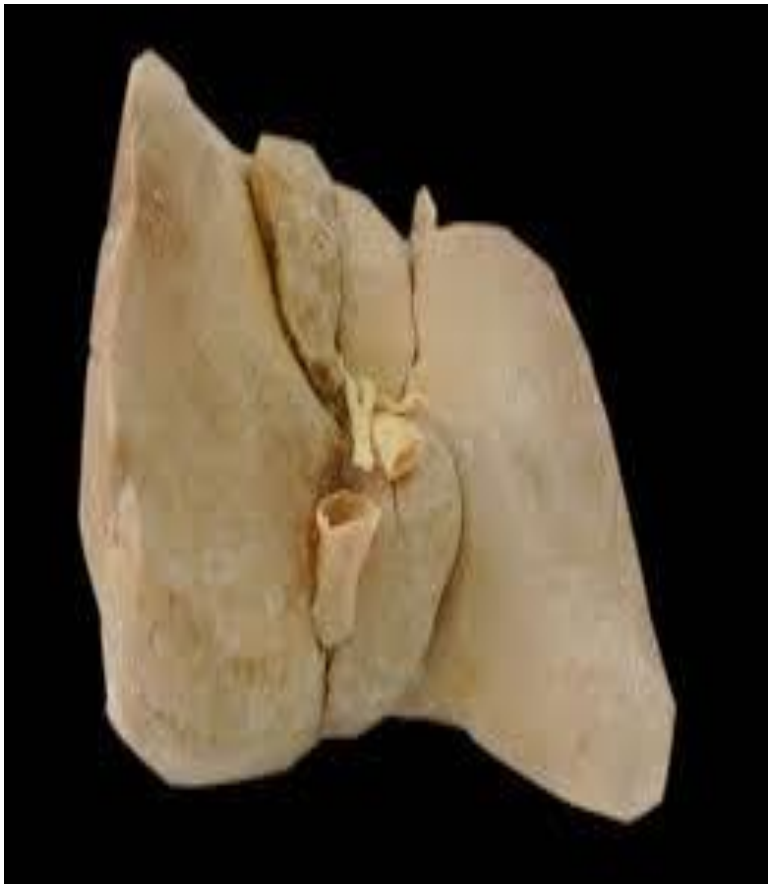
Liver



Lo11

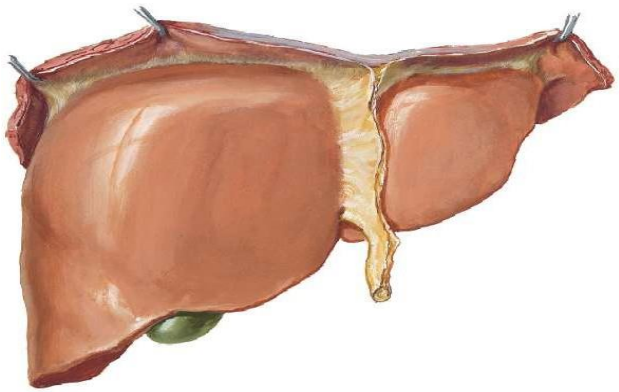
Liver

- It is composed largely of epithelial cells (hepatocytes), which are bathed in blood derived from the hepatic portal veins and hepatic arteries. Sinusoids

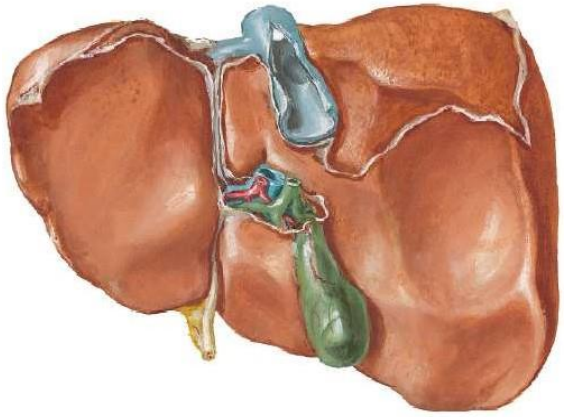
- Hepatocytes are also associated with an extensive system ofminute canals, which form the biliary system into which products are secreted

Surfaces :

Anterosuperior surface



Postero inferior surface



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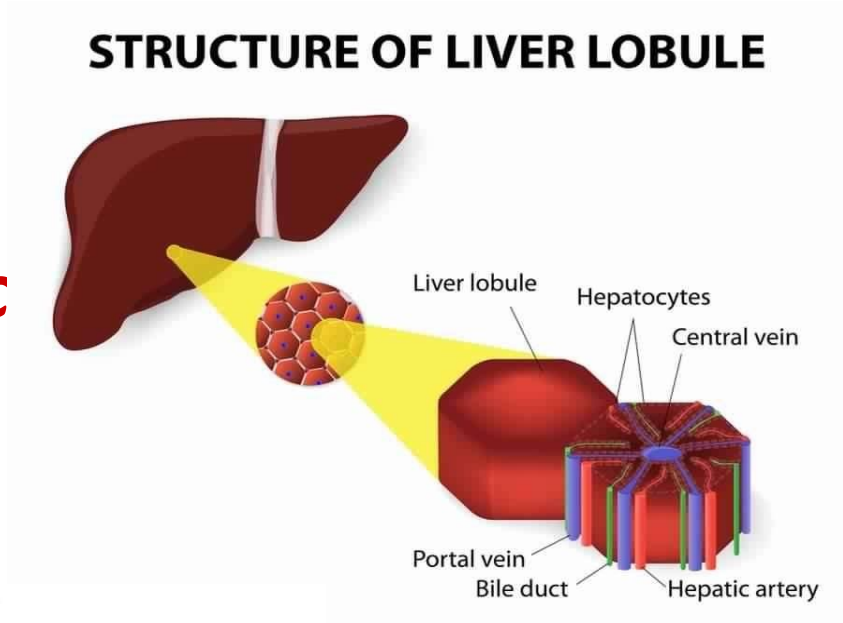
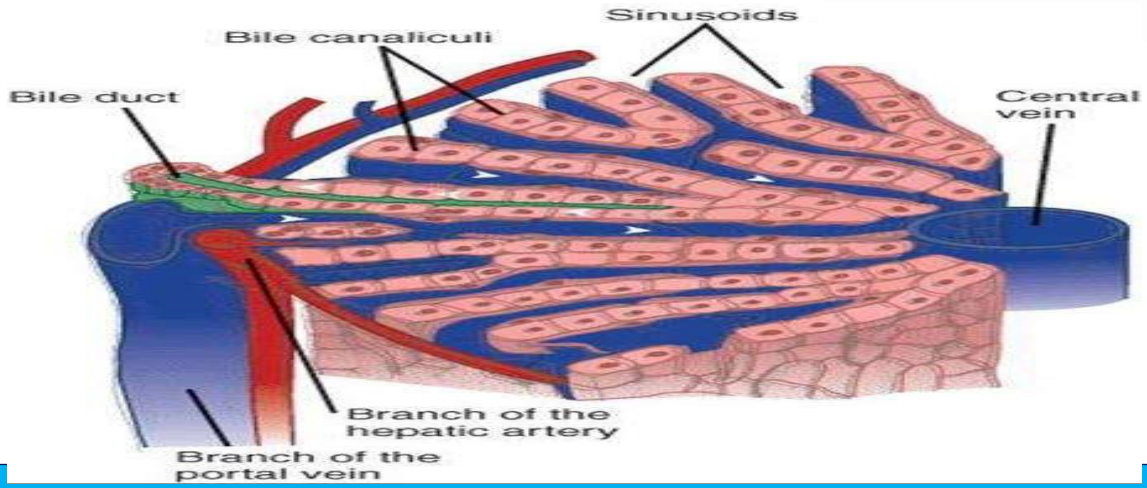
Structure of liver

1. *Hepatic Lobes*
2. *Hepatic Lobules*
3. *Hepatocytes and Hepatic Plates*
4. *Portal Triads*





Liver segments :

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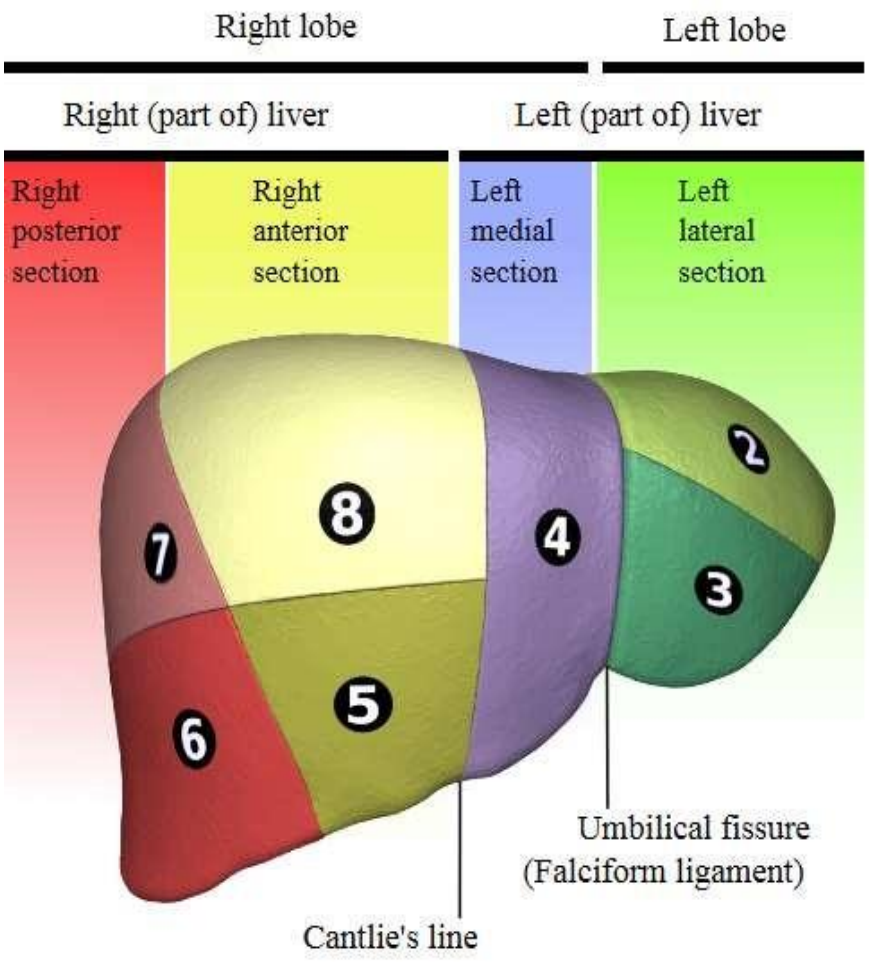
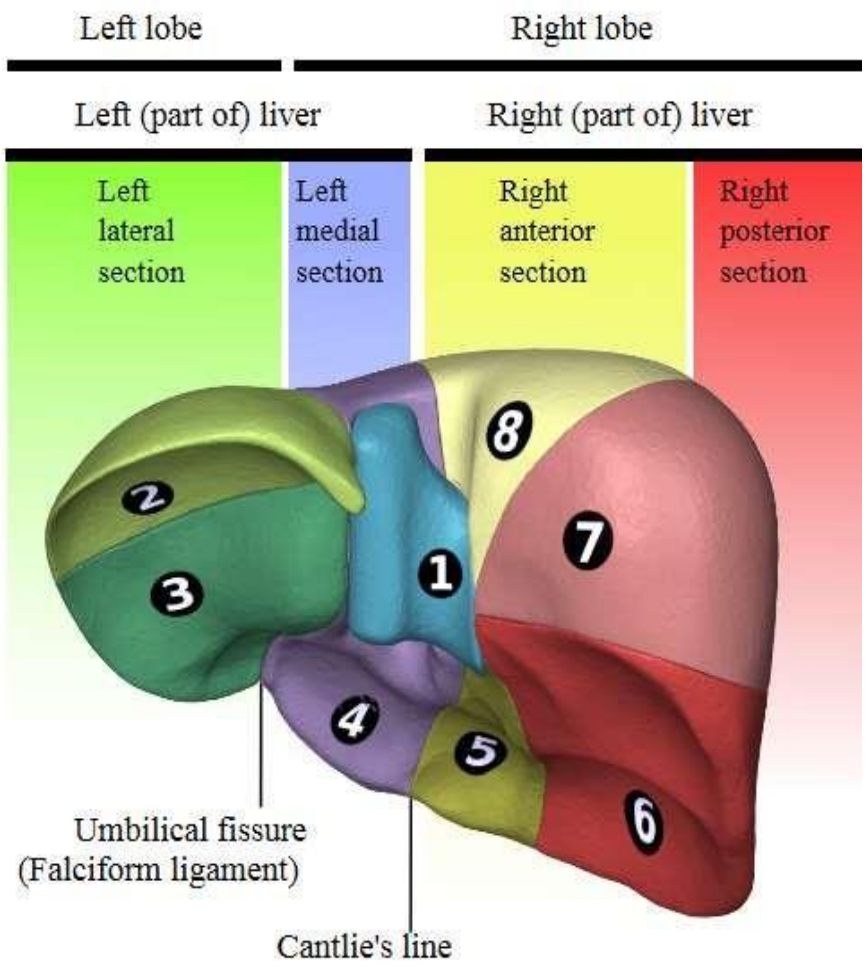


Anterior view

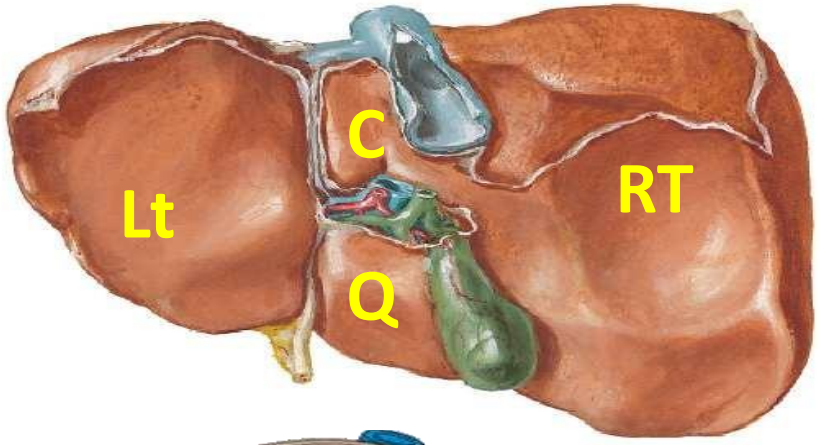


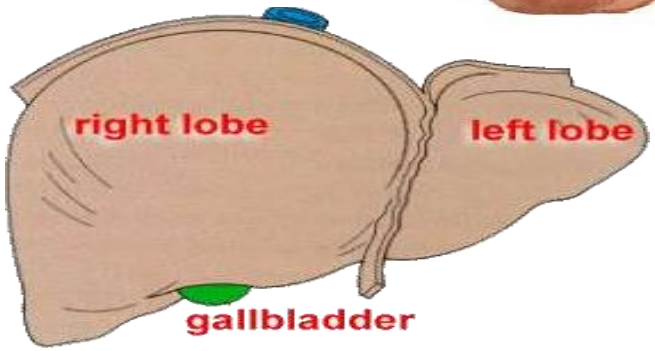
Posterior view

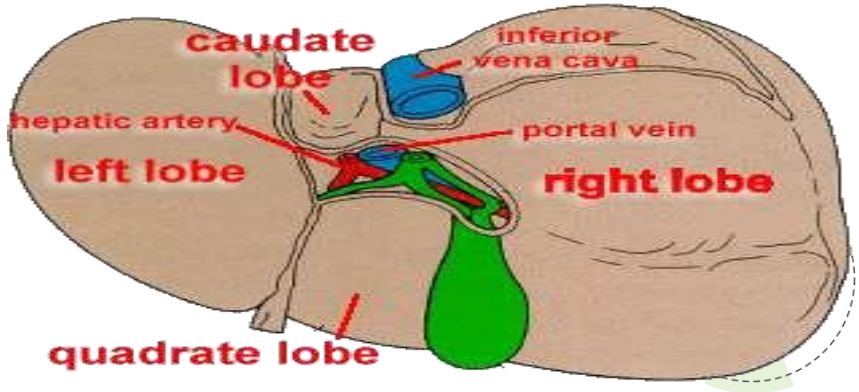
LO11

Hepatic Lobes :

- **Right lobe**
- = is the **largest** in volume and contributes to all surfaces
- **Quadrate lobe**
- is only visible from the inferior surface. it is **functionall**y related to the left lobe.
- **Caudate lobe**
- this lobe arise from the right lobe, but it is f**unctionally** separated from it
- **Left lobe**
- The left lobe is the **smaller** lobe







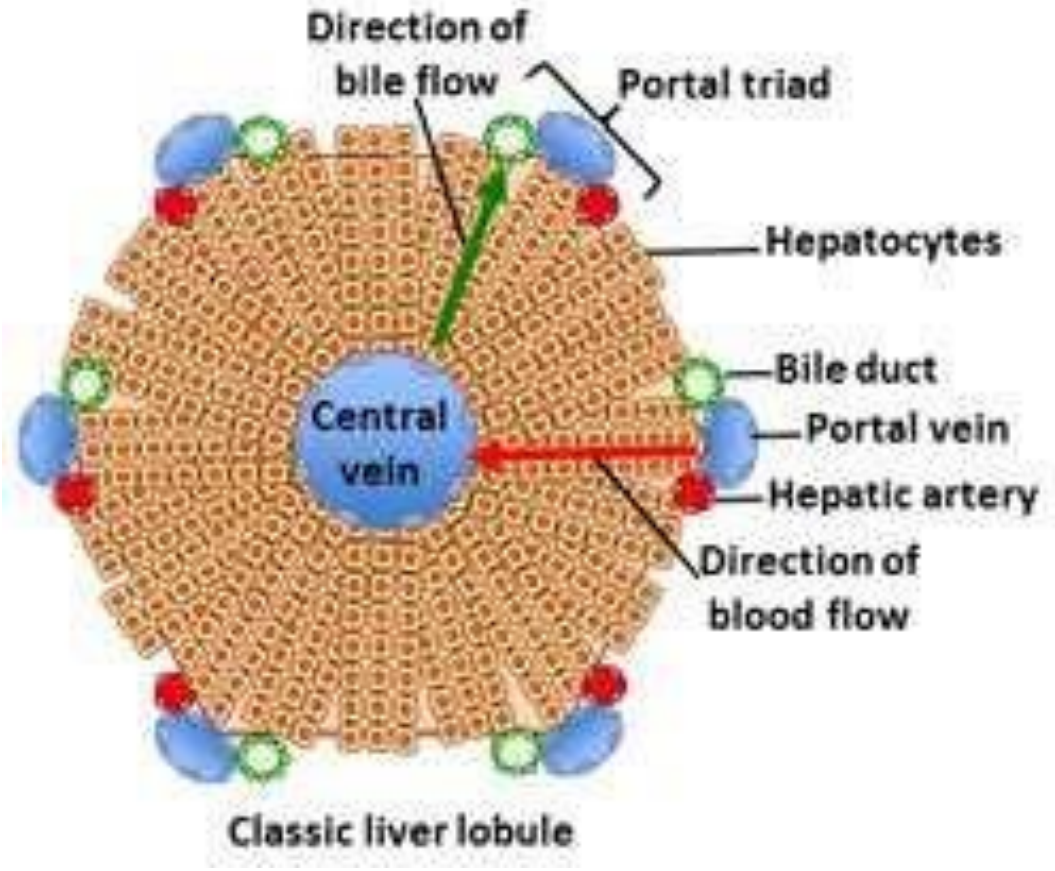
Hepatic lobule

Lo11,12

1. Hepatic lobule is the **structural** and **functional** unit of liver.

2. There are about 50,000 to 100,000 lobules in the liver.

3. The lobule is a **honeycomb-like structure** and it is made up of liver cells called hepatocytes.



Classic liver lobule

Objectives:

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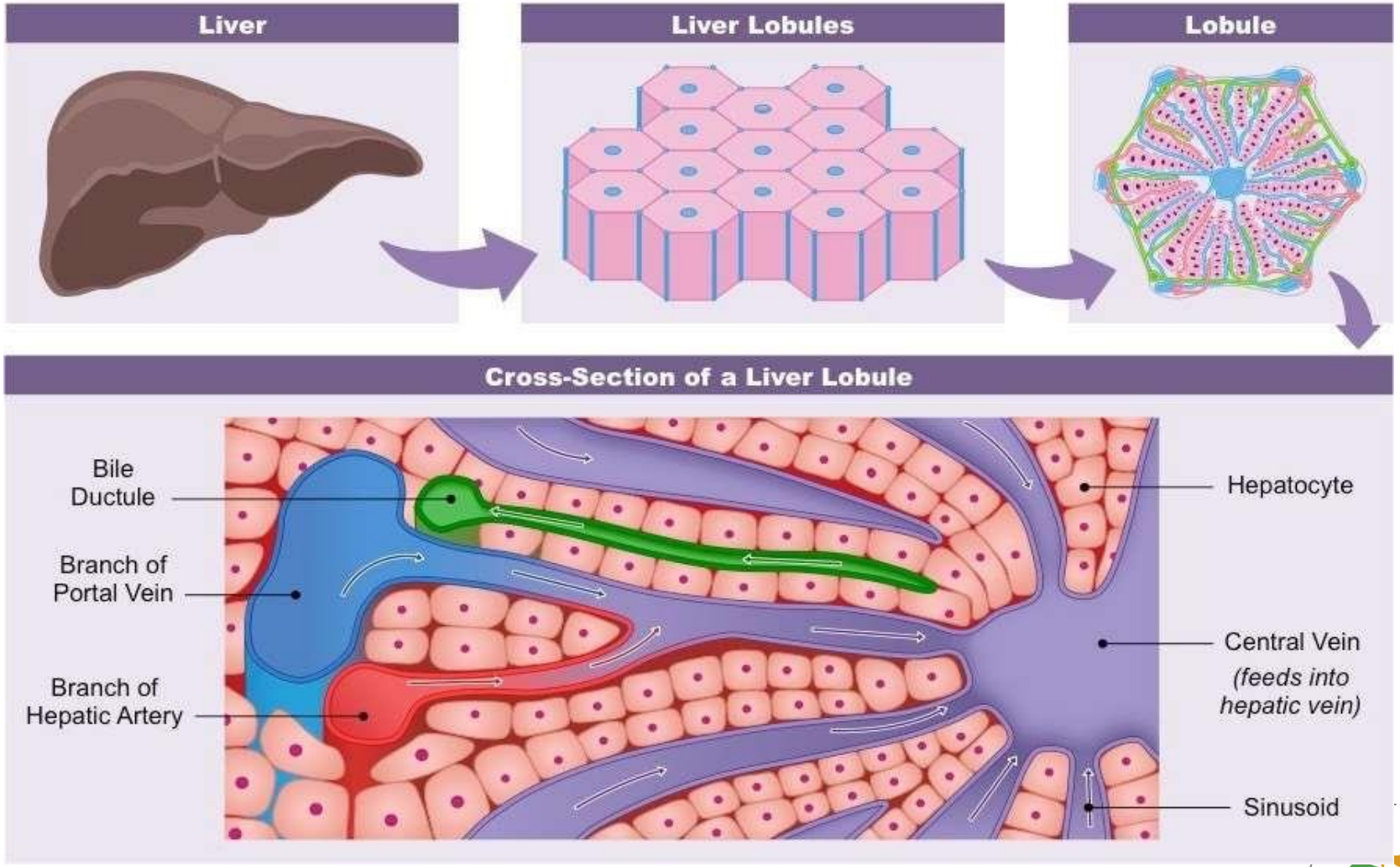

Liver lobules :

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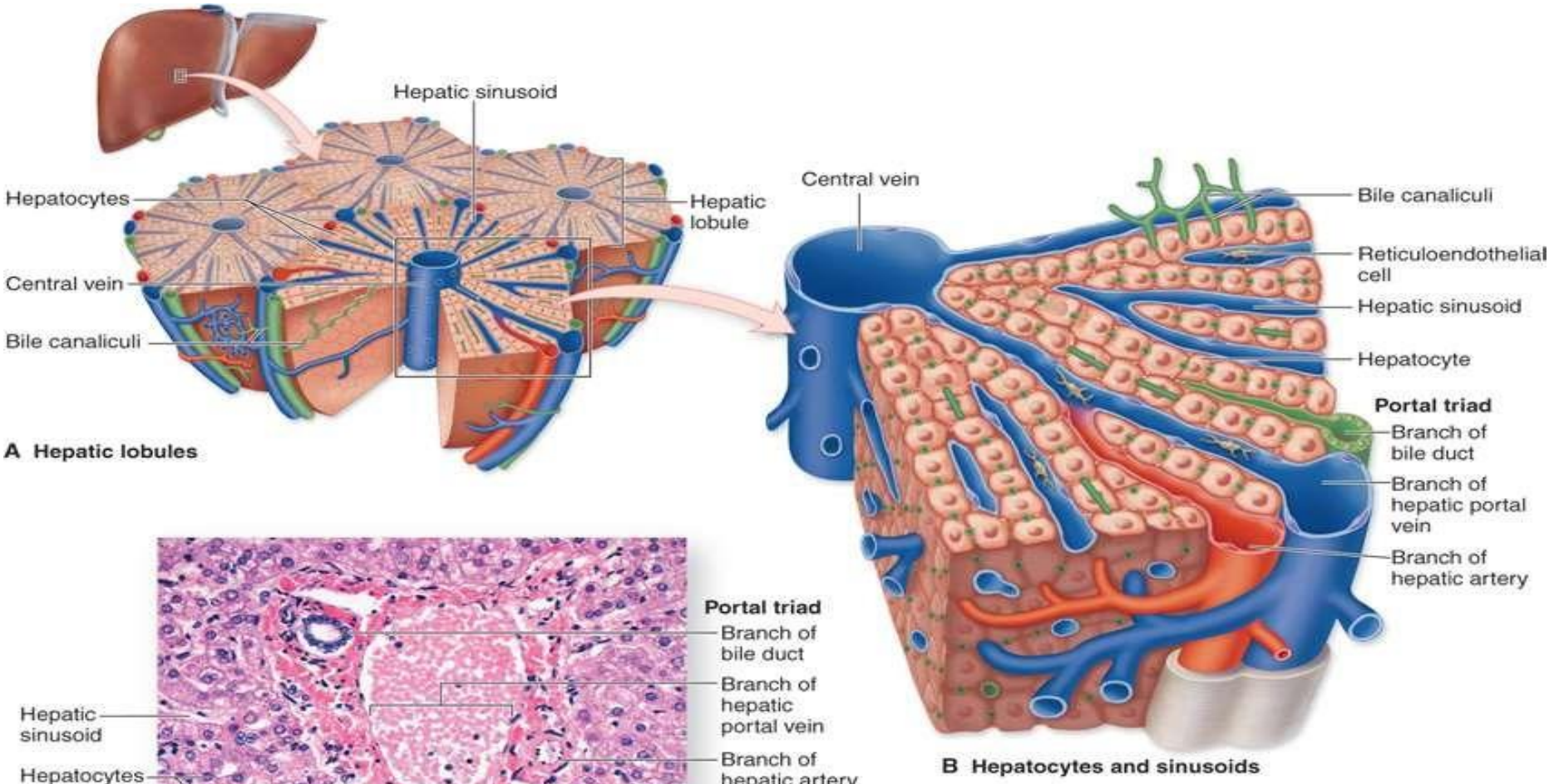

Histology :

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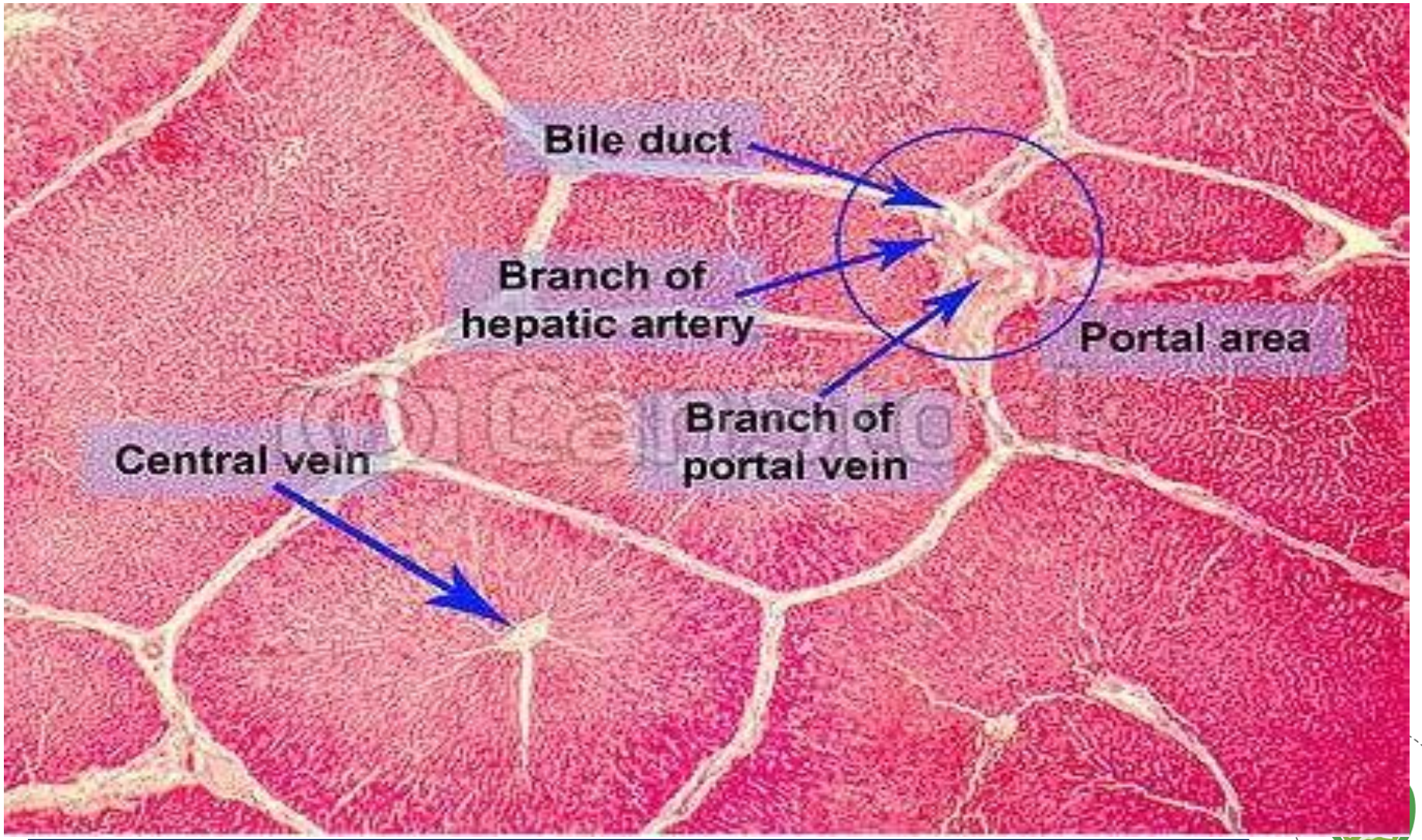

Blood supply of liver :

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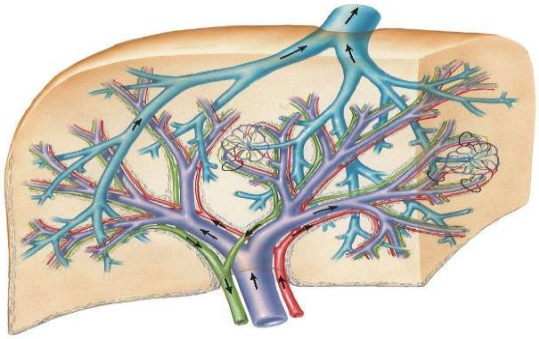
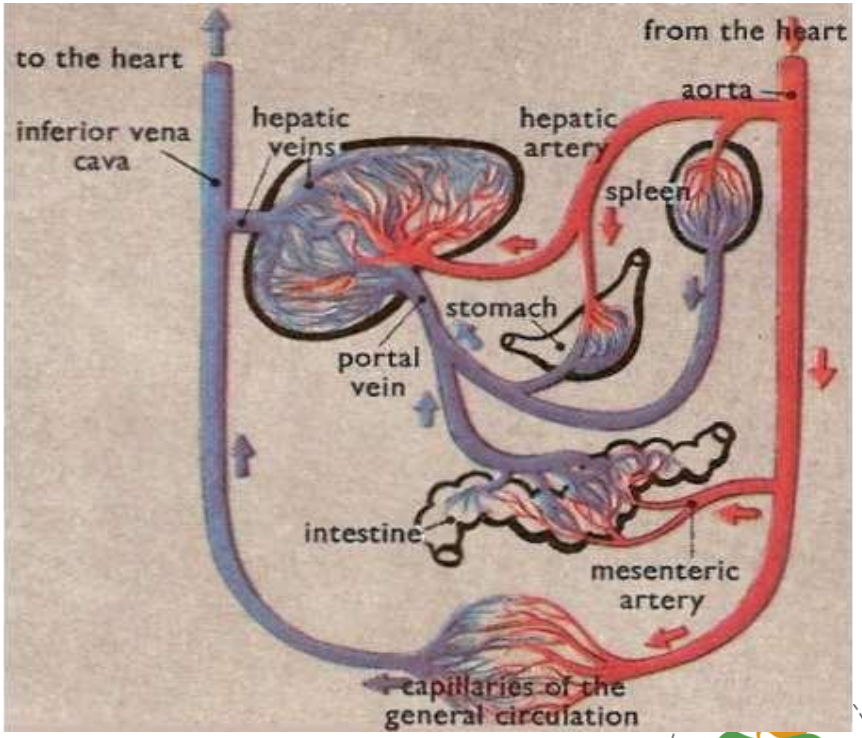


- Two sources provide blood to the liver
  - **Hepatic artery**
    From celiac trunk of aorta
  - **Portal vein**

- Blood exits the liver via the **central vein**

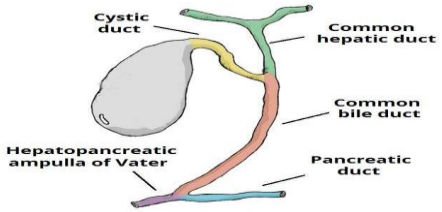
- Blood flow into the liver is controlled by number of factors
  - Muscular sphincters
  - Number of different stimuli, including the ANS , circulating hormones, bile salts, and metabolites

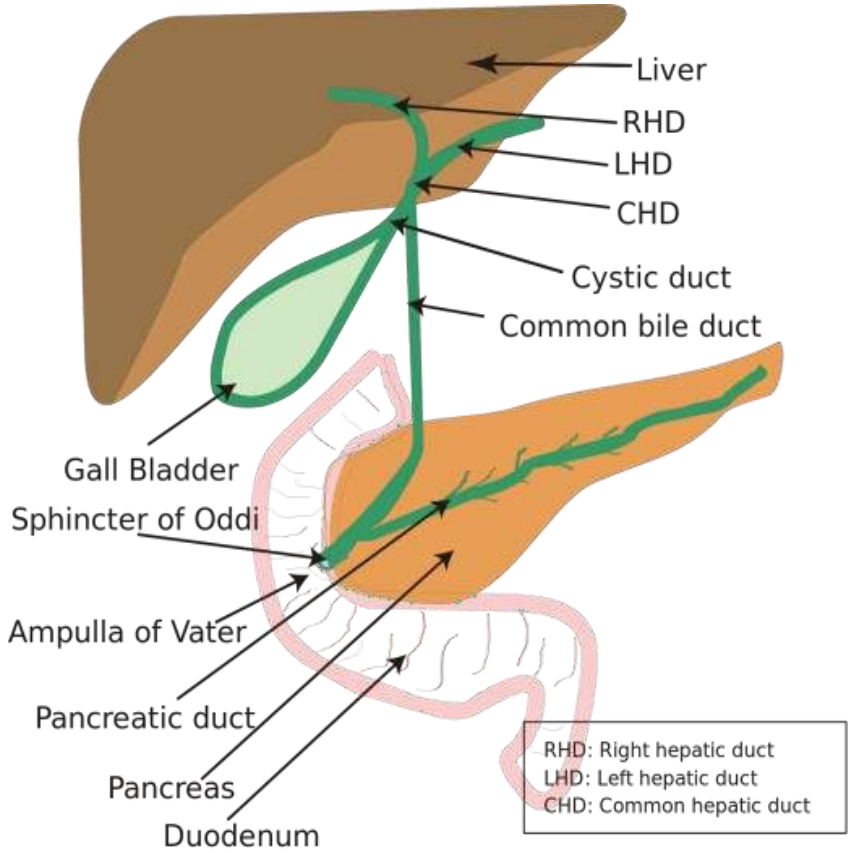


Functional anatomy of Biliary System

Lo12

1. Biliary system = **extrahepatic biliary apparatus :**
   is formed by **gallbladder** and **extrahepatic bile ducts**
   (bile ducts outside the liver).
2. Right and left **hepatic bile ducts** which come out of liver join to form **common hepatic duct.**
3. It unites with the **cystic duct** from gallbladder to form **common bile duct.**
4. All these ducts have similar structures



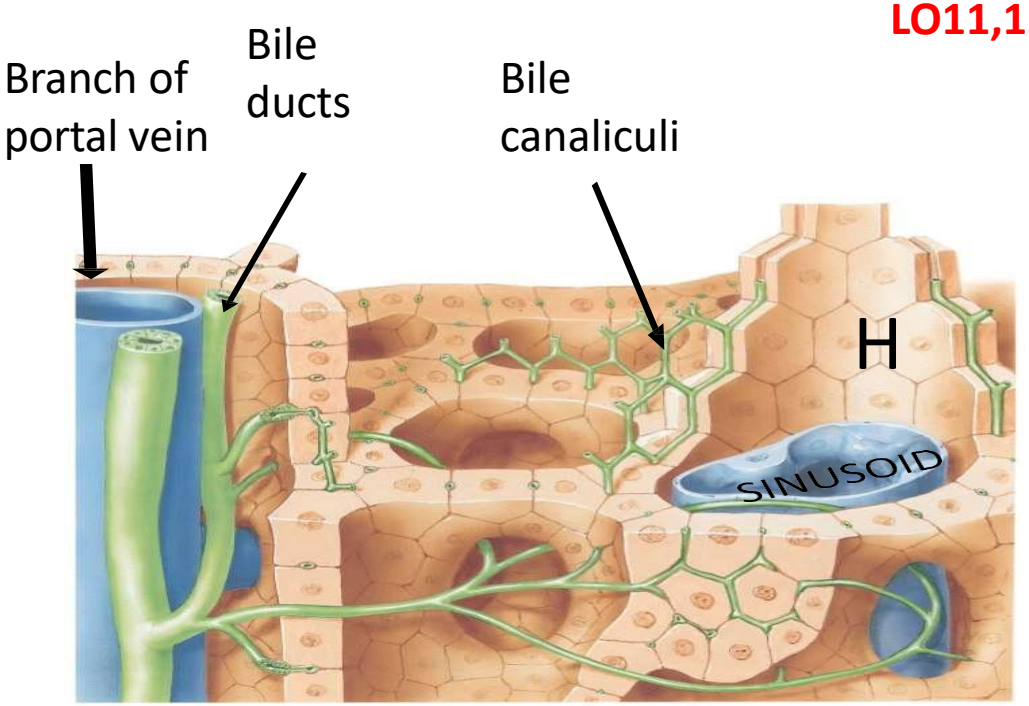


LO11

Gall bladder

LO11,12

- **INTRAHEPATIC BILIARY SYSTEM**



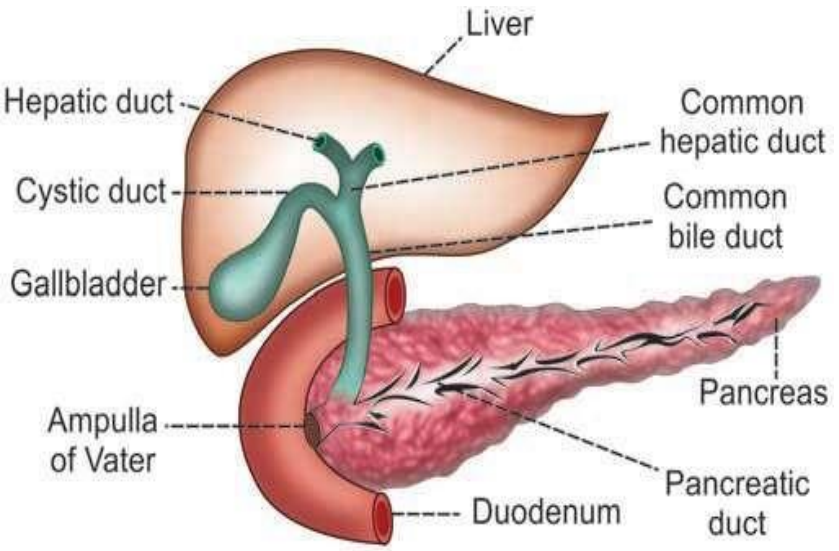
EXTRAHEPATIC BILIARY SYSTEM

1. Rt. hepatic duct
2. Lt. hepatic duct
3. Com. hepatic duct
4. Cystic duct
5. Com. Bile duct
6. Gallbladder

Biliary system :

Lo12

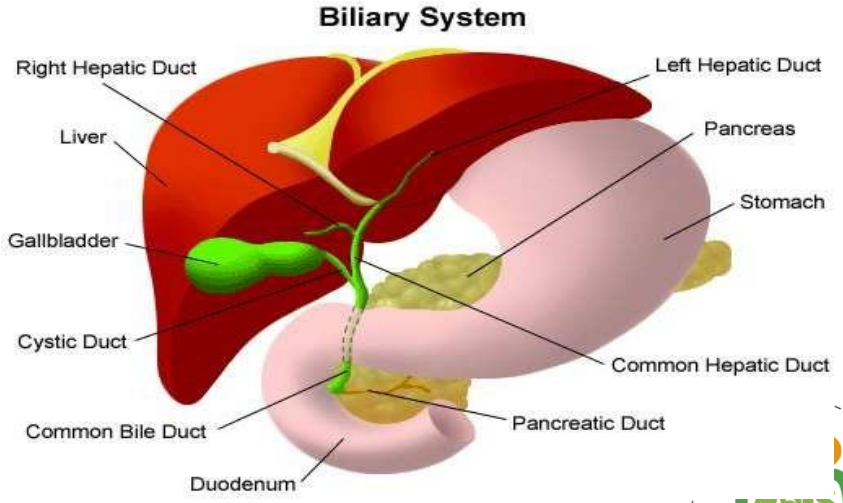
5. **Common bile duct** unites with **pancreatic duct** to form the **common hepatopancreatic duct** which open into the duodenum.
at Ampulla of Vater



6. There is a sphincter called **Sphincter of Oddi** at the lower part of common bile duct, befor it joins the pancreatic duct.

7.It is normally kept closed; so the bile secreted from liver enters gallbladder where it is **stored.**

8 At stimulation, the sphincter open and allows flow of bile from gallbladder into the intestine.



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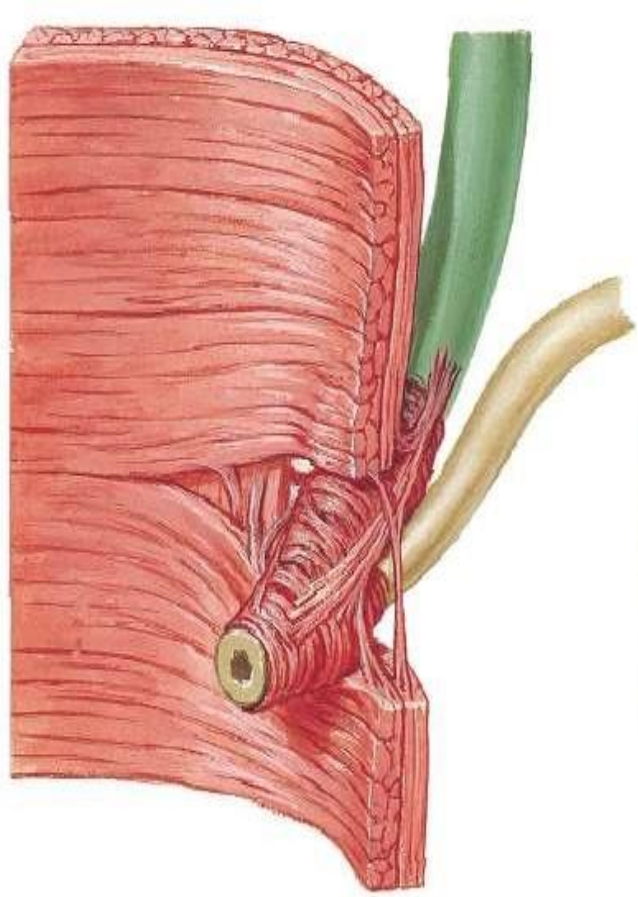
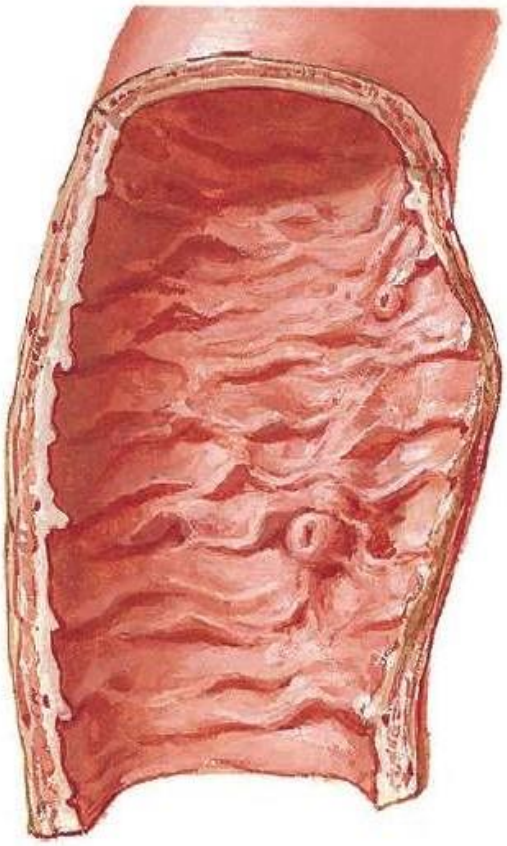
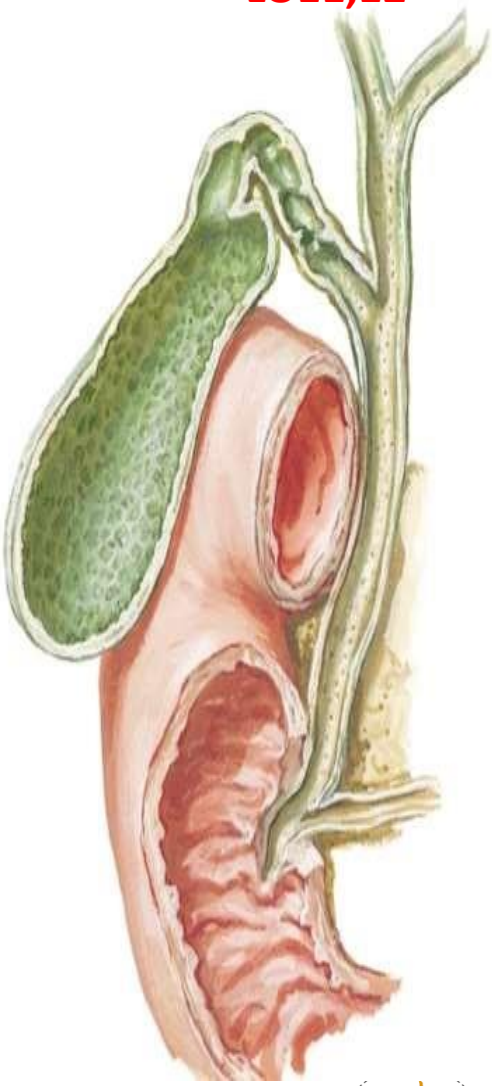
- Hepato-pancreatic ampulla of vater
- Major duodenal papilla
- Sphincter of Oddi







Clinical correlates::

LO 12

Liver Cirrhosis:

Progressive destruction of hepatocytes (parenchymal liver cells) results in replacement of the cells by fibrous tissue.

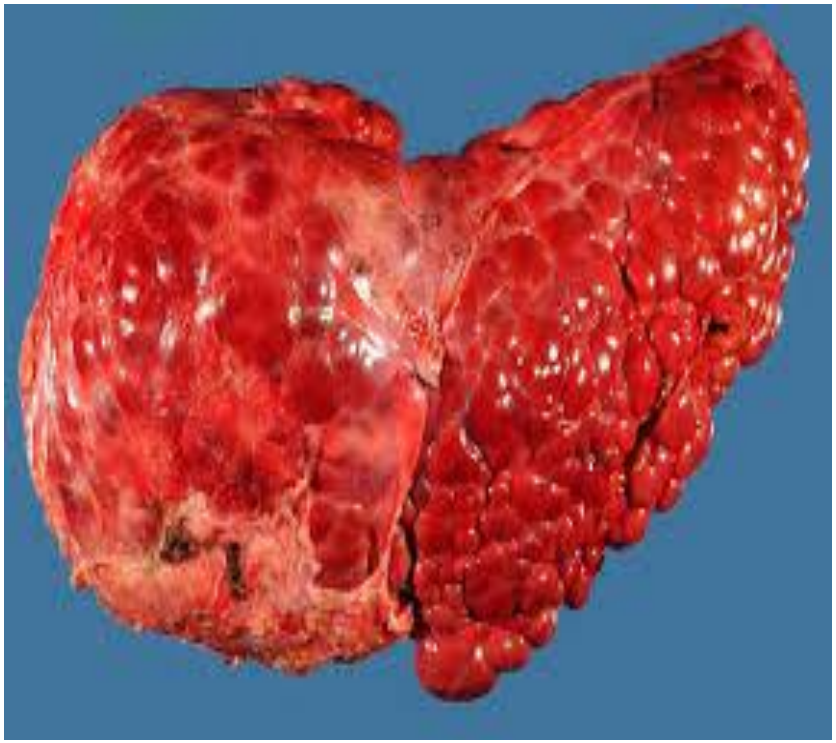
The fibrous tissue surrounds the intrahepatic blood vessels and bile ducts, making the liver tissue firm.

the most common cause of portal hypertension

The pressure in the veins and their tributaries draining the liver increase, producing portal hypertension.

At the sites of anastomoses between these veins and systemic veins, portal hypertension produces dilated (varicose) veins whose thin walls may rupture, resulting in haemorrhage

Cirrhosis



Portal vein

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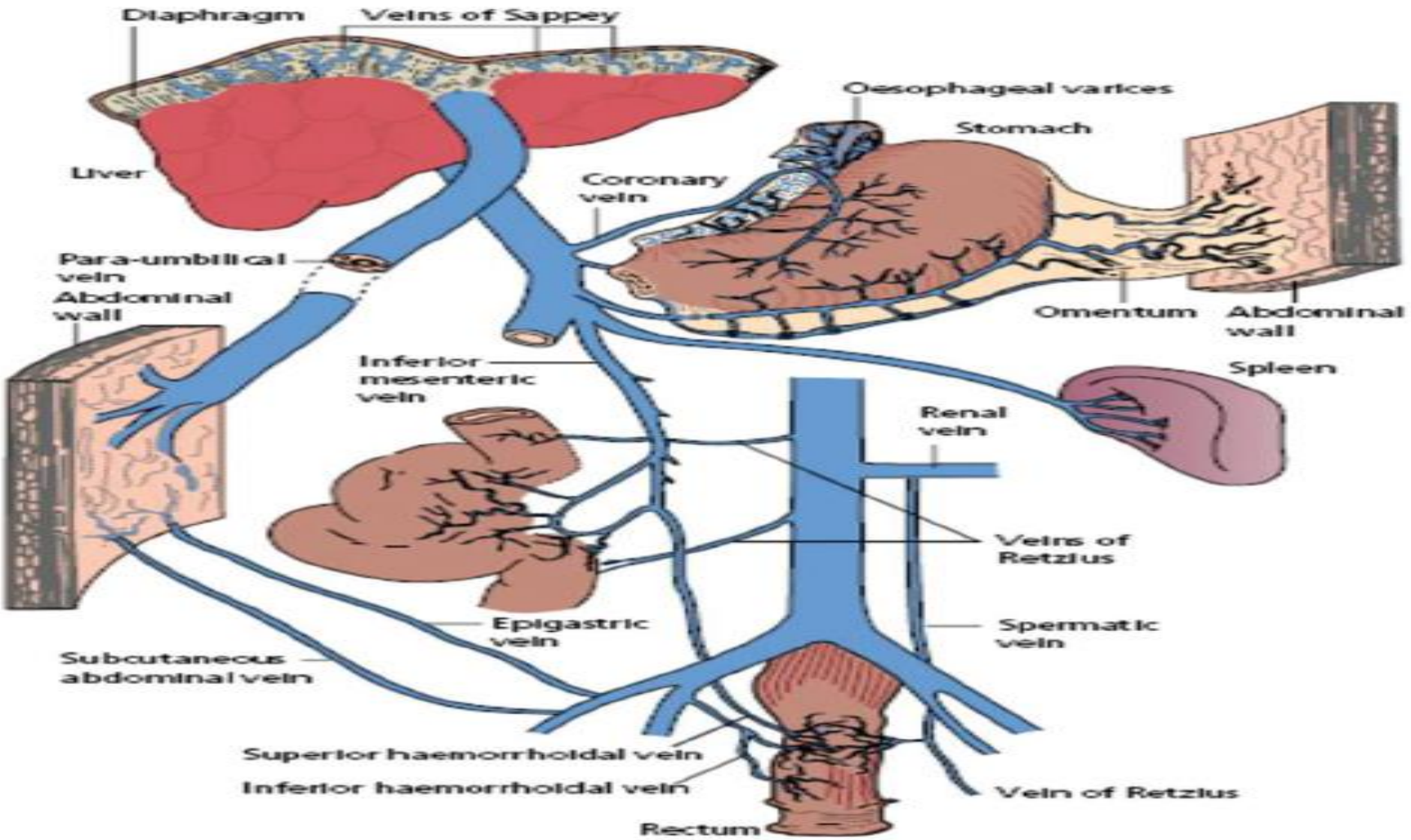


LO1,3

- **GALL STONE:**

Cholelithiasis

For unclear reasons, substances in bile can crystallize in the gallbladder, forming gallstones. Common and usually harmless, gallstones can sometimes cause pain, nausea, or inflammation.

- **Cholecystitis:**

Inflammation of the gallbladder, often due to a gallstone in the gallbladder. Cholecystitis causes severe pain and fever, and can require surgery when inflammation continues or recurrent

LO12

Cholecystitis:

Acute :

- mainly caused by gall stone
- Pain at RT hypochondrium
- Murphy sign positive ?
- Palpable ,tender gall bladder
- Fevere ,nausia ,etc

Chronic :

- Non functioning gall bladder ,
- Cause : gall stone
- Chronic inflamed thickened gall bladder
- Pain at Rt hypochondrium
- Intolerance to fatty meal , dyspepsia, etc

LO12

Pancreatitis

- Local inflammatory change in pancreas in which activated pancreatic enzymes leak into the substances of pancreas causing auto digestion of the gland
- Life-threatening inflammatory disorder of the pancreas
- Variable severity and duration
- Cause: gall stone , alcohol , ideopathic ,etc

LO13

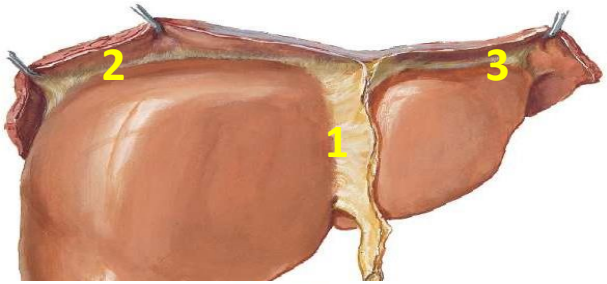
Peritoneal ligaments of the liver :

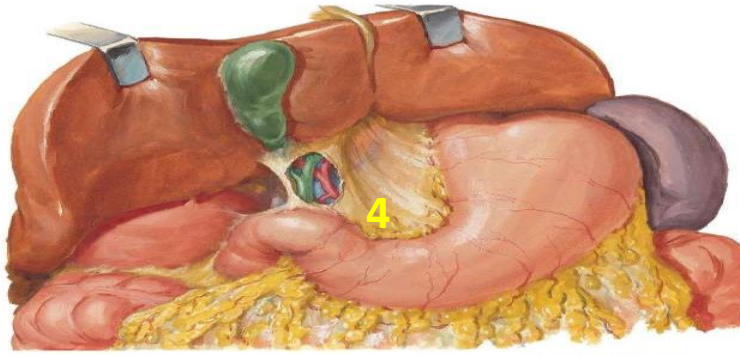
1. **Falciform ligament**
2. **Coronary ligament** (upper & lower layers)
3. **Triangular ligament** (Right & Left)
4. **Lesser omentum**
5. **Ligamentium teres**

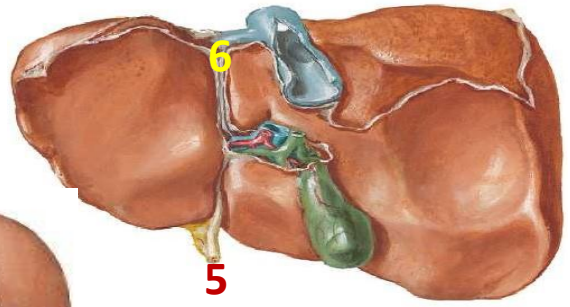
(obliterated paraumbilical veins

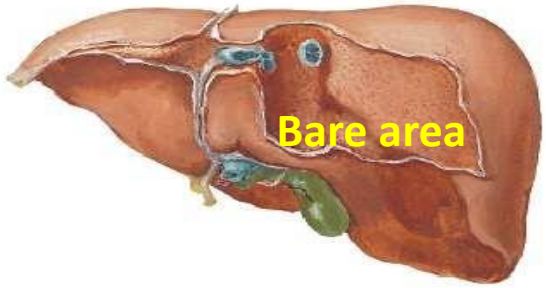
6. **Ligamentium venosum**

= obliterated ductus venous?





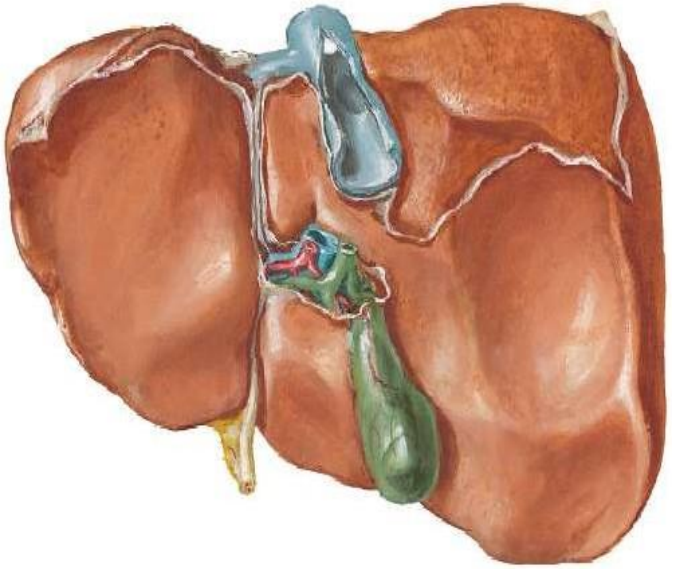




Lo13

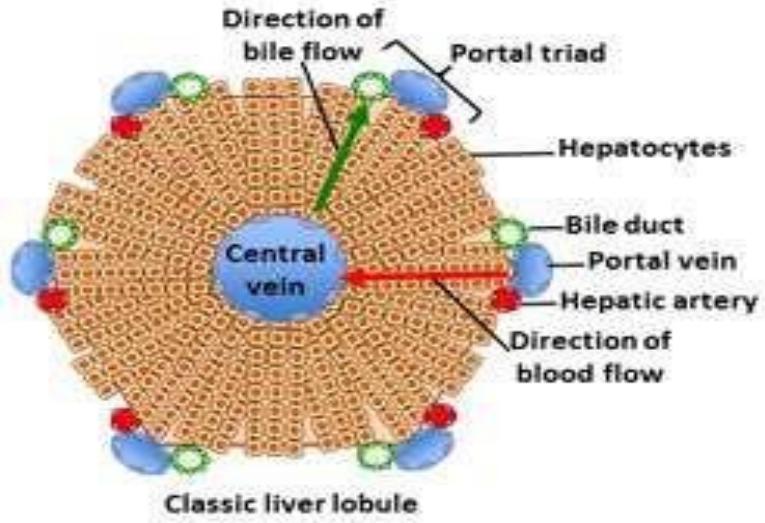
Porta Hepatis =Portal triad

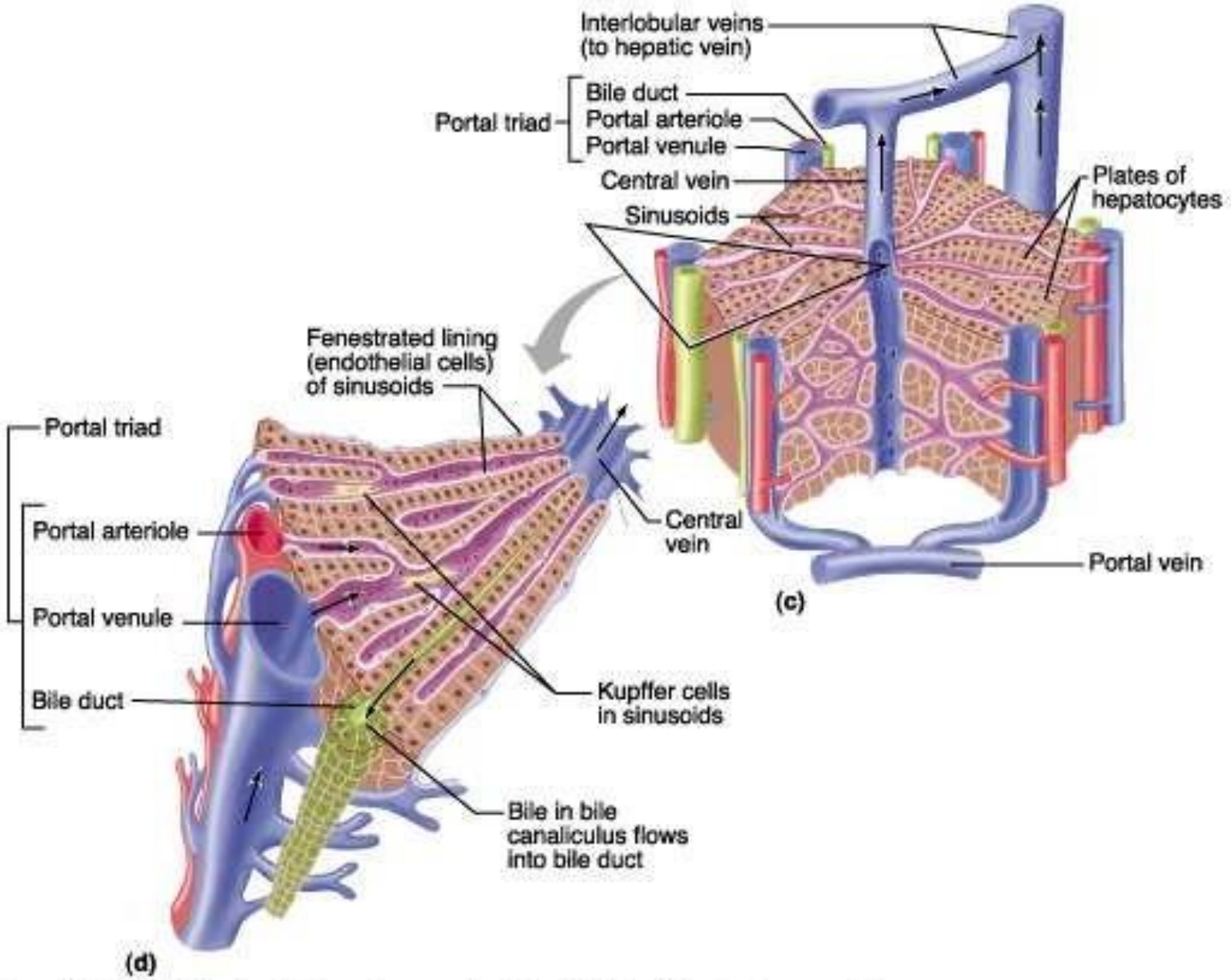
1. Each lobule is surrounded by many portal triads.
2. Each portal triad consists of **three vessels:**
   1. A branch of hepatic artery
   2. A branch of portal vein
   3. A division of bile duct.



- **Contents :**

1. Rt. & Lt. Hepatic (bile) ducts
2. Rt. & Lt. branches of Hepatic artery
3. Rt. & Lt. branches of Portal vein
4. Sympathetic & Parasympathetics
5. Hepatic LNs.





Relation between liver and IVC

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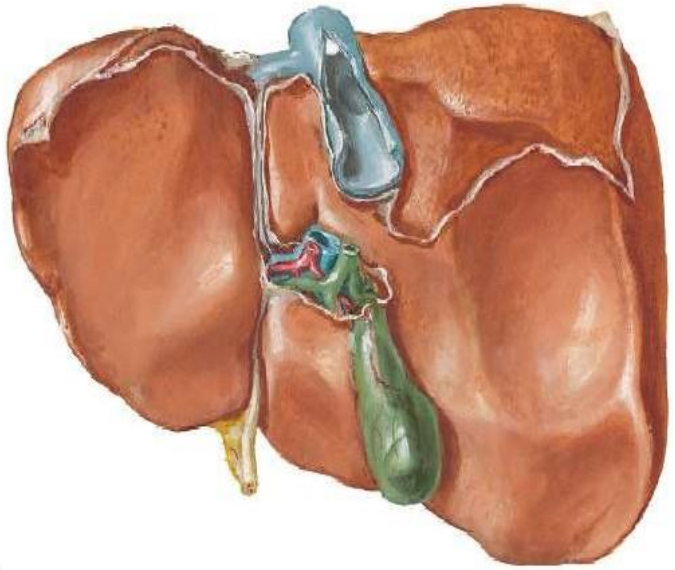
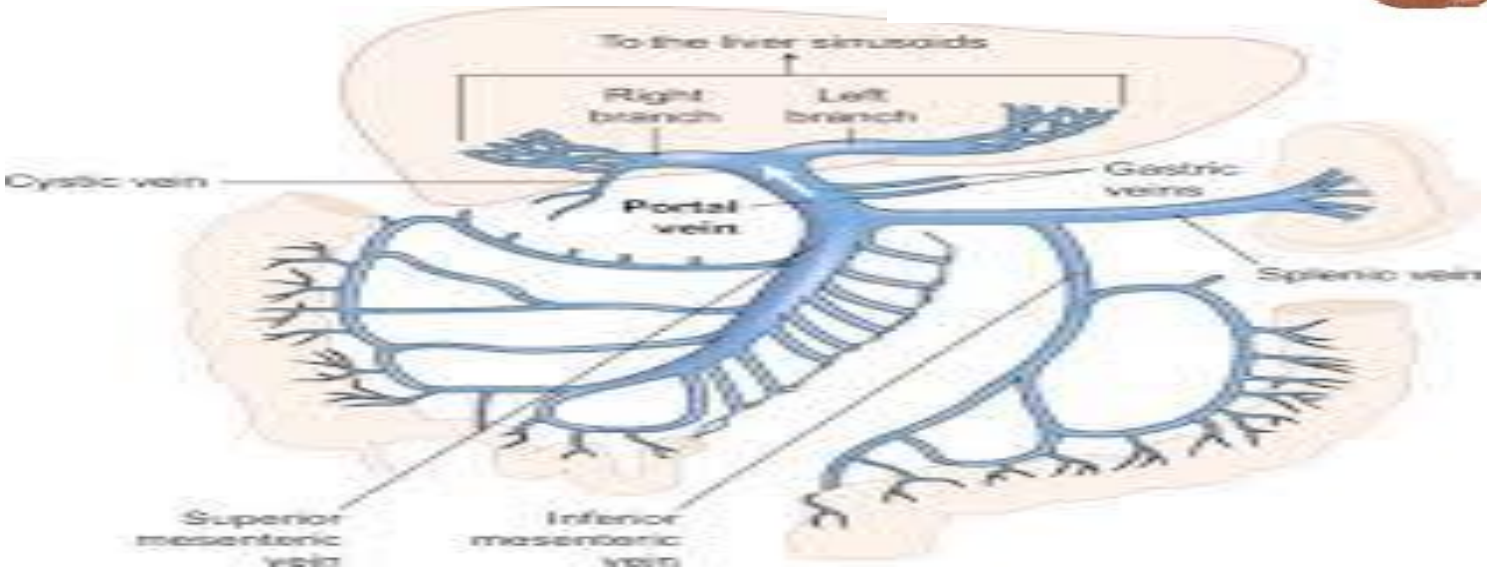


Organs sitting directly **in front of** the **IVC** include the **liver**, **duodenum** and **pancreas**.



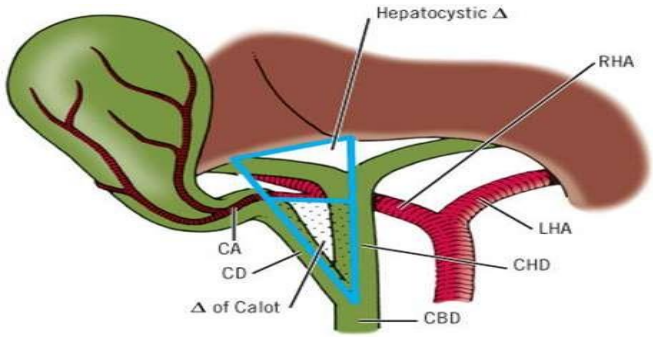
Gall bladder and cystic duct

LO13

- **Gall bladder**:
- Under the liver
- Stores 30-50 ml of bile
- Divided into fundus ,body and neck

BLOOD SUPPLY:

Arterial	Cystic artery
Venous	Cystic vein
Lymphatics :	A cystic LN at the neck of GB
Nerves:	Autonomic from coeliac plexus



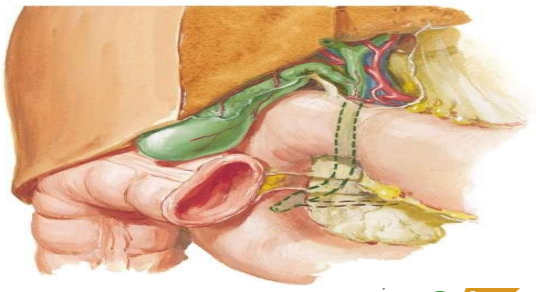
Calots triangle:

Bounded by:

Sup = inf surface of liver

LT = CHD

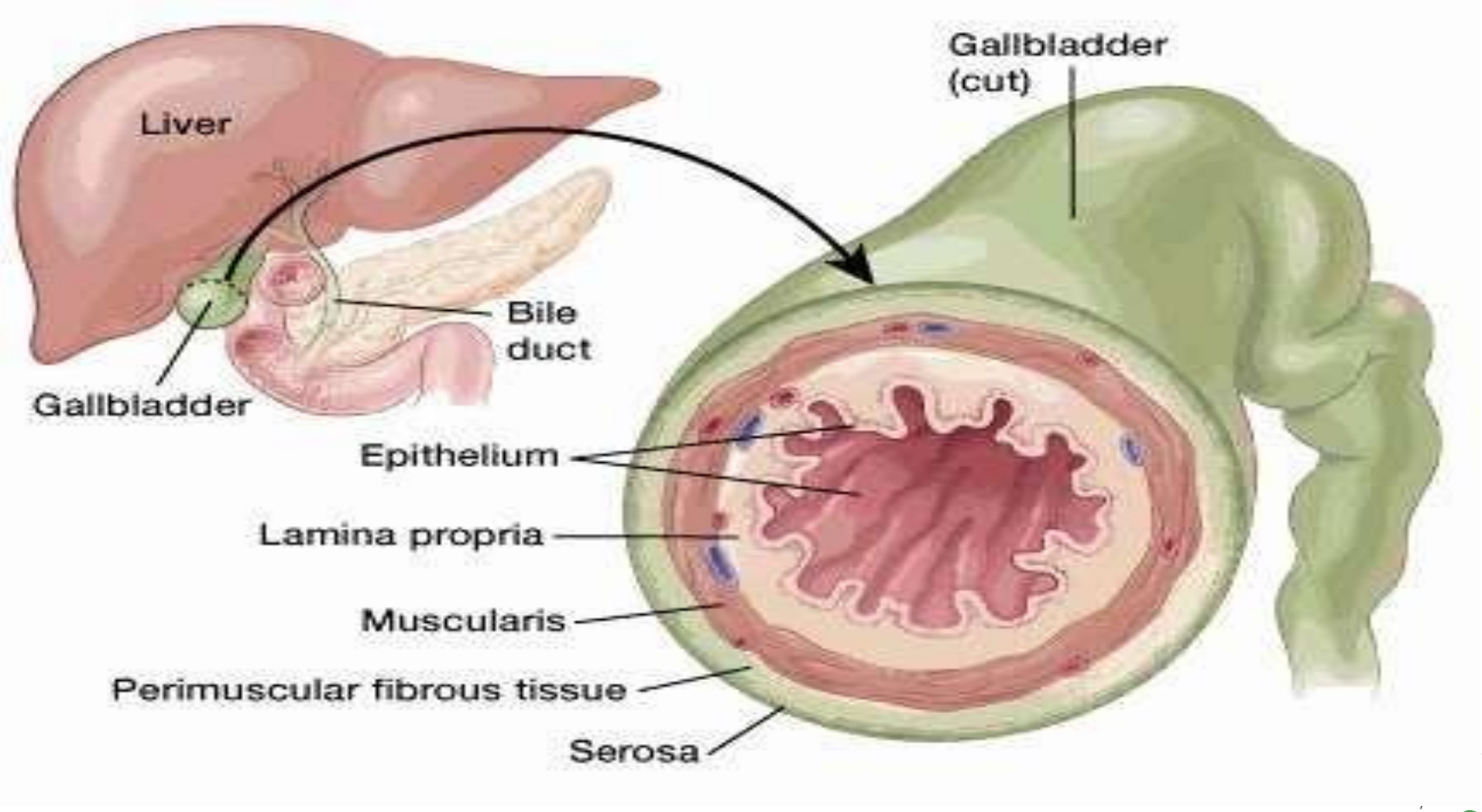
RT = cystic



Calots triangle : important landmark for localization of cystic artery

Lo13

Functional histology of gall bladder



Portal vein and tributaries

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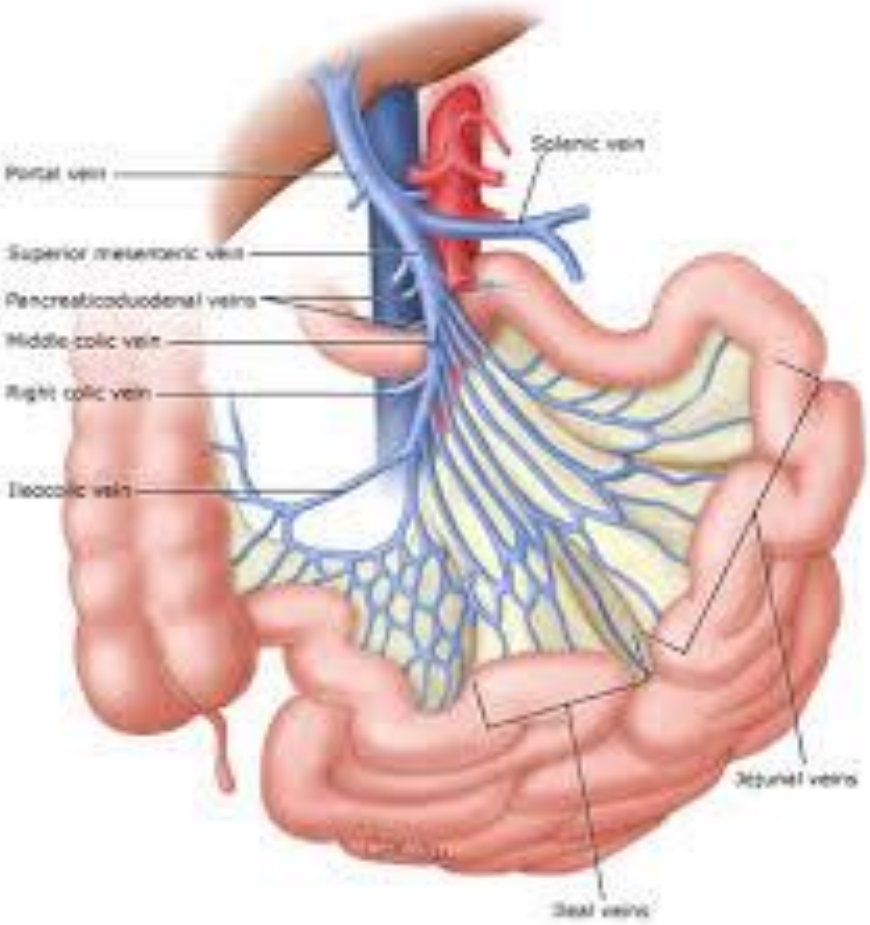
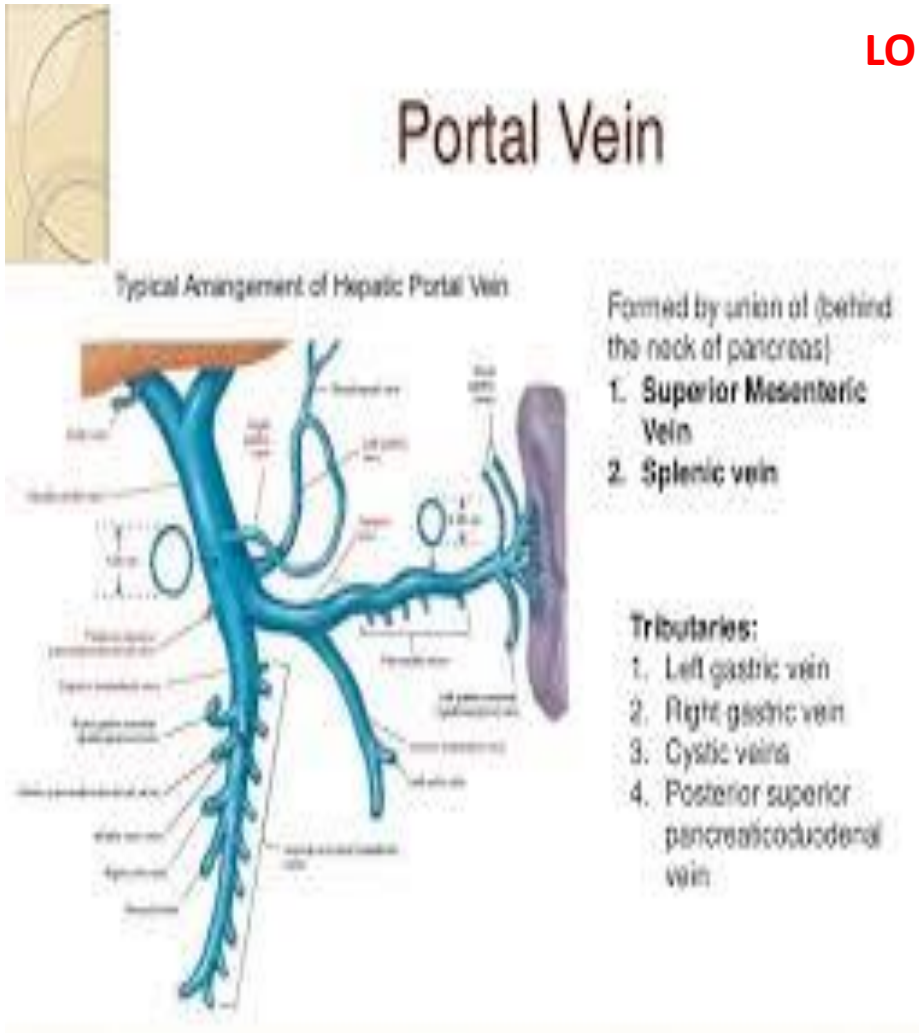


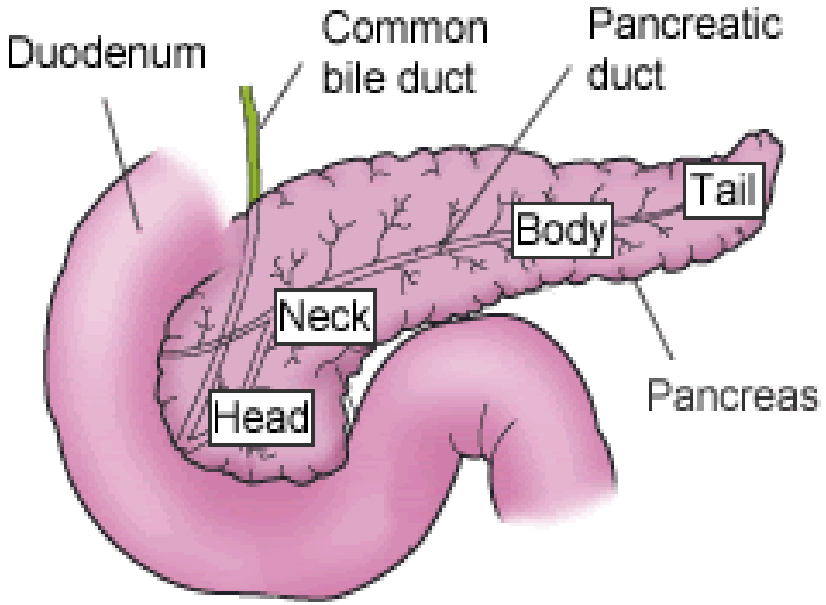


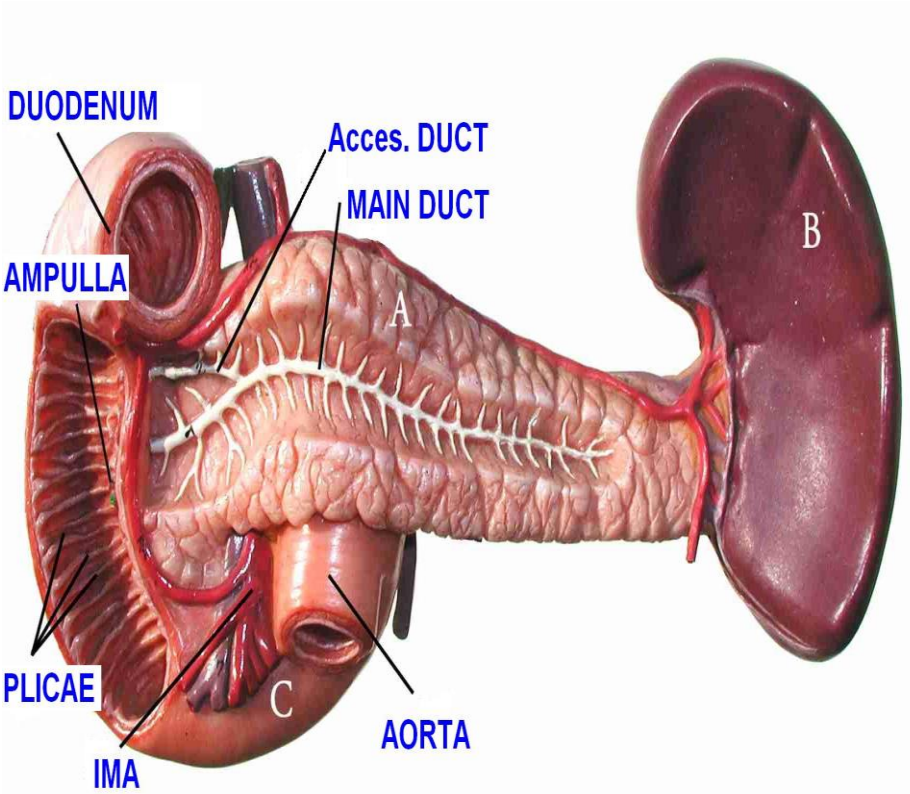
Lo13

Pancreas ,Spleen and its vasculature

Pancreas:

Exocrine and endocrine





Lo13

BV of Pancreas

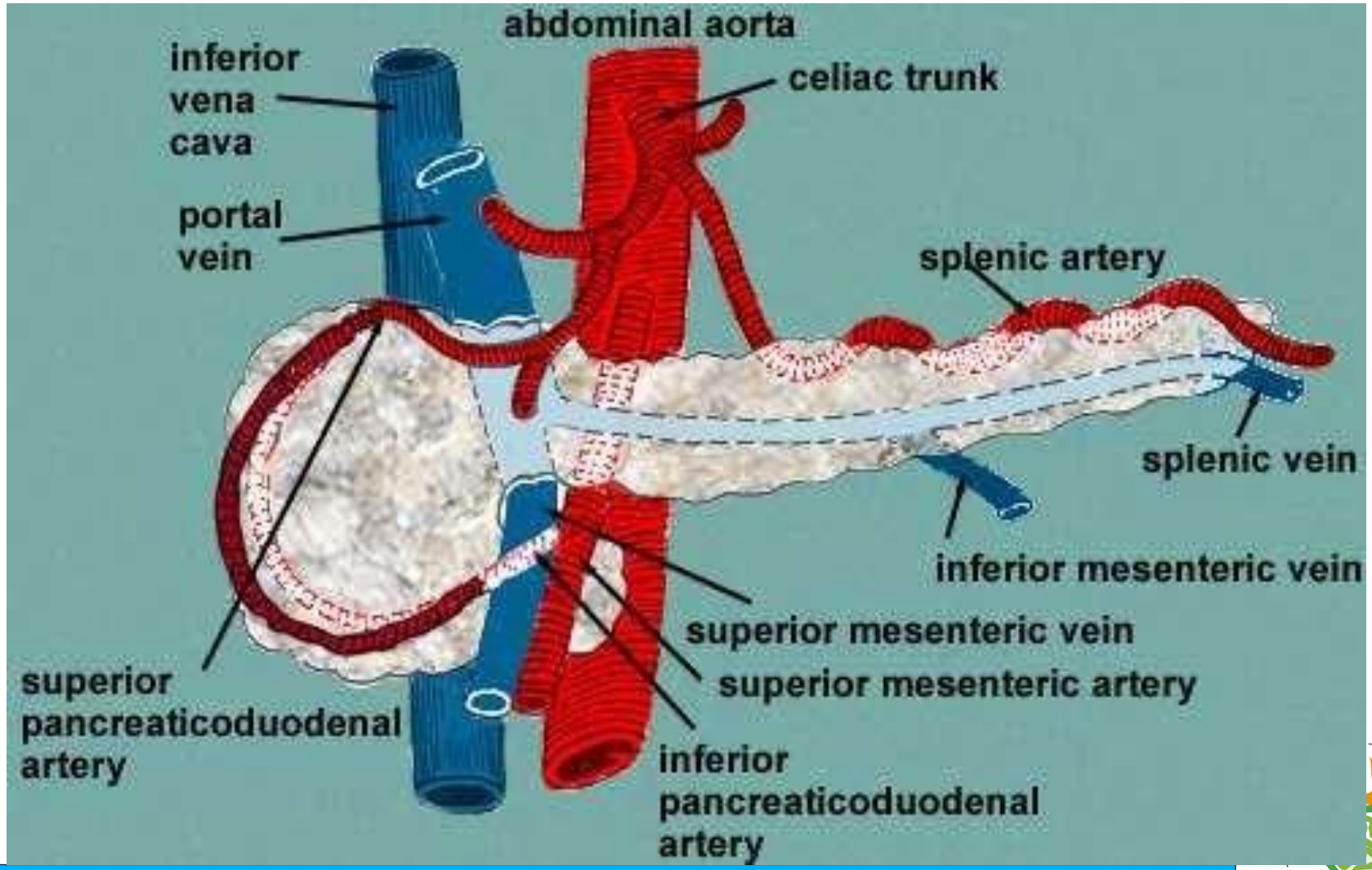
- Splenic artery.
- Superior pancreaticoduodenal artery
- Inferior pancreaticoduodenal arteries

artery.

The corresponding veins drain into the portal system.

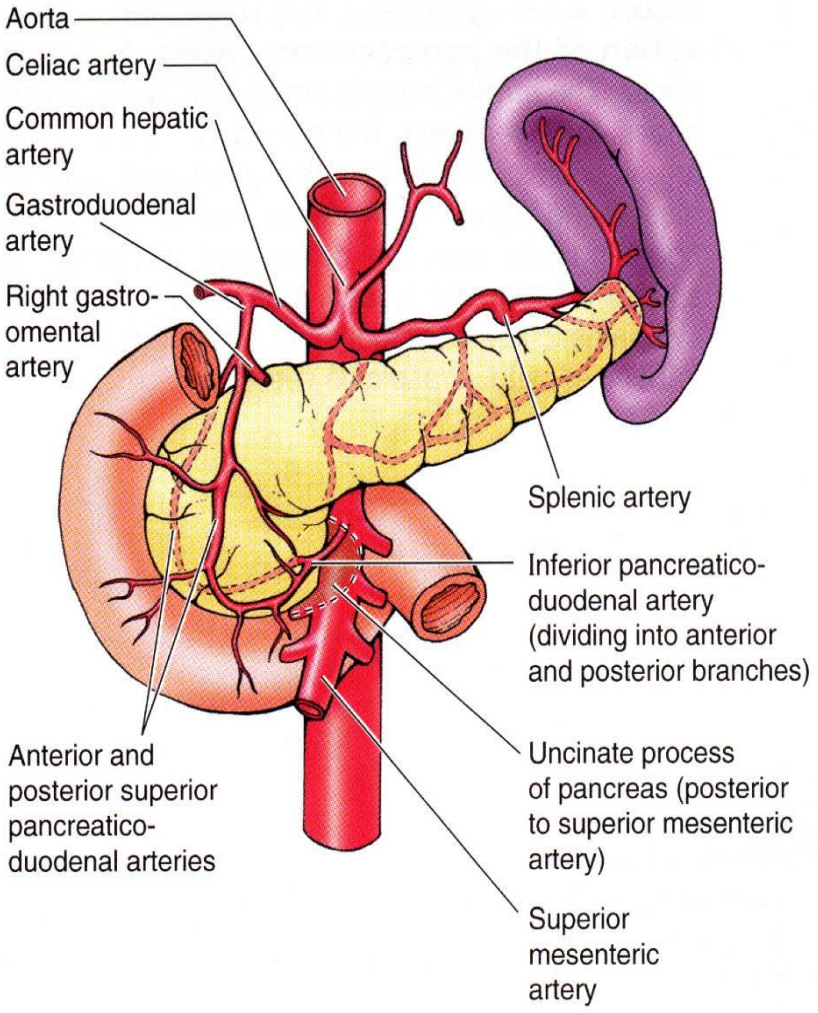
Blood supply of pancreas :

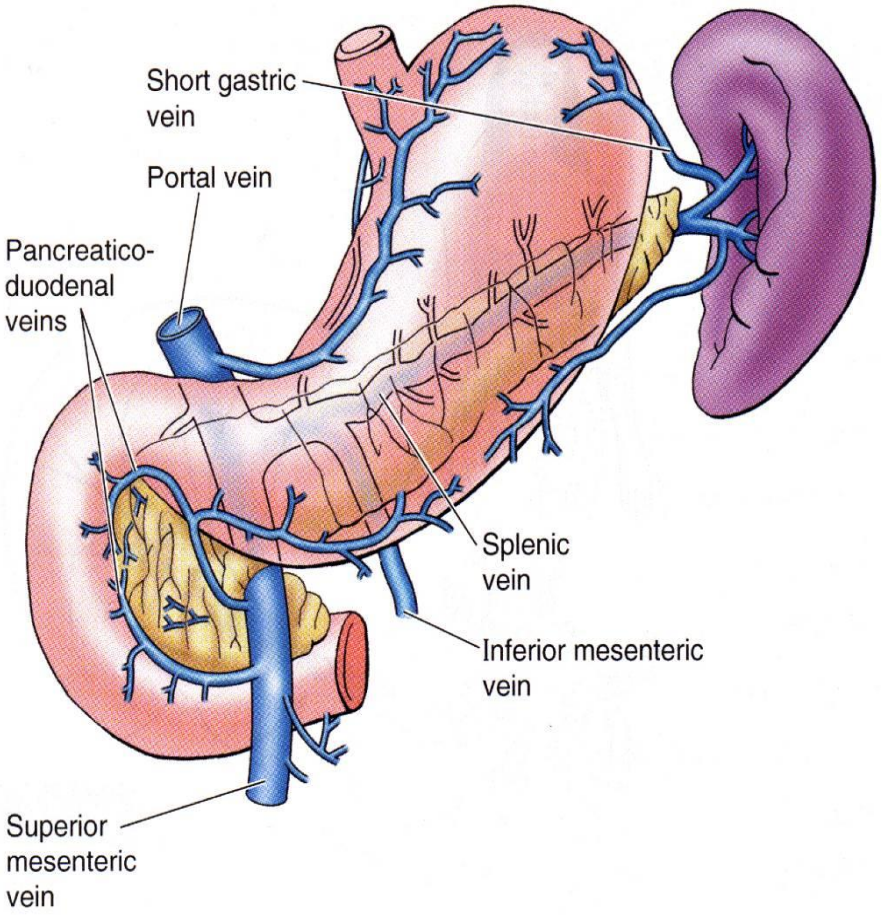
LO13



Arterial supply and venous drainage of the pancreas and spleen

LO13



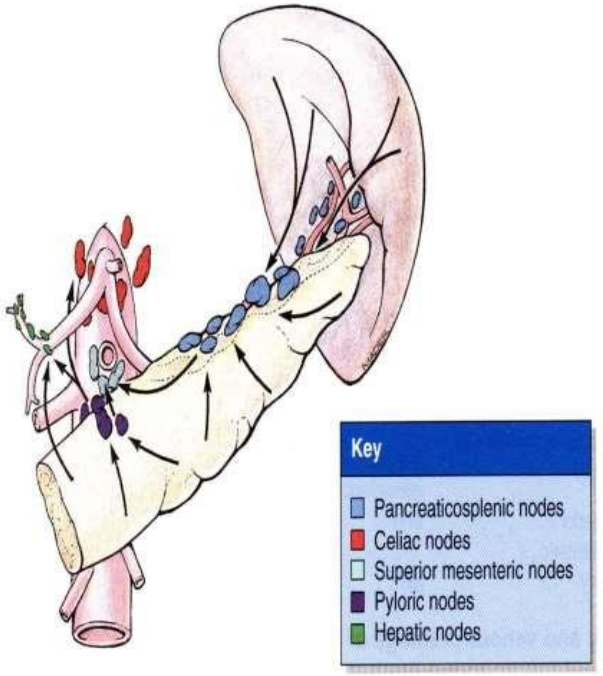


Lymphatic Drainage

Lo13

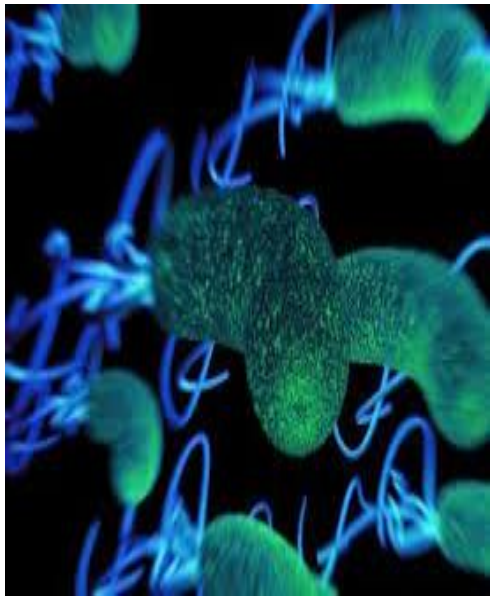
- Lymph nodes are situated along the arteries that supply the gland.
- The efferent vessels ultimately drain into the celiac and superior mesenteric lymph nodes.

- Sympathetic and parasympathetic chain
- Parasympathetic = vagus nerve



Helicobactria and chronic gastritis

Lo14



Inflammation, gastritis, and ulcer formation

Atrophy with gastic metaplasia and dysplasia are seedbed for carcinoma

Formation

Helicobacter pylori harms the stomach linings by several mechanisms.

The ammonia produced to regulate pH is toxic to epithelial cells, (this damages epithelial cells, disrupts tight junctions and causes apoptosis), can also cause inflammation and is potentially a carcinogen