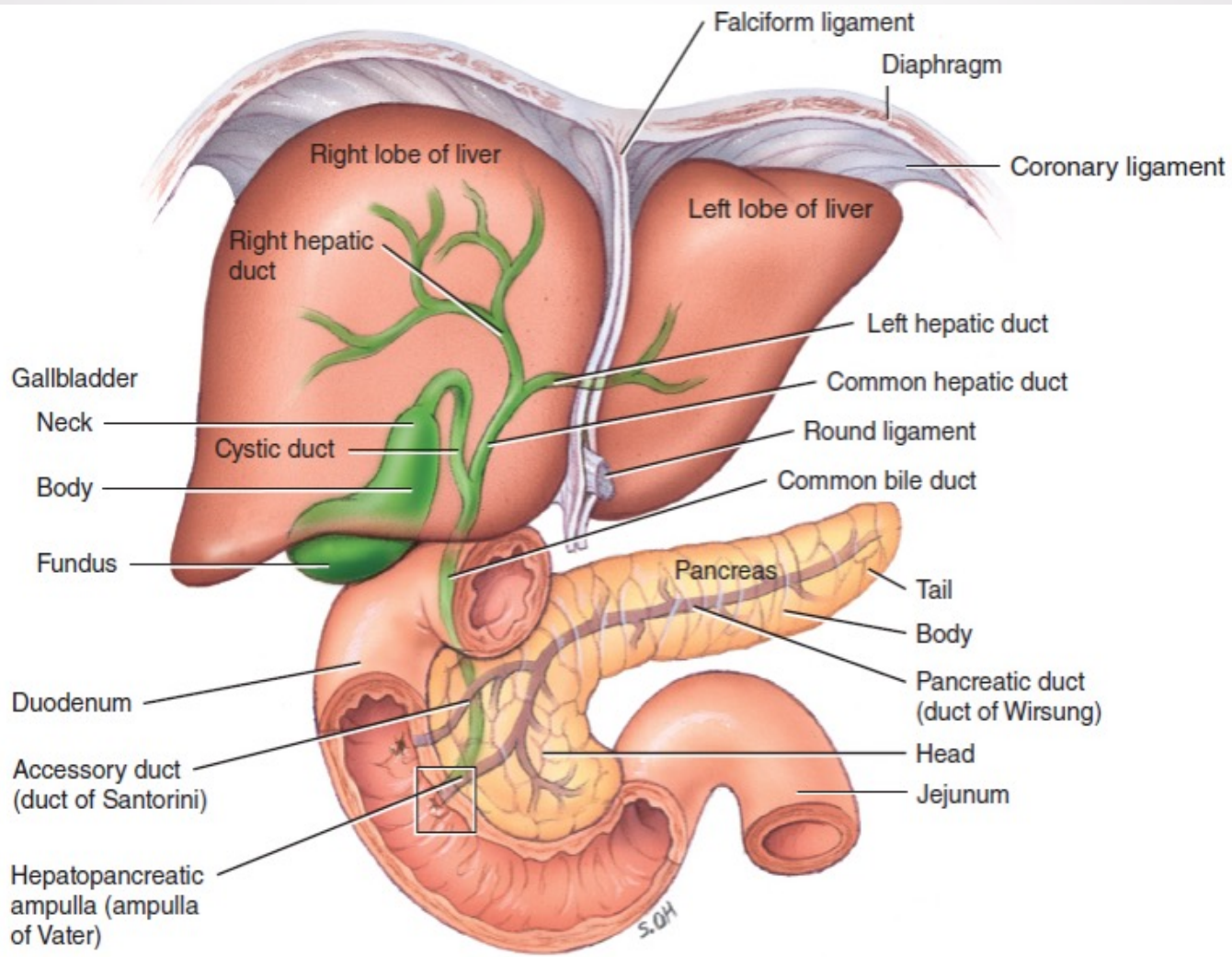


The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. They are positioned in the top-left, bottom-left, and bottom-right areas, framing the central text.

Gastrointestinal Tract (GIT)

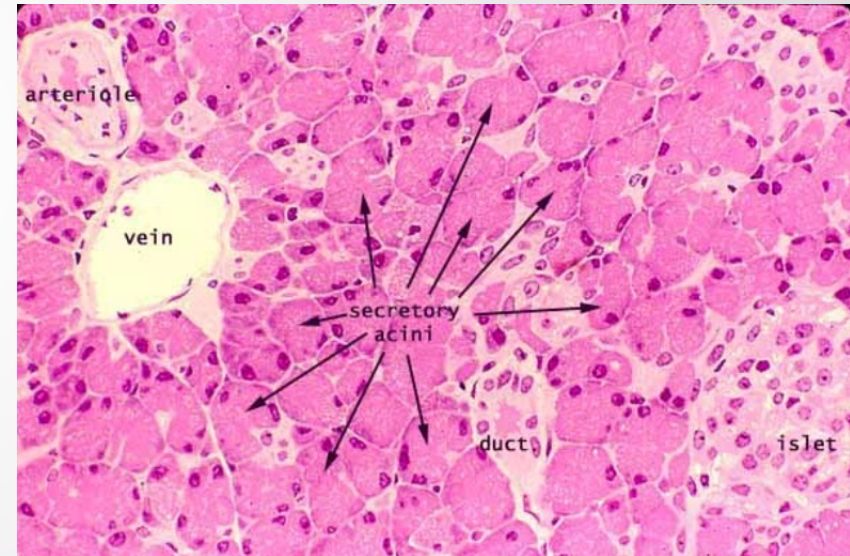
LIVER, PANCREAS, AND GALLBLADDDER



(a) Anterior view

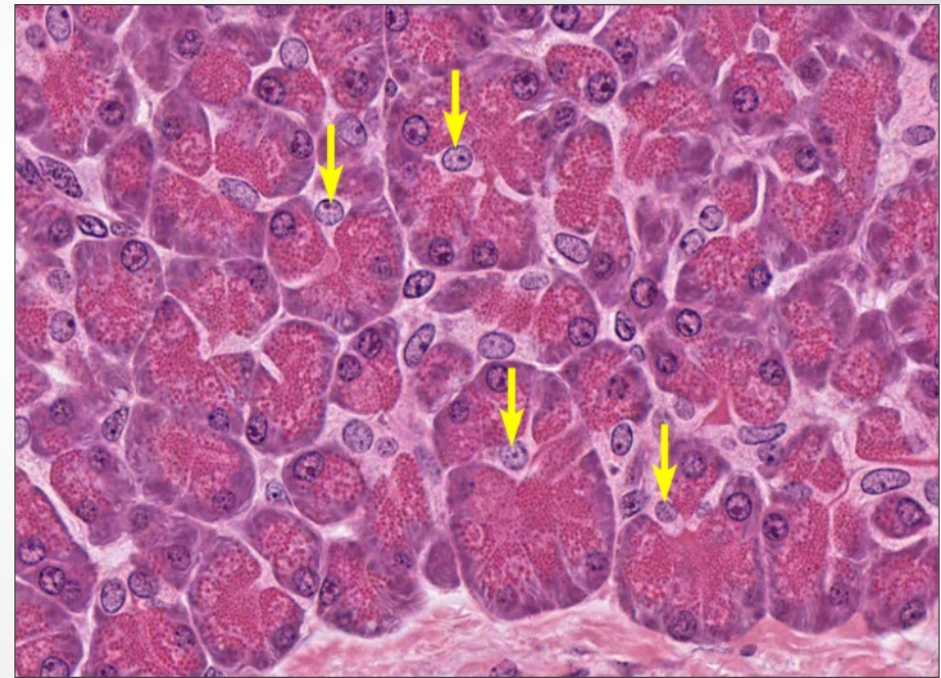
Histology Of The Pancreas

- Made up of small clusters of glandular epithelial cells.
- 99% of the clusters, called **acini** constitute the *exocrine* portion of the organ.
- Cells within acini secrete a mixture of fluid and digestive enzymes.
- 1% of the clusters, called **pancreatic islets** (*islets of langerhans*) form the *endocrine* portion of the pancreas.
- These cells secrete the hormones glucagon, insulin, somatostatin, and pancreatic polypeptide.

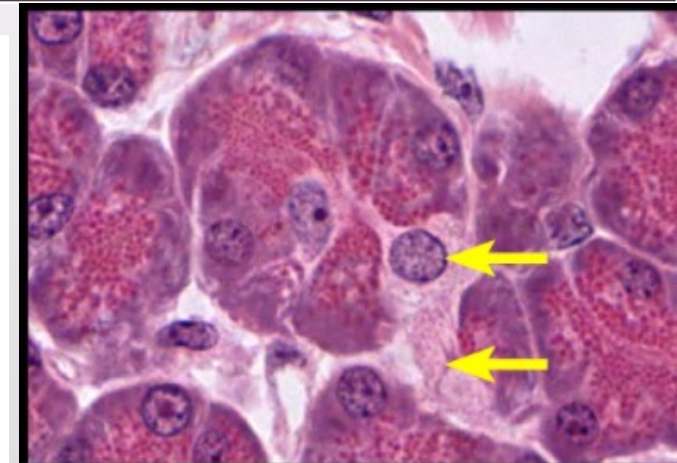
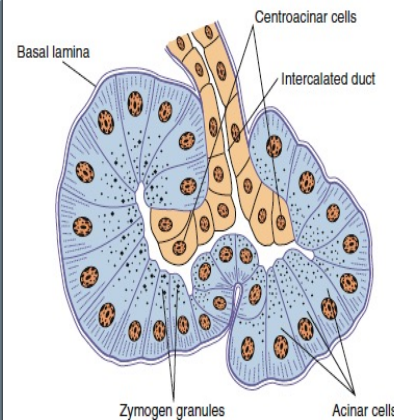


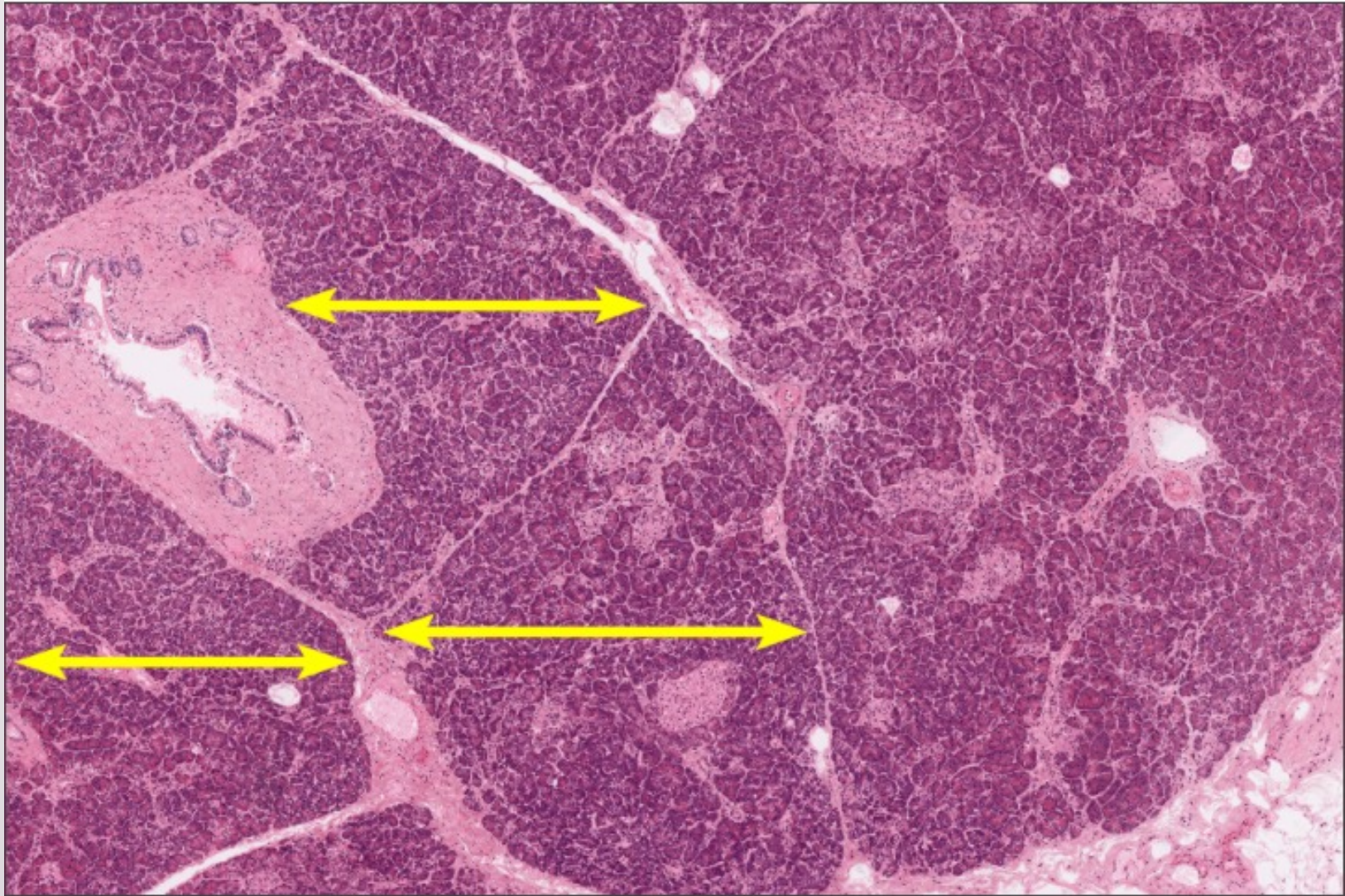
- Has a thin capsule of connective tissue, from which septa extend to separate the parenchyma into lobules

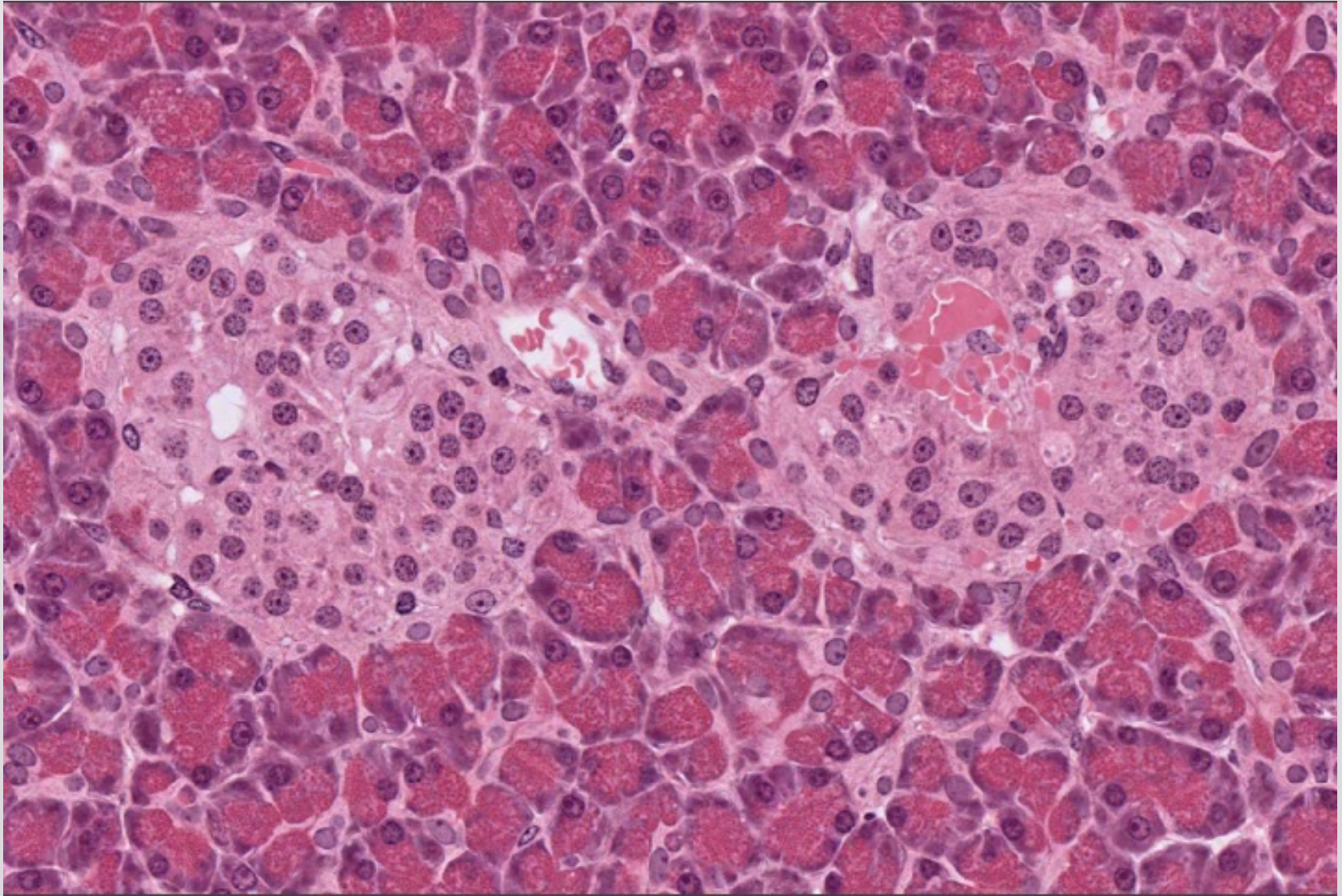
- The enzymes are produced by cells of serous acini
- Lacks striated ducts
- Pancreatic acinus consists of several serous cells surrounding a very small lumen, without myoepithelial cells
- The acinar cells: with round basal nuclei, and numerous zymogen granules apically.
- Each acinus is drained by a short intercalated duct of simple squamous or low cuboidal epithelium.



- Centroacinar cells: small pale-staining extend into the lumen of the acinus.
- Cells of the intercalated ducts secrete a large volume of fluid, rich in HCO_3^- ; alkalinizes and transports hydrolytic enzymes.
- The intercalated ducts merge with intralobular ducts and interlobular ducts (increasingly columnar epithelia) before joining the main pancreatic duct.





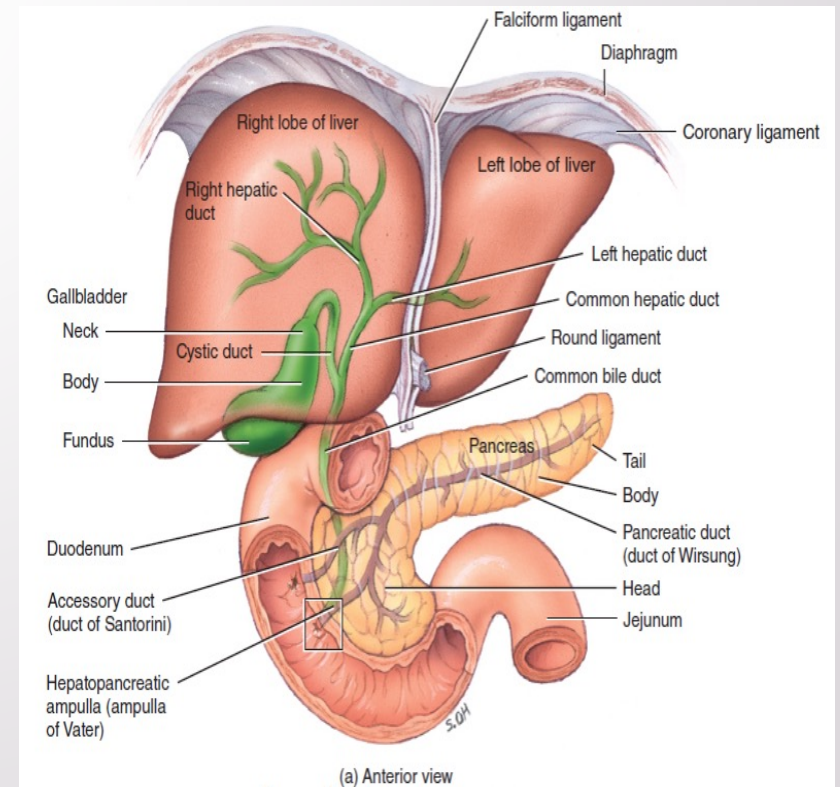




Liver And Gallbladder

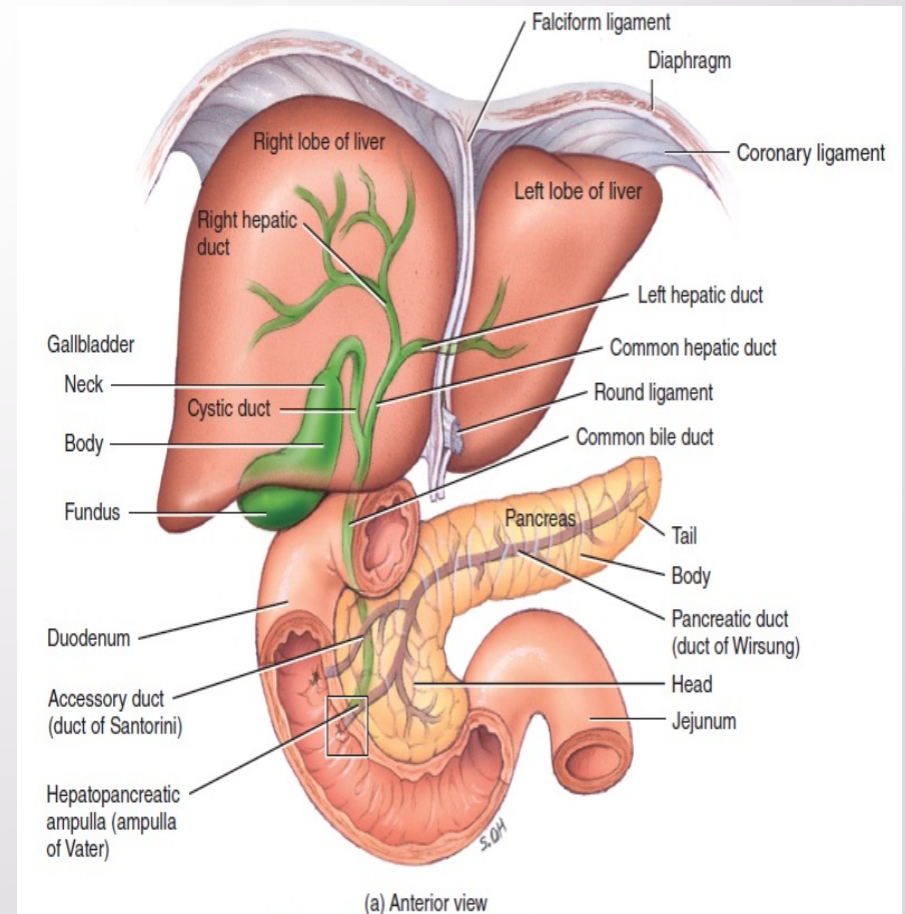
READ ONLY

- Liver is the heaviest gland of the body; 1.4 kg in an average adult.
- Second only to the skin in size.
- Liver is inferior to the diaphragm and occupies most of the right hypochondriac and part of the epigastric regions of the abdominopelvic cavity.
- The **gallbladder** is a pear-shaped sac located in a depression of the posterior surface of the liver.
- It is 7–10 cm long and typically hangs from the anterior inferior margin of the liver.



Anatomy Of The Liver And Gallbladder

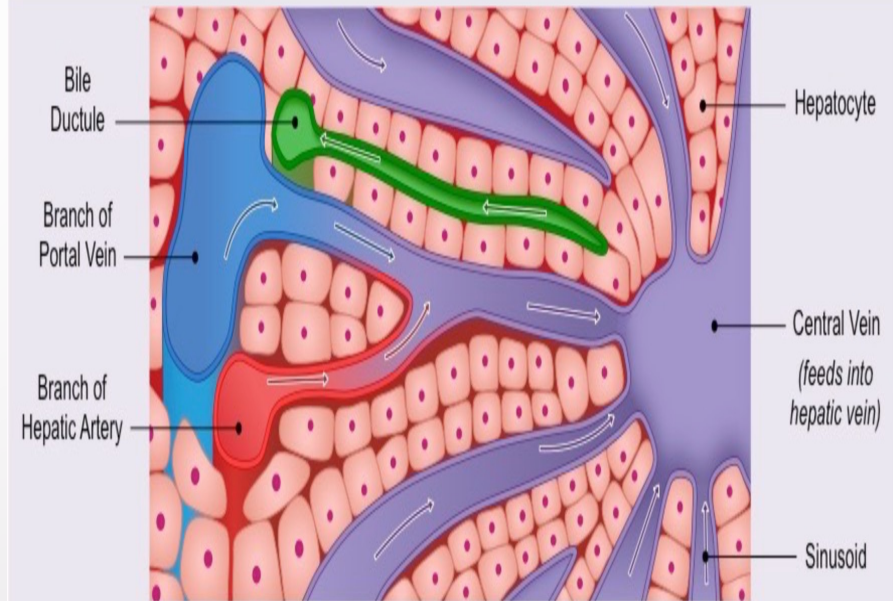
- The liver is almost completely covered by visceral peritoneum and is completely covered by a dense irregular connective tissue layer that lies deep to the peritoneum.
- The liver is divided into two principal lobes—a large **right lobe** and a smaller **left lobe**—by the falciform ligament, and smaller lobes: **quadrate lobe** and **caudate lobe**.
- The parts of the gallbladder include: the broad **fundus** (projects beyond the inferior border of the liver), the **body** (central portion) and the **neck** (tapered portion).



Histology Of The Liver

1.Hepatocytes: are the major functional cells of the liver and perform: metabolic, secretory, and endocrine functions.

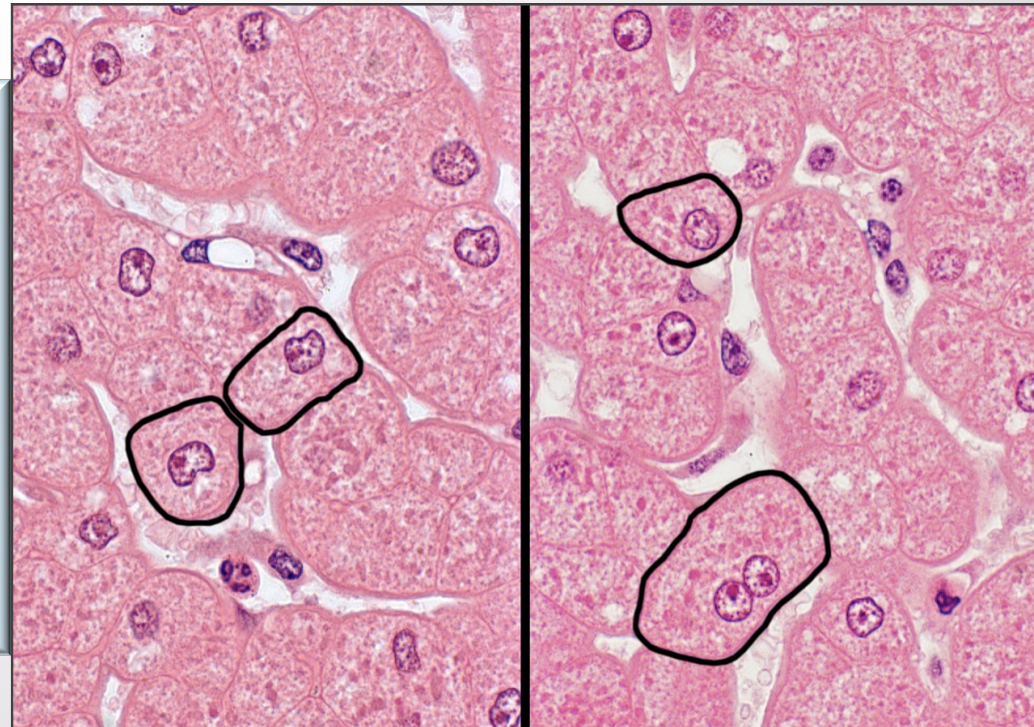
- Specialized epithelial cells with 5 to 12 sides that make up about 80% of the volume of the liver.
- Hepatocytes form complex three-dimensional arrangements called **hepatic laminae**.



- The hepatic laminae are plates of hepatocytes one cell thick bordered on either side by the endothelial-lined vascular spaces called hepatic sinusoids.
- Grooves in the cell membranes between neighboring hepatocytes provide spaces for canaliculi (hepatocytes secrete bile in).

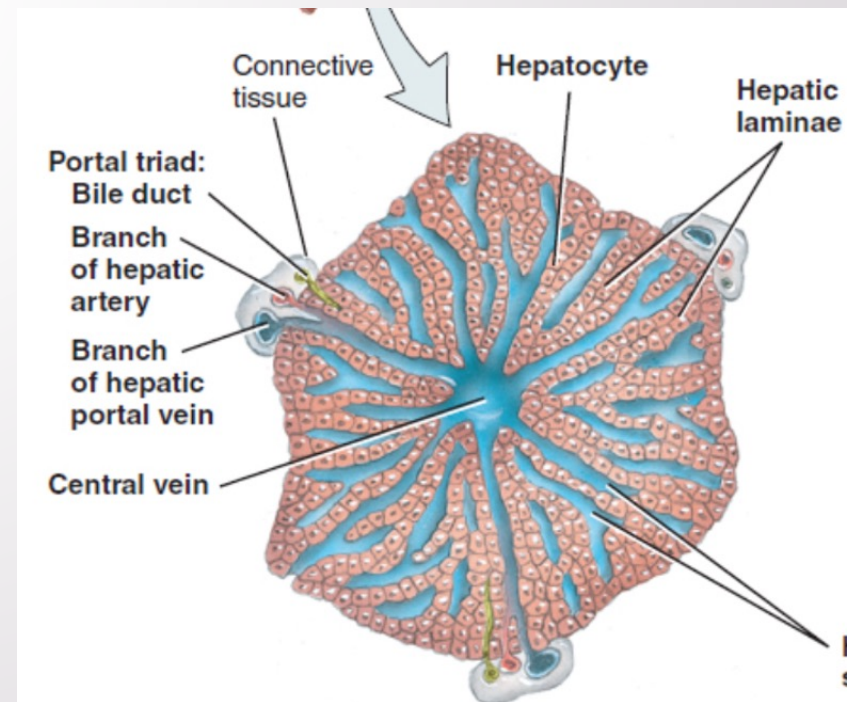
Hepatocytes

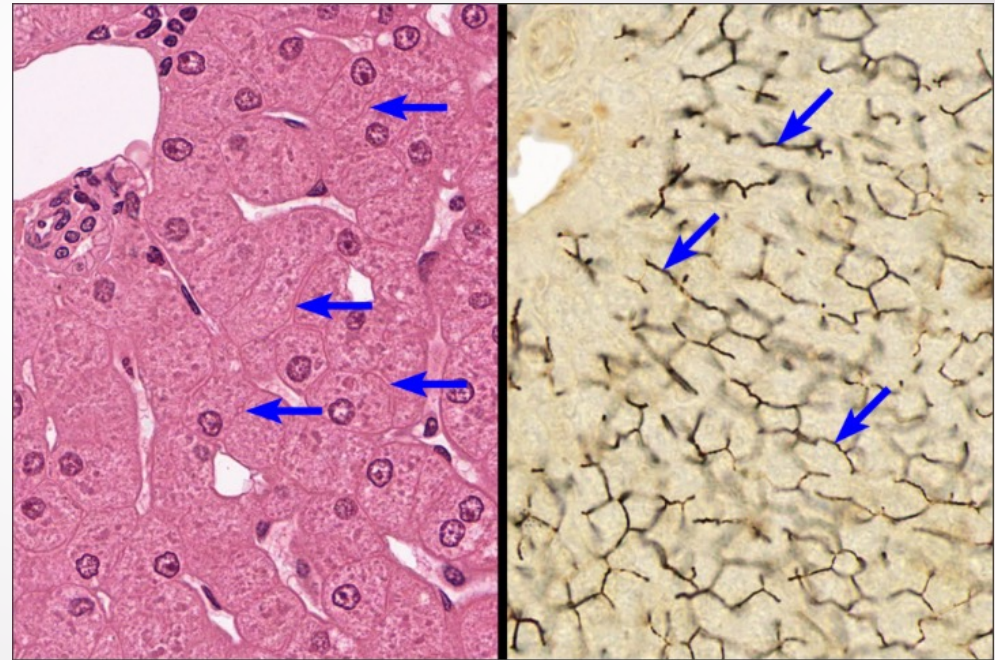
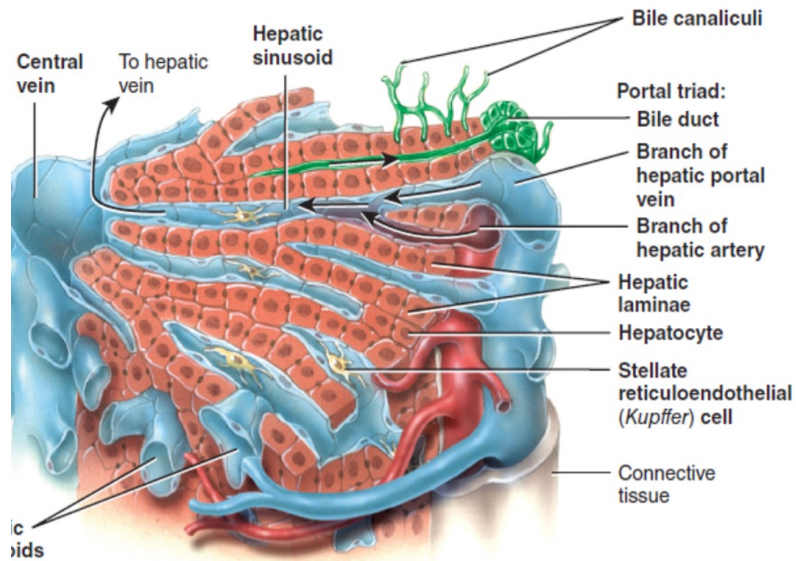
- Most functionally diverse cells of the body---- various functions and secretes several molecules.
- Large cuboidal or polyhedral epithelial cells, with large, round central nuclei.
- Eosinophilic cytoplasm rich in mitochondria.
- Cells are frequently **binucleated**.
- 50% of them are polyploid--- 2-8 times the normal chromosome number.



Hepatic lobules

- Hepatocytes form hundreds of irregular plates (reticulin support) arranged radially around a small central vein---lobules (*thousands*)
- Peripherally each lobule has 3-6 portal areas -----contains three interlobular structures (portal triad):
- A **venule** branch of the portal vein, with blood rich in nutrients but low in O₂,
- An **arteriole** branch of the hepatic artery that supplies O₂,
- One or two small bile **ductules**.
- Lymphatics and nerves.





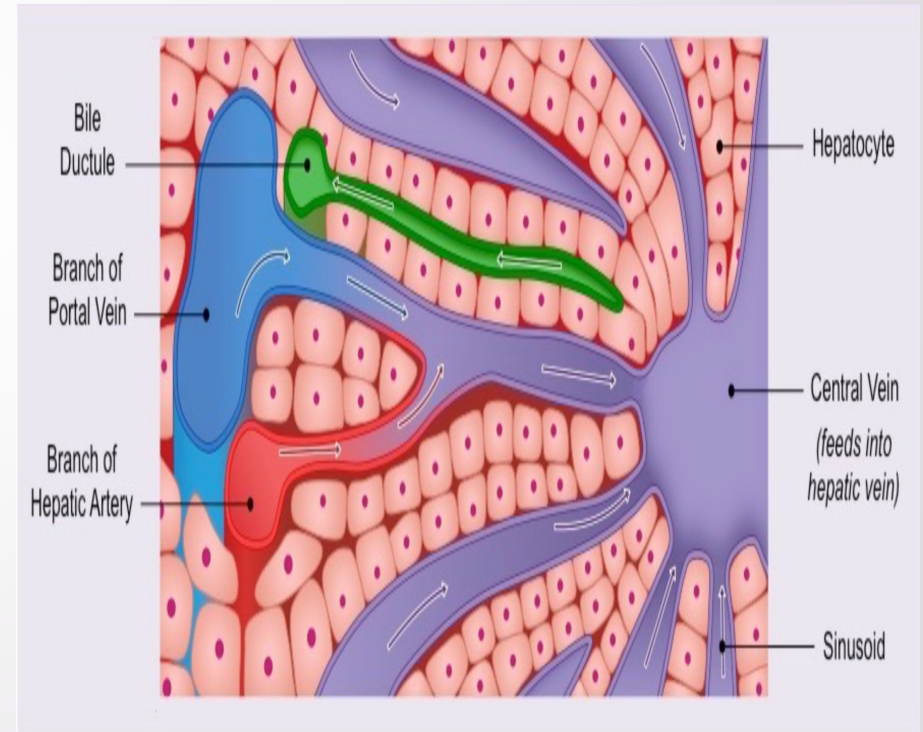
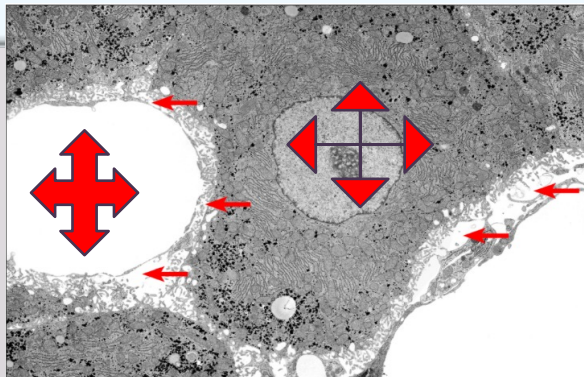
- The common hepatic duct joins the **cystic duct** from the gallbladder to form the **common bile duct**---bile enters the duodenum of the small intestine.

Bile canaliculi: small ducts between hepatocytes that collect bile produced by the hepatocytes.

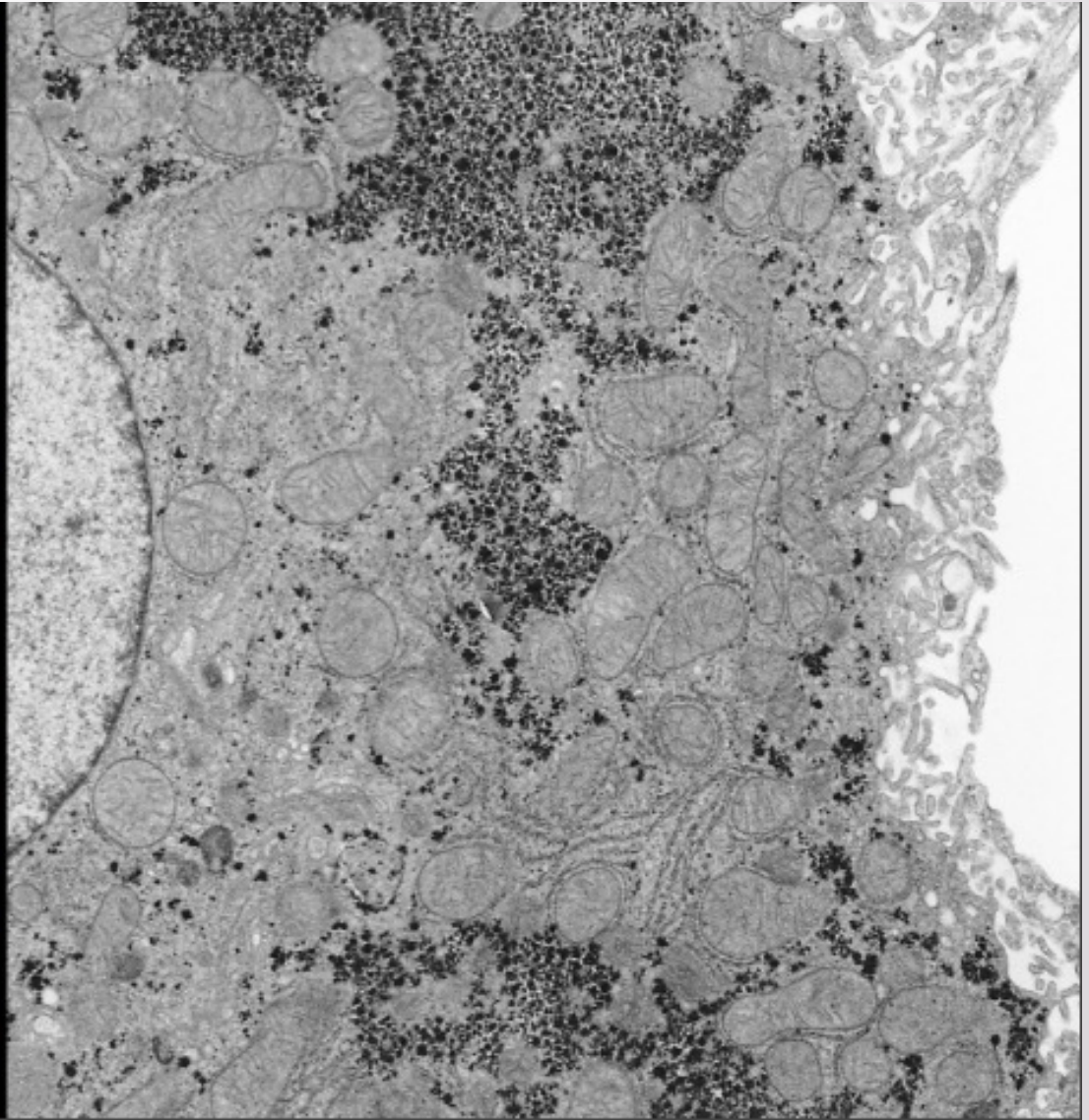
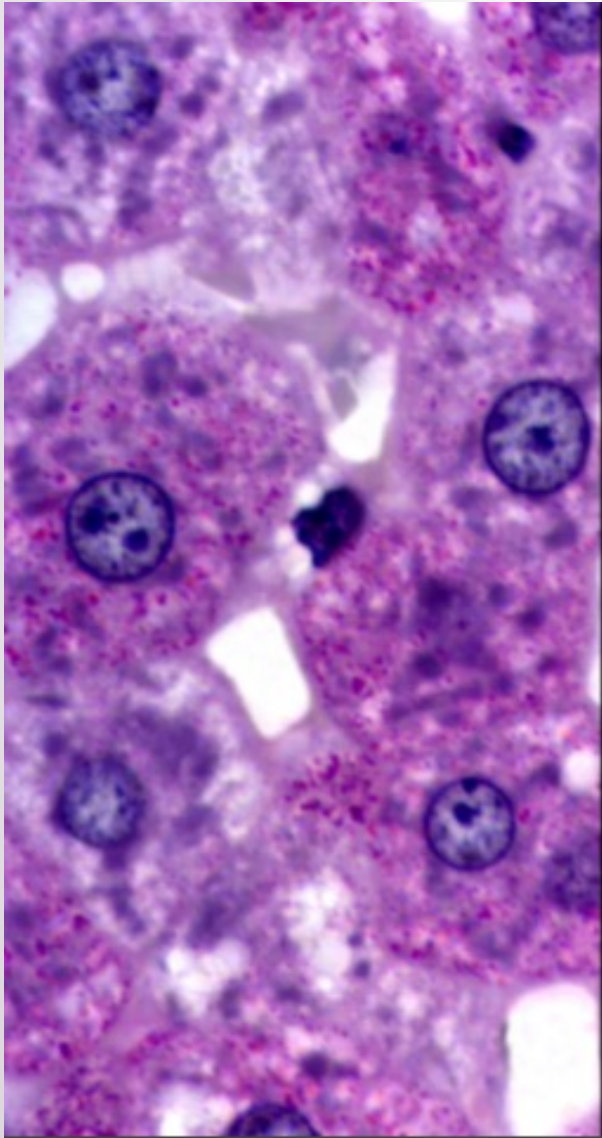
- From bile canaliculi, bile passes into **bile ductules** and then **bile ducts**.
- The bile ducts merge and eventually form the larger **right** and **left hepatic ducts**---unite---**common hepatic duct**

- **Hepatic sinusoids:** highly permeable blood capillaries(discontinuous+ fenestrated endothelium) between rows of hepatocytes that receive oxygenated blood from branches of the hepatic artery and nutrient-rich deoxygenated blood from branches of the hepatic portal vein.
- Hepatic sinusoids converge and deliver blood into a **central vein---** to **hepatic veins----**to inferior vena cava
- **Portal triad:** a bile duct, branch of the hepatic artery, and branch of the hepatic vein.

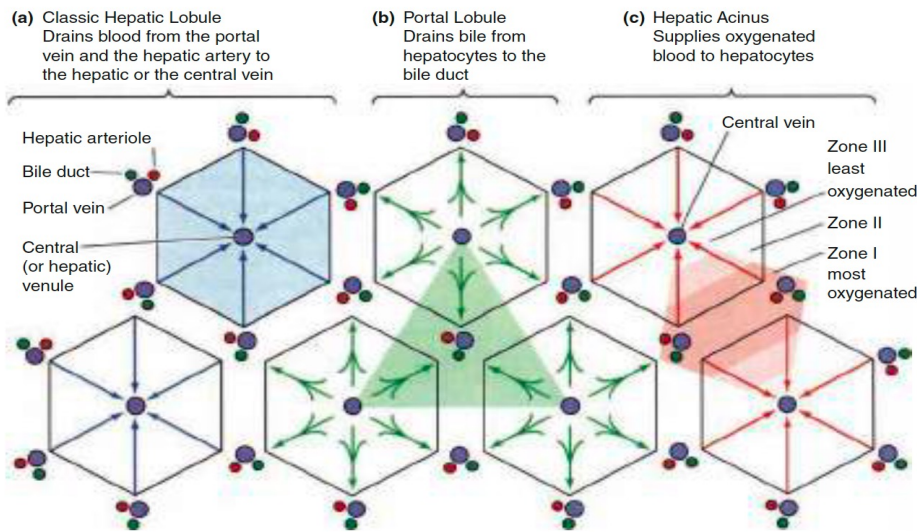
- The discontinuities and fenestrations allow plasma to fill a narrow perisinusoidal space (or space of Disse) and directly bathe the many irregular microvilli projecting from the hepatocytes into this space



- **Stellate reticuloendothelial cells (Kupffer):** (*hepatic macrophages*) fixed phagocytes, destroy worn-out WBCs/RBCs, bacteria, and foreign matter in the venous blood draining from the gastrointestinal tract.



- (A) **Classic lobule** concept offers a basic understanding of the structure-function relationship in liver organization and emphasizes the endocrine function of hepatocytes as blood flows past them toward the central vein.



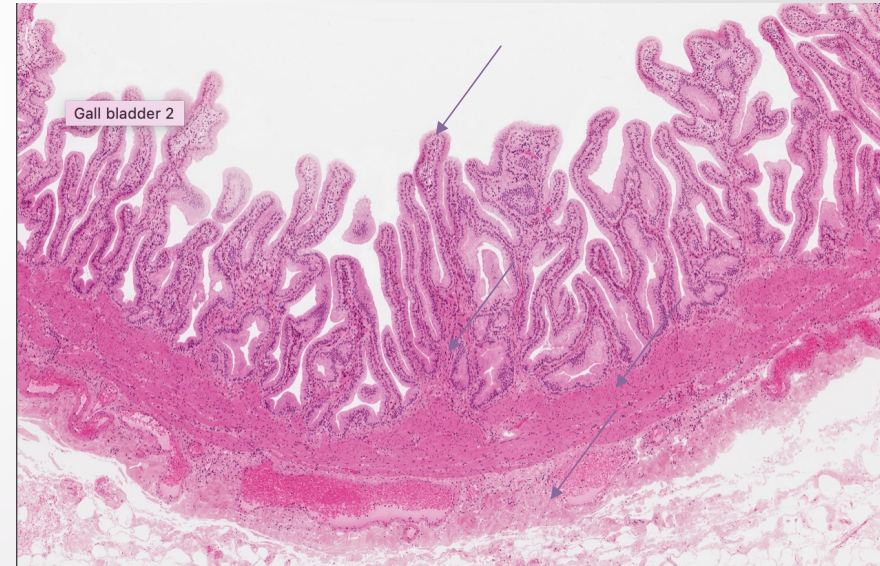
- (B) **Portal lobule** emphasizes the hepatocytes' exocrine Function and the flow of bile from regions of three classic lobules Toward the bile duct in the portal triad at the center here. The area Drained by each bile duct is roughly triangular.

- (C) **Hepatic acinus** concept emphasizes the different oxygen and nutrient contents of blood at different distances along the sinusoids, with blood from each portal area supplying cells in two or more classic lobules. Major activity of each hepatocyte is determined by its location along the oxygen/nutrient gradient:

Periportal cells of zone I get the most oxygen and nutrients and show metabolic activity generally different from the pericentral hepatocytes of zone III, exposed to the lowest oxygen and nutrient concentrations.

Histology Of The Gallbladder

- Mucosa consists of simple columnar epithelium arranged in rugae.
- The wall lacks a submucosa.
- The middle, muscular coat consists of smooth muscle fibers.
- Contraction of the smooth muscle fibers ejects the contents of the gallbladder into the **cystic duct**.



- The gallbladder's outer coat is the visceral peritoneum.
- **The functions of the gallbladder** are to store and concentrate the bile produced by the liver (up to tenfold) until it is needed in the duodenum.
- In the concentration process, water and ions are absorbed by the gallbladder mucosa.
- The lining epithelial cells of the gallbladder have prominent mitochondria, microvilli, and large intercellular spaces