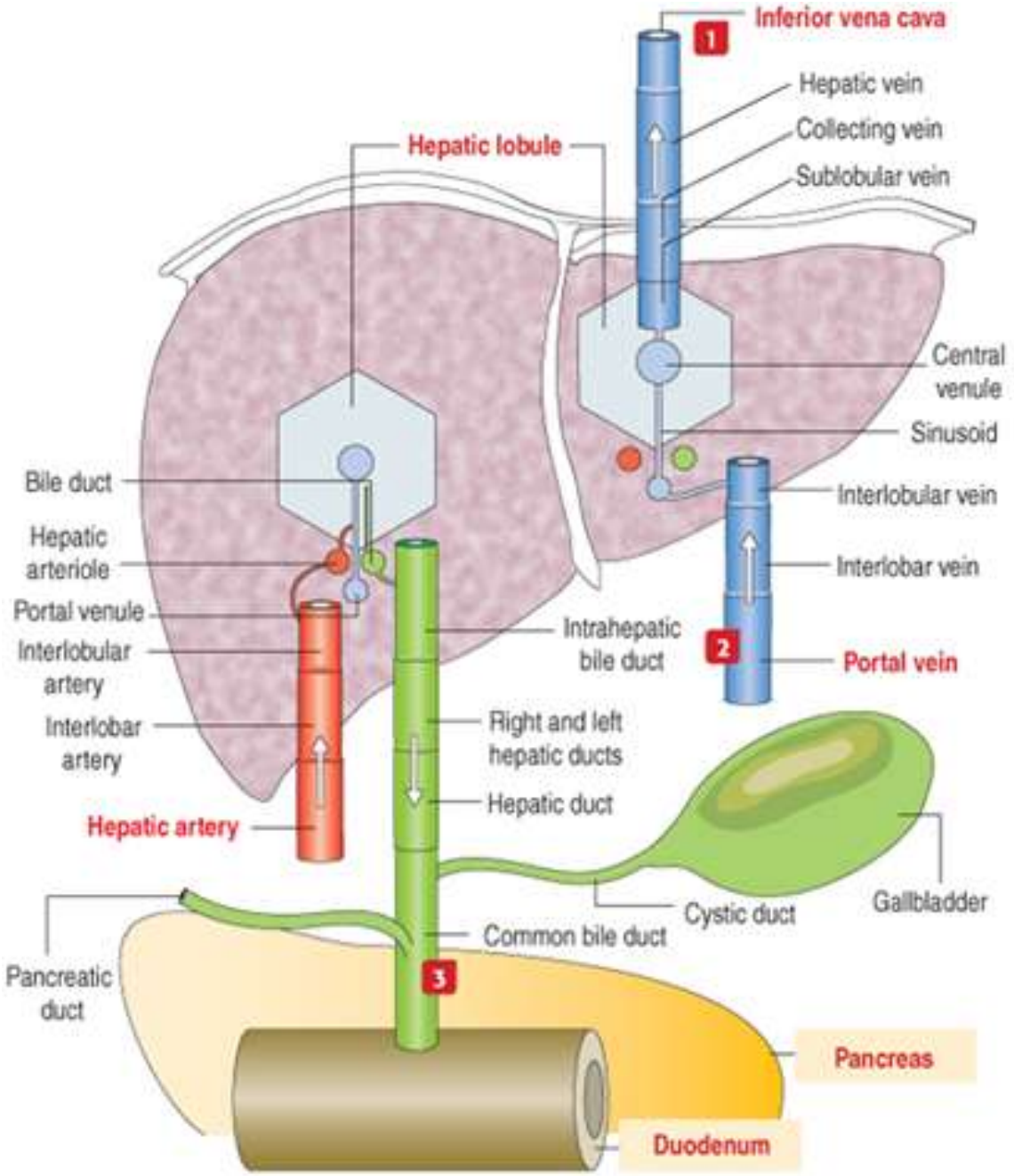
HISTOLOGI
SISTEM ENTEROHEPATIK

LABORATORIUM HISTOLOGI

2016

Sasbel:
Mahasiswa mampu menjelaskan

- Mahasiswa mampu menjelaskan:
  - histologi struktur hepar dan fungsinya
  - struktur sinusoid hepar dan sel-sel di dalamnya
  - struktur *space of disse* hepar dan sel-sel di dalamnya
  - portal triad hepar
  - histologi saluran empedu dan fungsinya
  - histologi kelenjar eksokrin pankreas dan fungsinya


Inferior vena cava
1
Hepatic vein
Collecting vein
Sublobular vein
Hepatic lobule
Central venule
Sinusoid
Bile duct
Hepatic arteriole
Portal venule
Interlobular artery
Interlobar artery
Hepatic artery
Interlobular vein
Interlobar vein
Intrahepatic bile duct
2
Portal vein
Right and left hepatic ducts
Hepatic duct
Cystic duct
Gallbladder
Common bile duct
3
Pancreatic duct
Pancreas
Duodenum

hepar

Fat metabolism

- Oxidising triglycerides to produce energy
- Synthesis of plasma lipoproteins
- Synthesis of cholesterol and phospholipid

Carbohydrate metabolism

- Converting carbohydrates and proteins into fatty acids and triglyceride
- Regulation of blood glucose concentration by glycogenesis, glycogenolysis and gluconeogenesis

Protein metabolism

- Synthesis of plasma proteins, including albumin and clotting factors
- Synthesis of non-essential amino acids
- Detoxification of metabolic waste products (e.g. deamination of amino acids and production of urea)

Storage

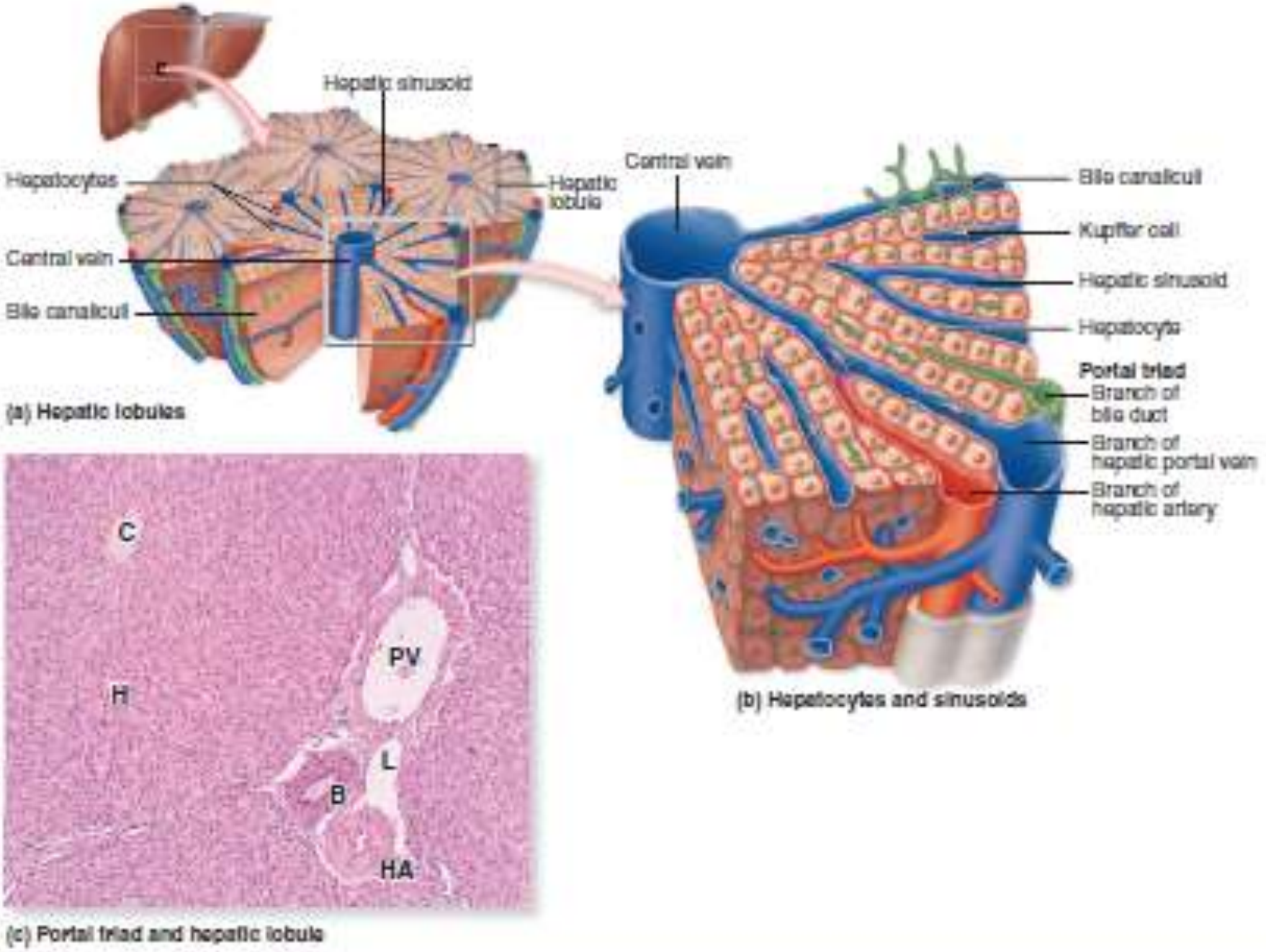
- Storage of glycogen, vitamins, iron

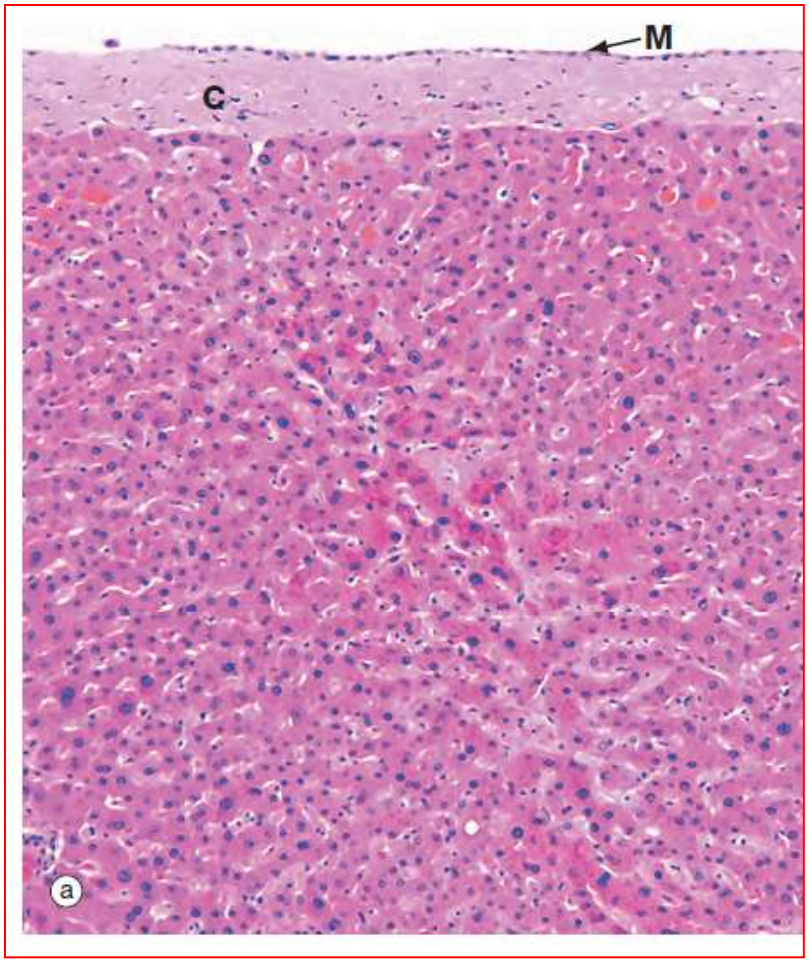
Intermediary metabolism

- Detoxification of various drugs and toxins (e.g. alcohol)

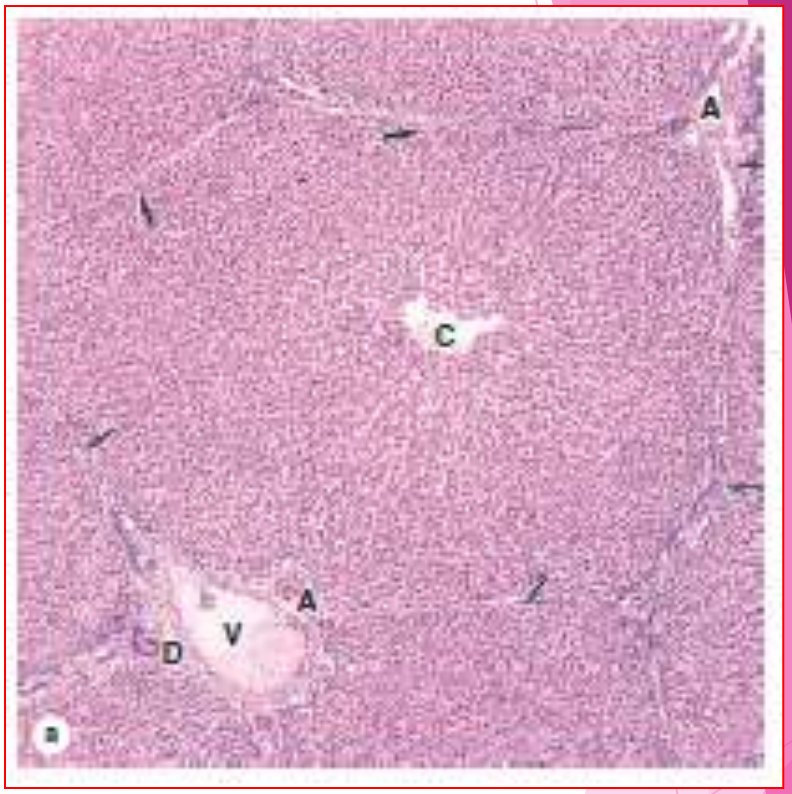
Secretion

- Synthesis and secretion of bile, which contains many of the products of the above processes


C
Hepatic sinusoid
Hepatocytes
Hepatic lobule
Central vein
Bile canaliculi
(a) Hepatic lobules
Central vein
Bile canaliculi
Kupffer cell
Hepatic sinusoid
Hepatocyte
Portal triad
Branch of bile duct
Branch of hepatic portal vein
Branch of hepatic artery
(b) Hepatocytes and sinusoids
C
PV
H
L
B
HA
(c) Portal triad and hepatic lobule

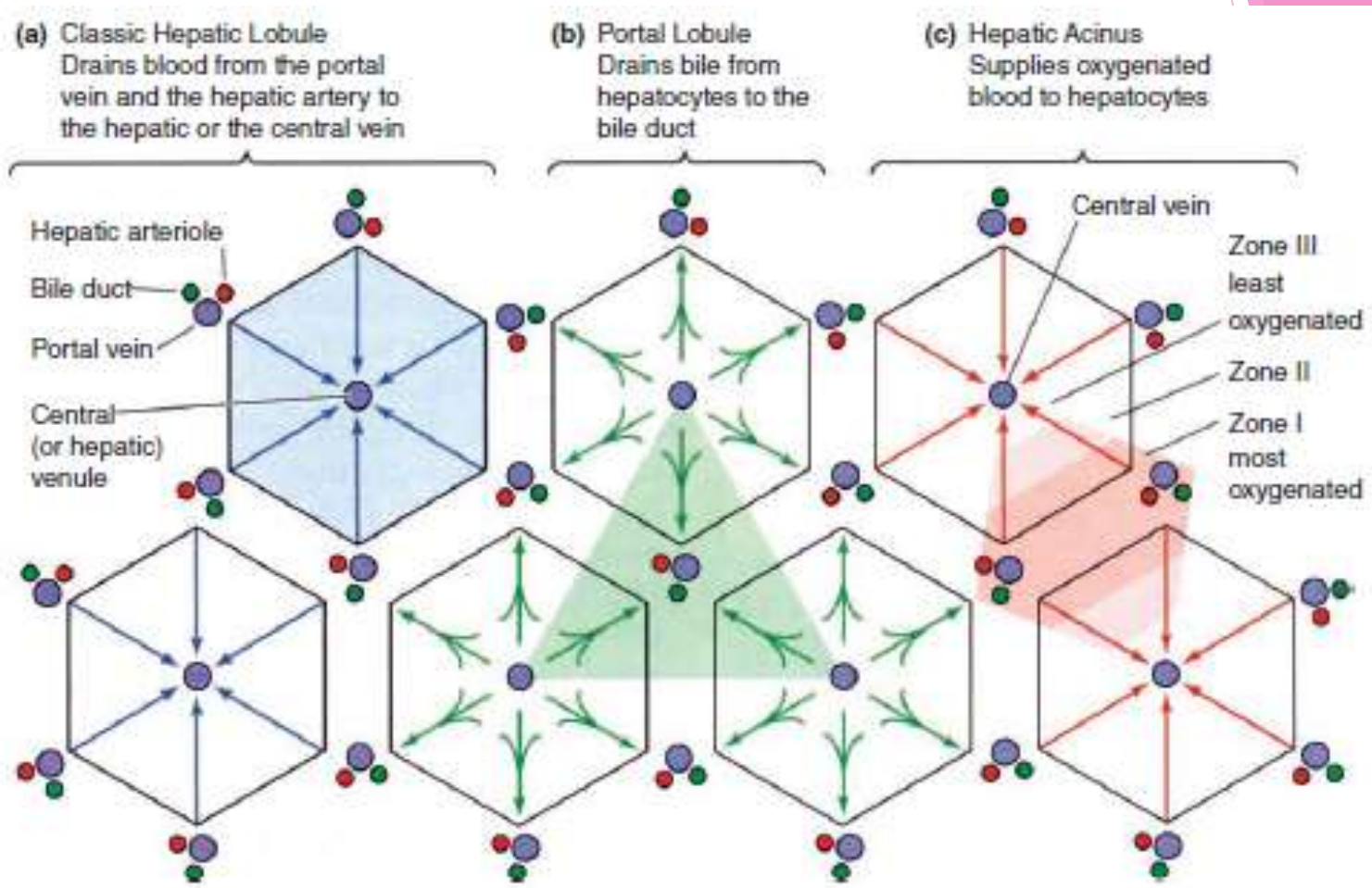


Young ,2014

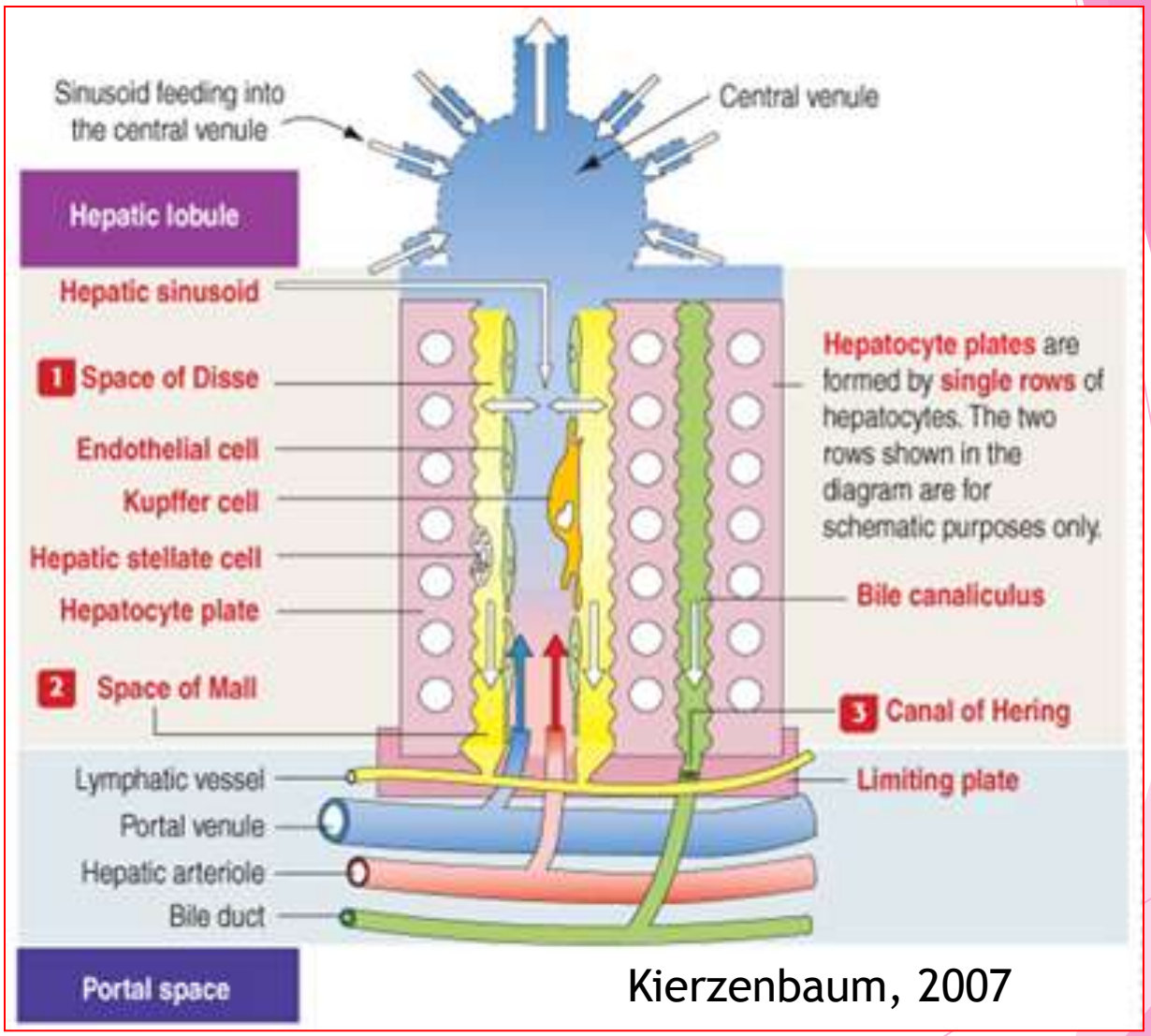


Mescher, 2012

Konsep lobulus hepar

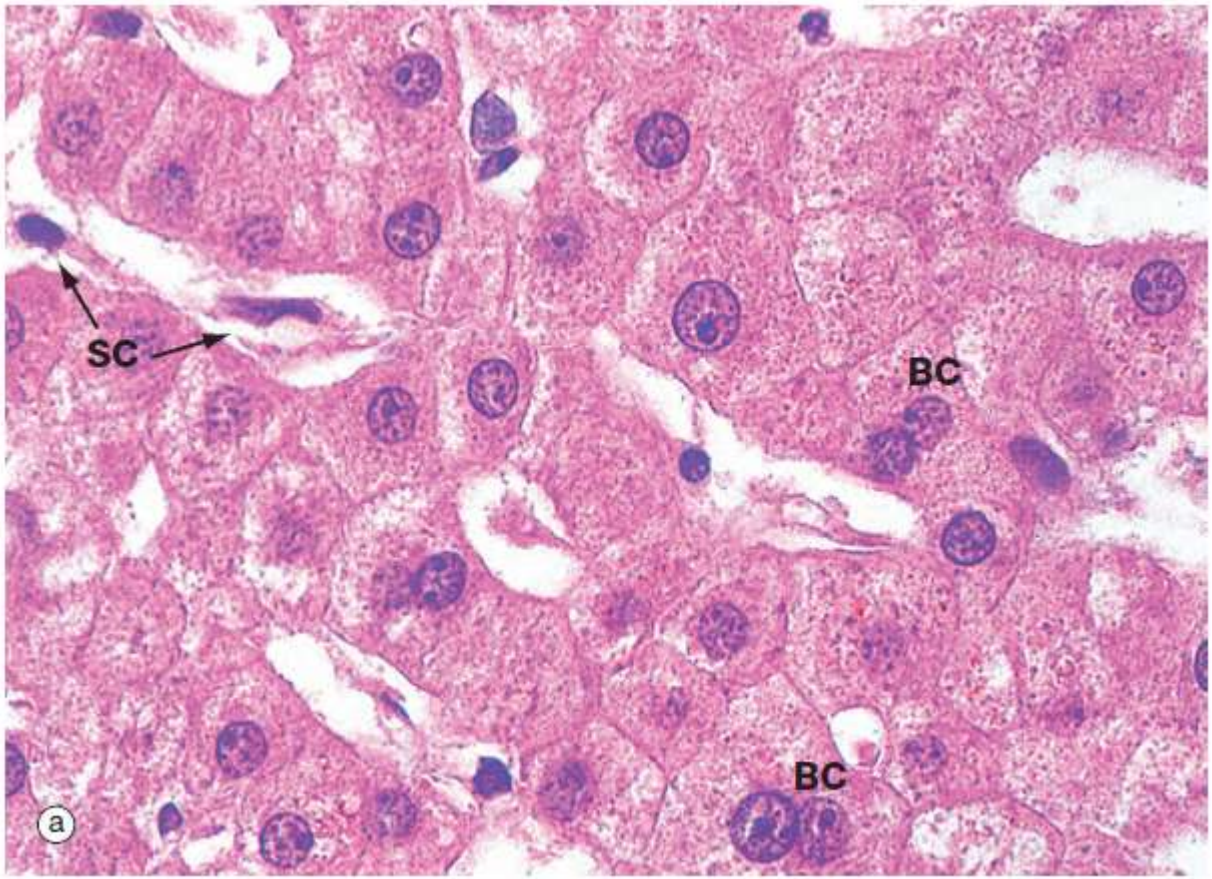


Mescher, 2012



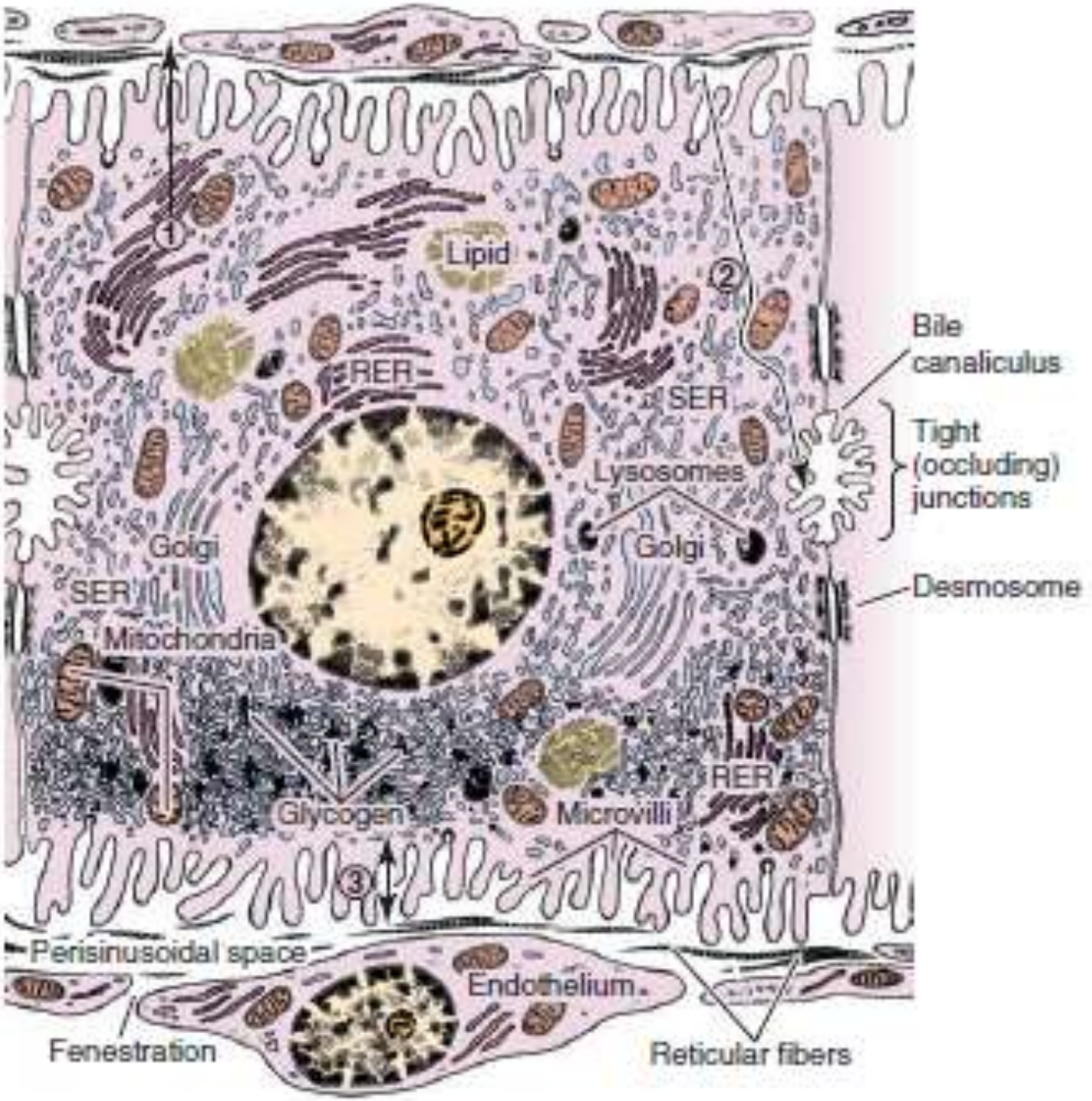
Kierzenbaum, 2007

hepatosit

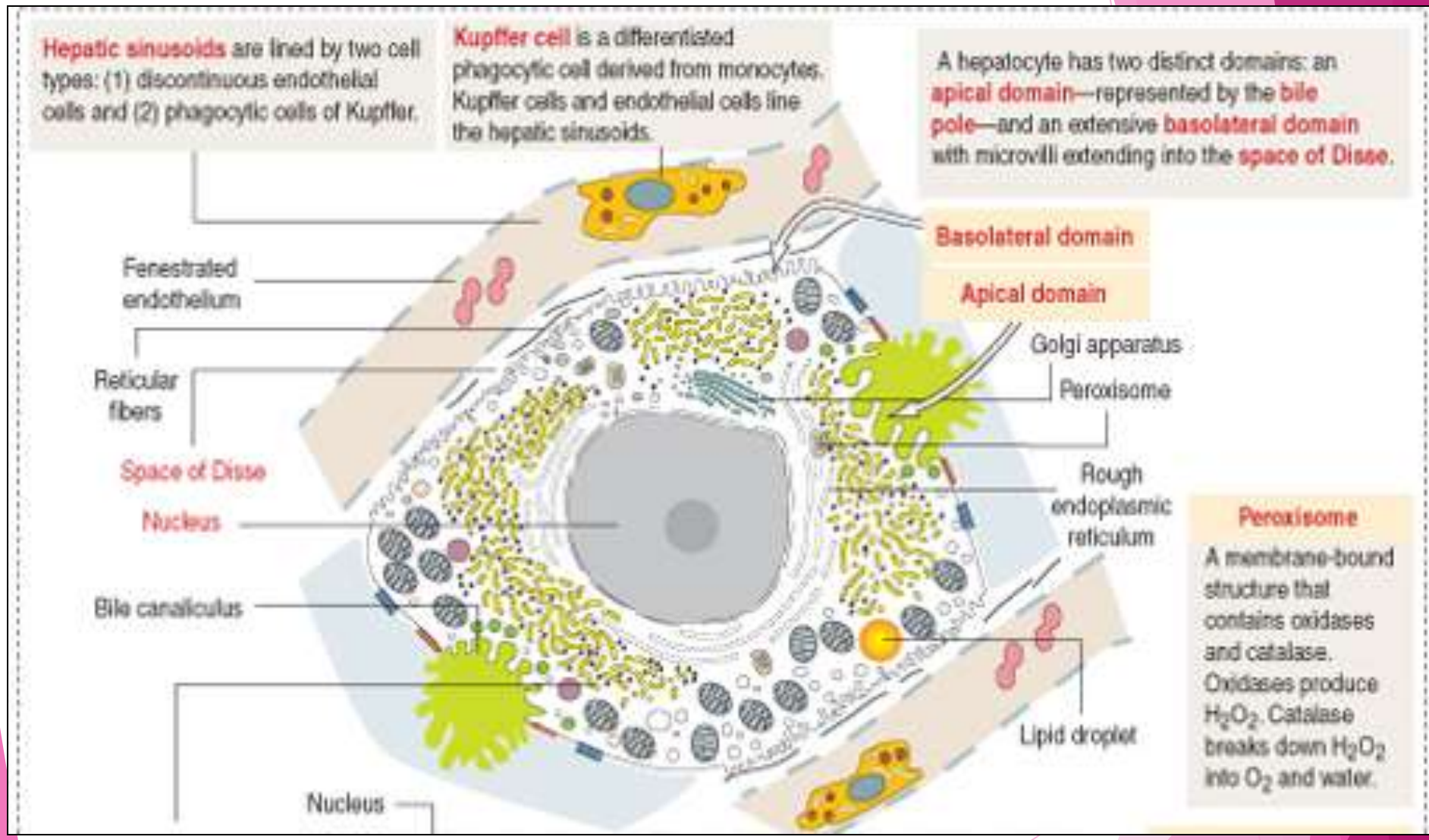


Mitokondria >>>

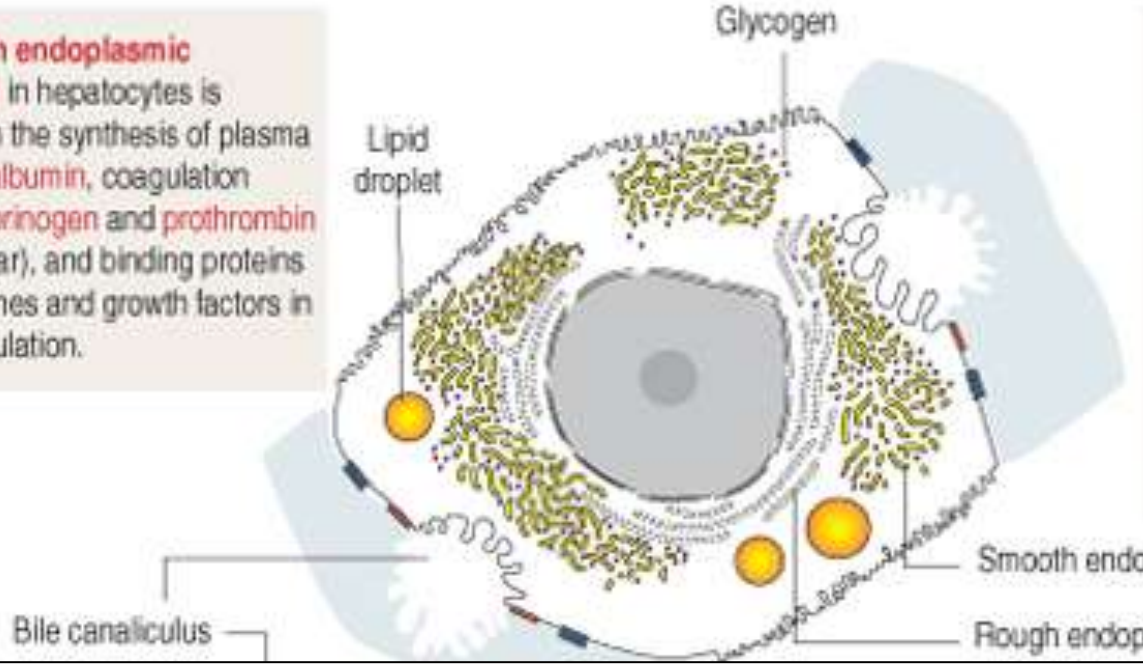
Young ,2014



Mescher, 2012

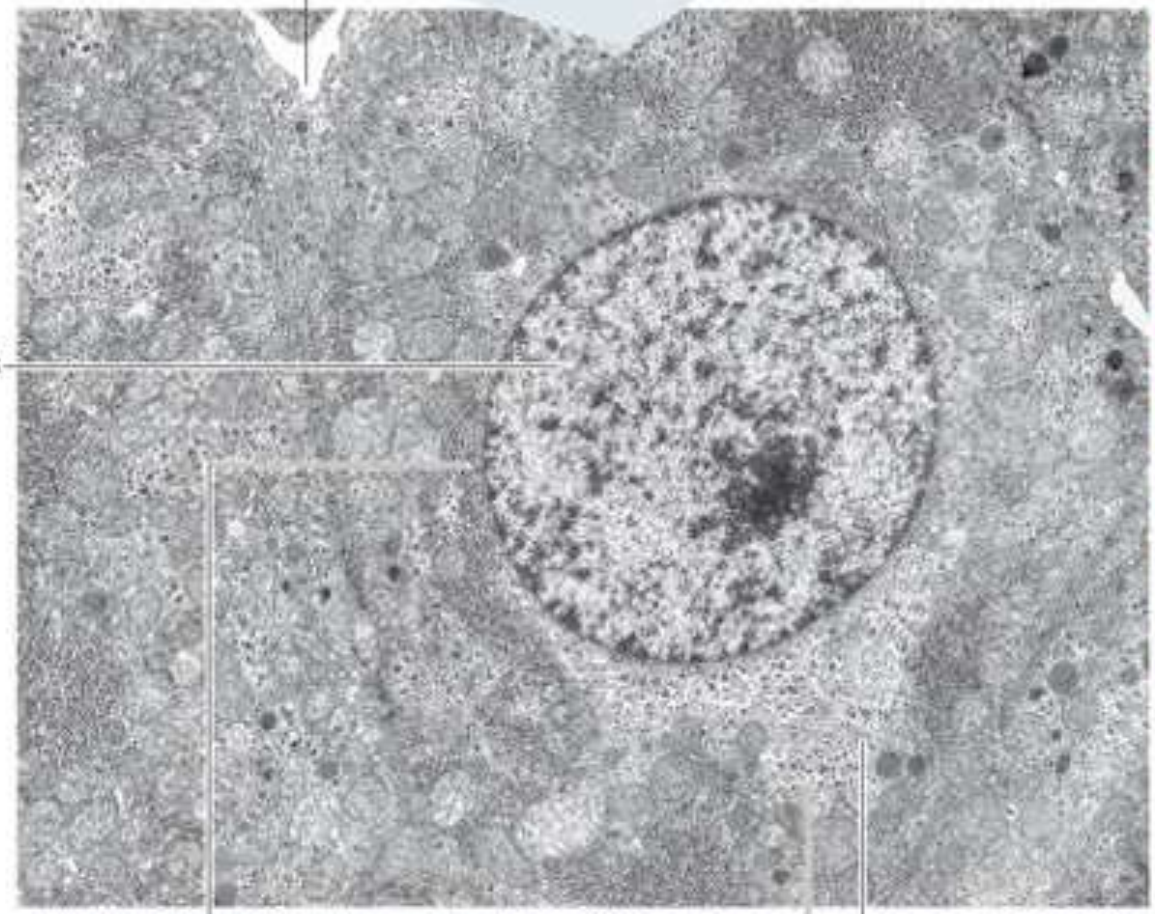

Hepatic sinusoids are lined by two cell types: (1) discontinuous endothelial cells and (2) phagocytic cells of Kupffer.
Kupffer cell is a differentiated phagocytic cell derived from monocytes. Kupffer cells and endothelial cells line the hepatic sinusoids.
A hepatocyte has two distinct domains: an apical domain—represented by the bile pole—and an extensive basolateral domain with microvilli extending into the space of Disse.
Basolateral domain
Apical domain
Fenestrated endothelium
Reticular fibers
Space of Disse
Nucleus
Bile canaliculus
Nucleus
Golgi apparatus
Peroxisome
Rough endoplasmic reticulum
Lipid droplet
Peroxisome
A membrane-bound structure that contains oxidases and catalase. Oxidases produce H_2O_2. Catalase breaks down H_2O_2 into O_2 and water.

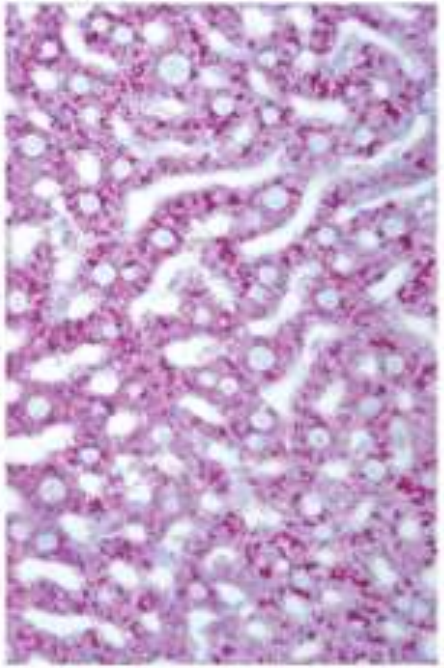
The **rough endoplasmic reticulum** in hepatocytes is involved in the synthesis of plasma proteins: albumin, coagulation factors (fibrinogen and prothrombin in particular), and binding proteins for hormones and growth factors in blood circulation.



The **smooth endoplasmic reticulum** in hepatocytes is highly developed and is always associated with clusters of glycogen molecules forming typical rosette-like inclusions.

Stored glycogen in hepatocytes represents a glucose reserve for the maintenance of sugar concentrations in blood. Glycogen is also stored in muscle.





Liver tissue stained with periodic acid–Schiff reagent to demonstrate deposits of glycogen (magenta staining) in the cytoplasm of hepatocytes.

Rough endoplasmic reticulum

Albumin, a major product of the hepatocyte, maintains plasma oncotic pressure. A decrease of albumin in a liver disease causes **edema** and **ascites**.

Blood coagulation depends on **fibrinogen**, **prothrombin**, and **factor VIII** produced in the hepatocyte. **Bleeding** is associated with liver failure. **Complement proteins**, synthesized by hepatocytes, participate in the destruction of pathogens.

Glycogen

Smooth endoplasmic reticulum

The smooth endoplasmic reticulum has an important function in **detoxification**.

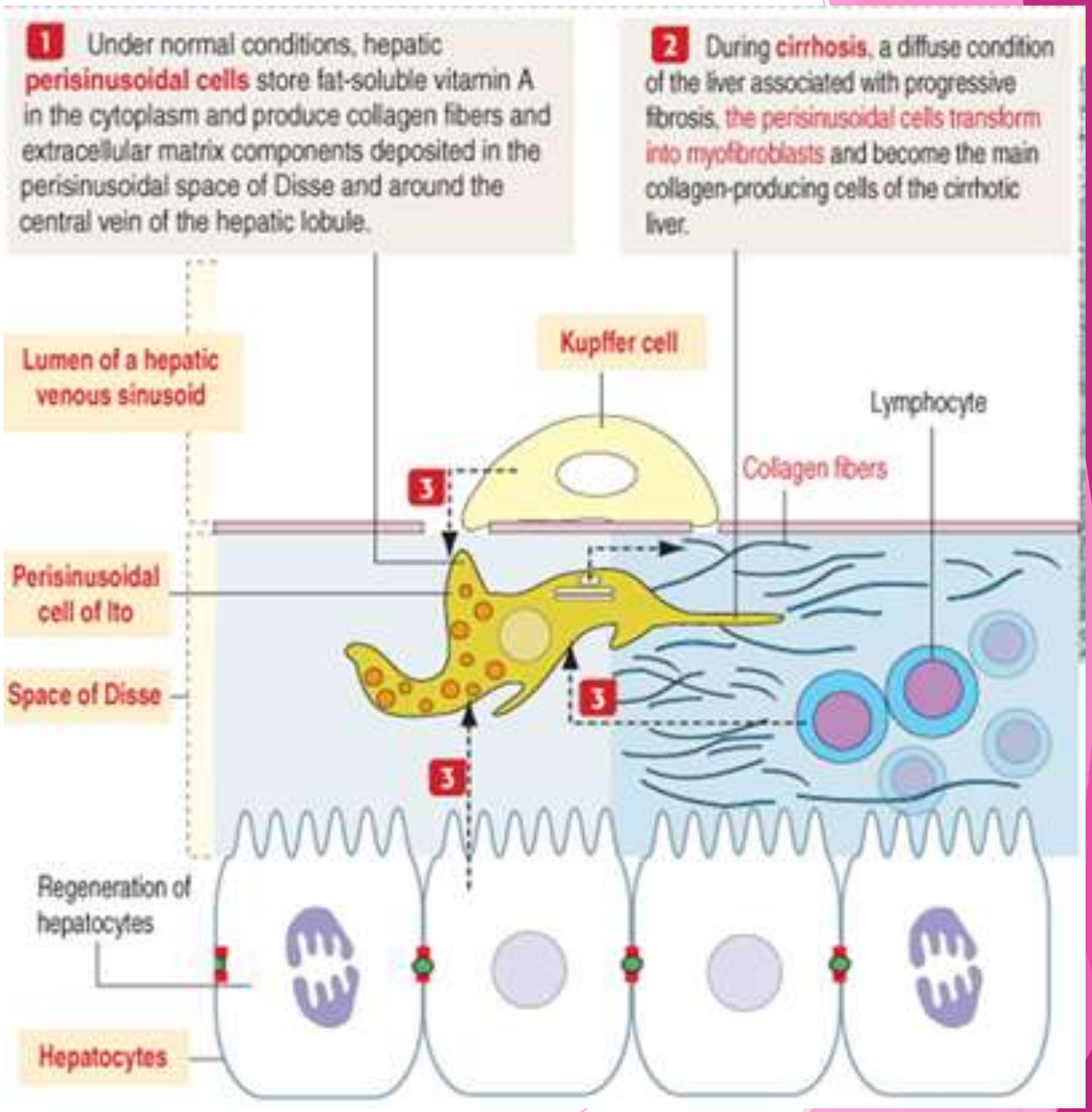
Enzymes necessary for the detoxification of drugs (barbiturates), steroids, alcohol, and other toxicants reside in the membrane of the smooth endoplasmic reticulum.

Sel Perisinusoidal = Sel Ito

- Storage and release of retinoids
- The production and turnover of ECM

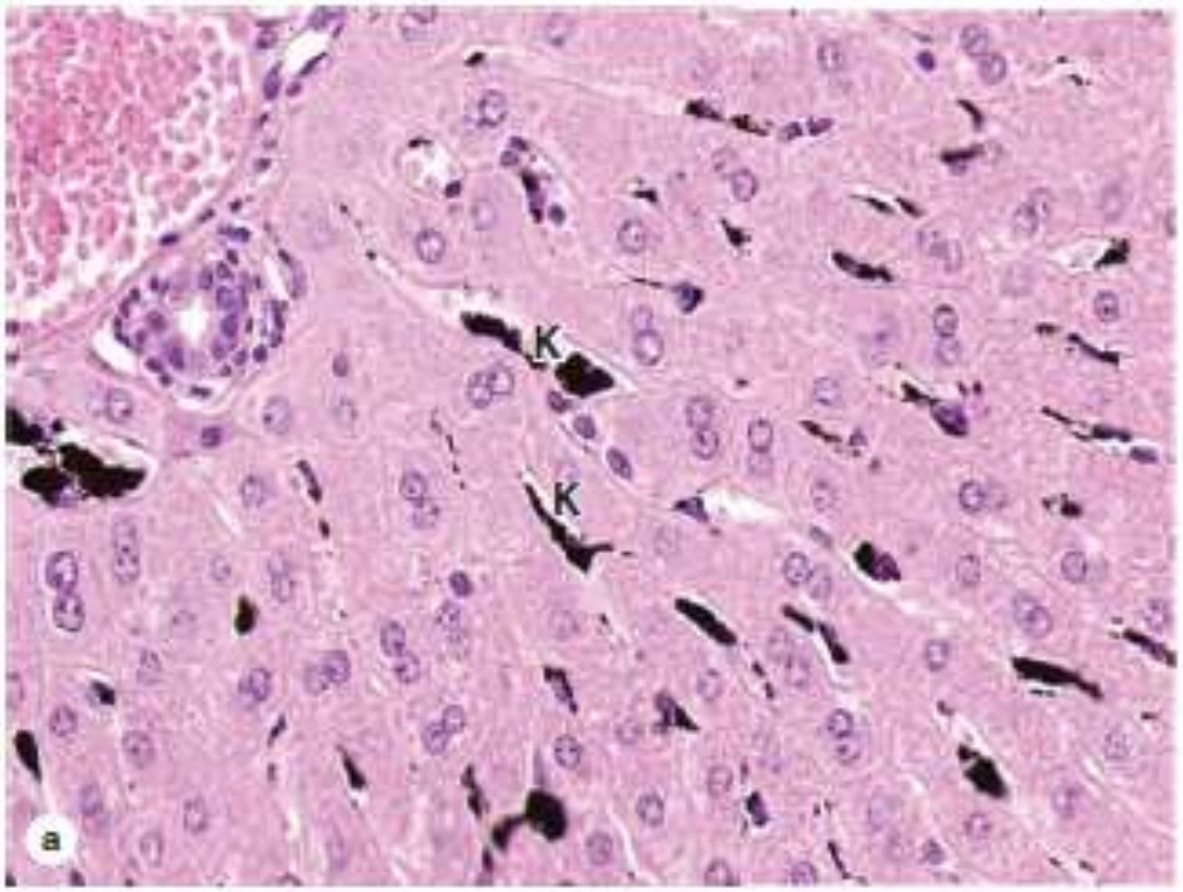
- Non proliferative cells → but can proliferate when activated by Kupffer and hepatocytes

Sel Ito



Kierzenbaum, 2007

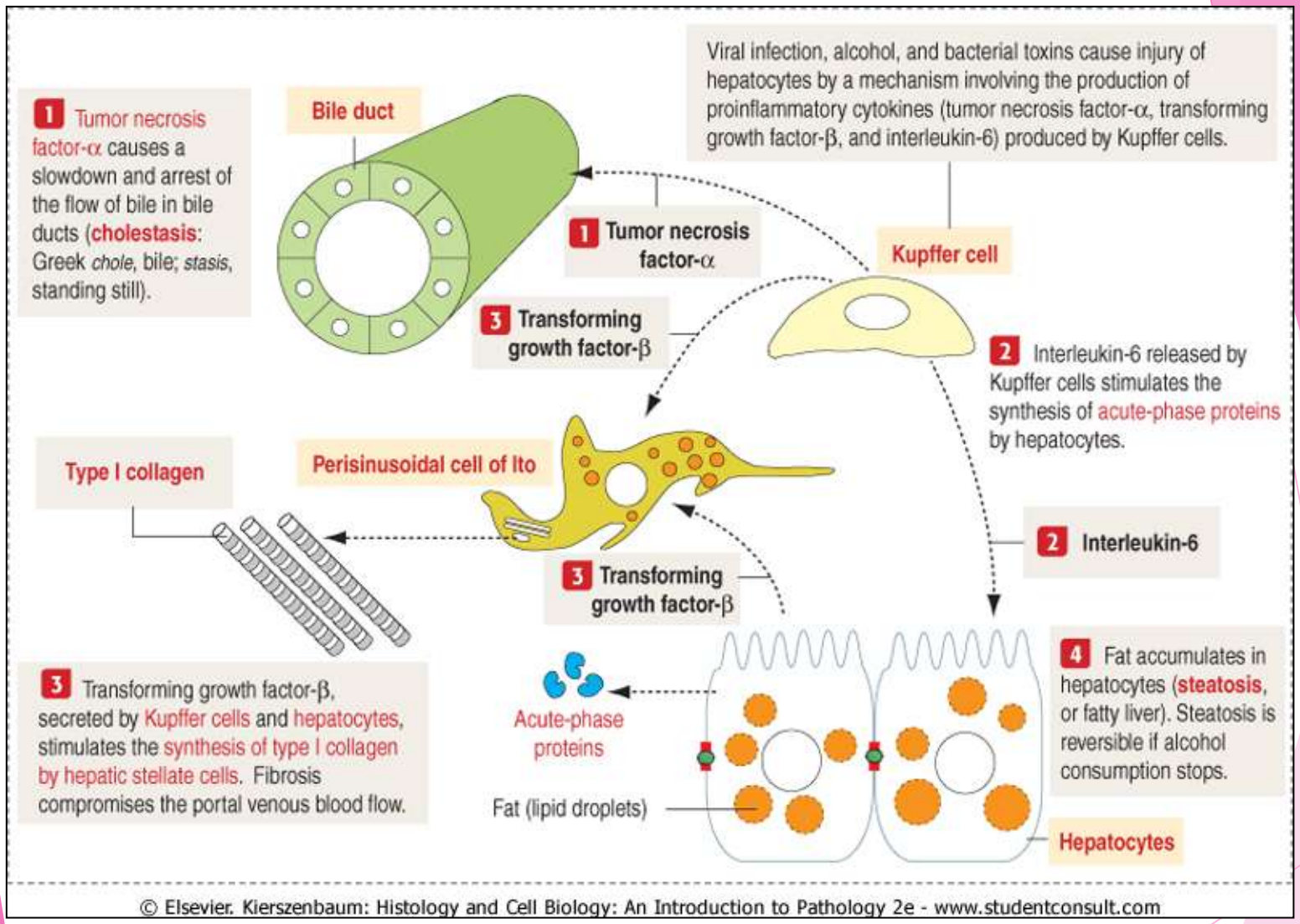
Sel kupfer



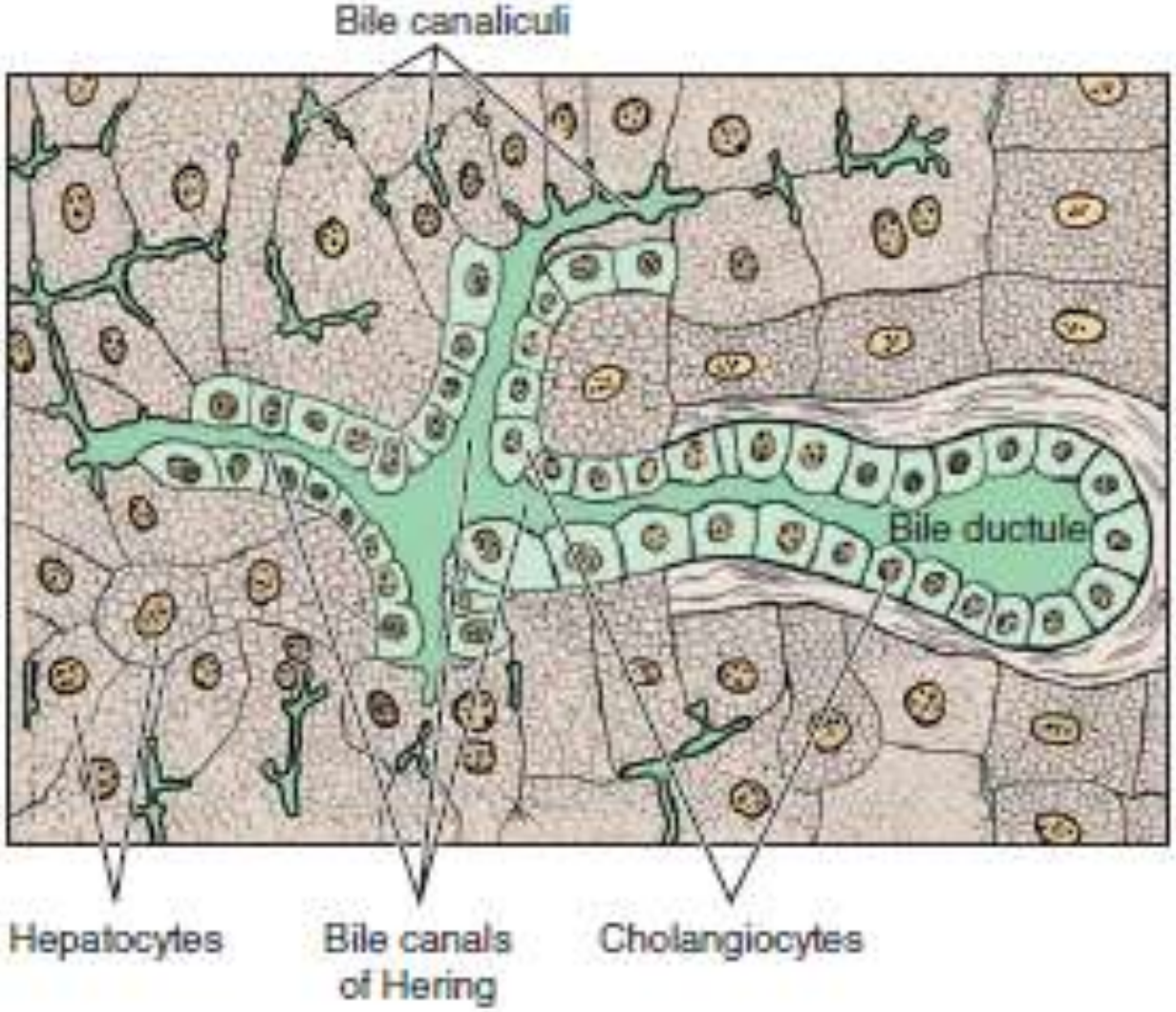
Mescher, 2012

Liver regeneration

- Early phases
  - Perisinoidal cells, macrophages, endotehleial cell
  - Endothelal cells : VEGFR2 → HGF → stimulate hepatocyte proliferation
- Prolonged liver injury
  - Perisinusoidal cell change into myofibroblast -→ fibrogenesis by depositing ECM
  - Fibrogenesis disrupts the regenerative potential of hepatocytes.



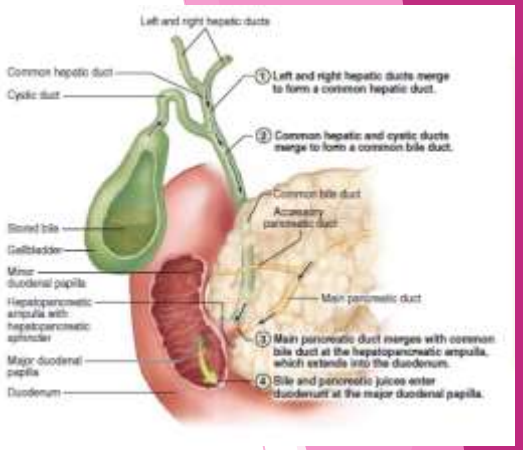
Kanalikuli biliaris



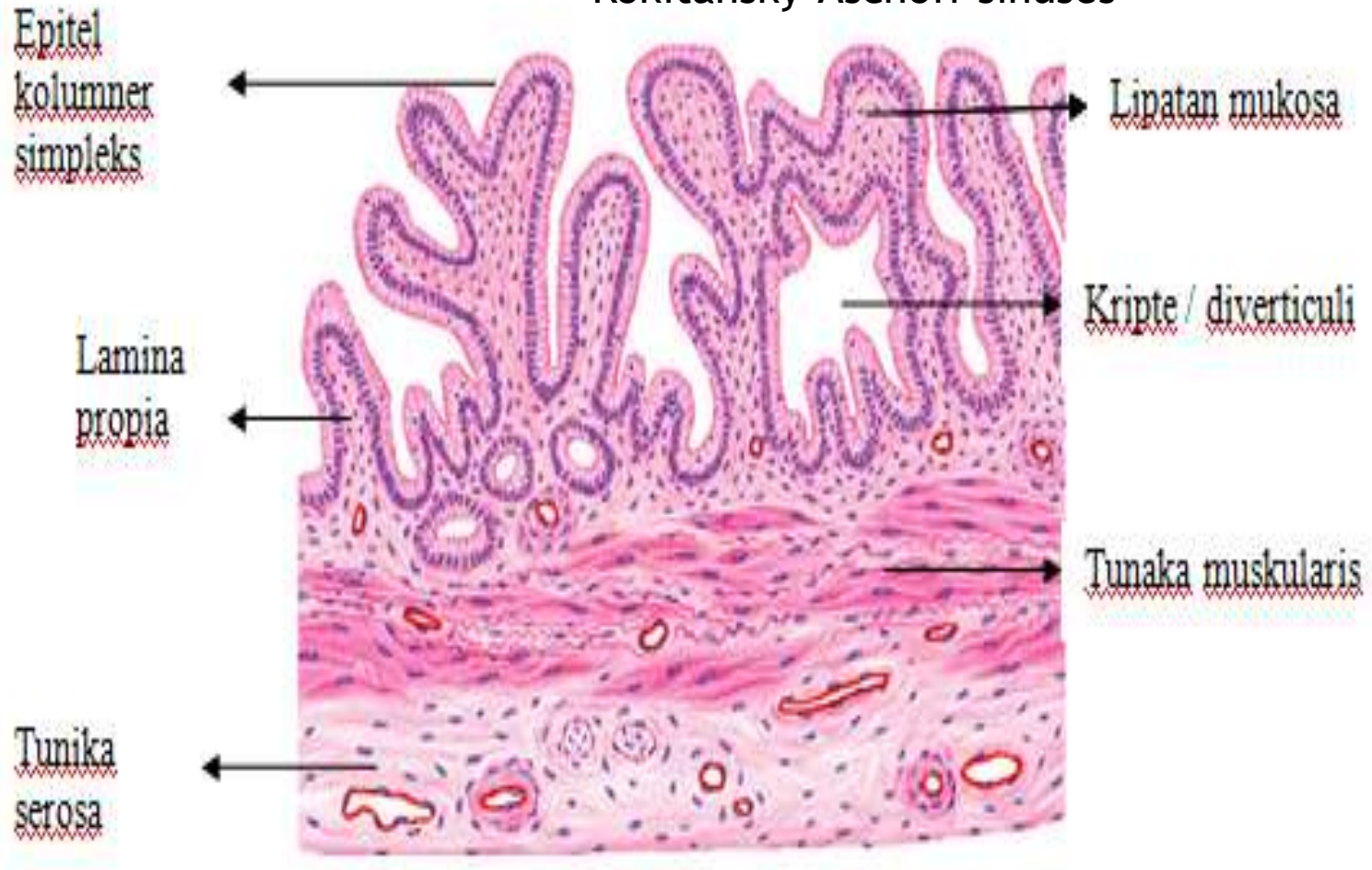
Gallbladder

The major functions of the gallbladder are:

1. Concentration (up to 10-fold) and storage of bile between meals.
2. Release of bile by contraction of the muscularis in response to **cholecystokinin** stimulation (produced by enteroendocrine cells in the duodenum) and **neural stimuli**, together with **relaxation of the sphincter of Oddi** (a muscular ring surrounding the opening of the bile duct in the wall of the duodenum).



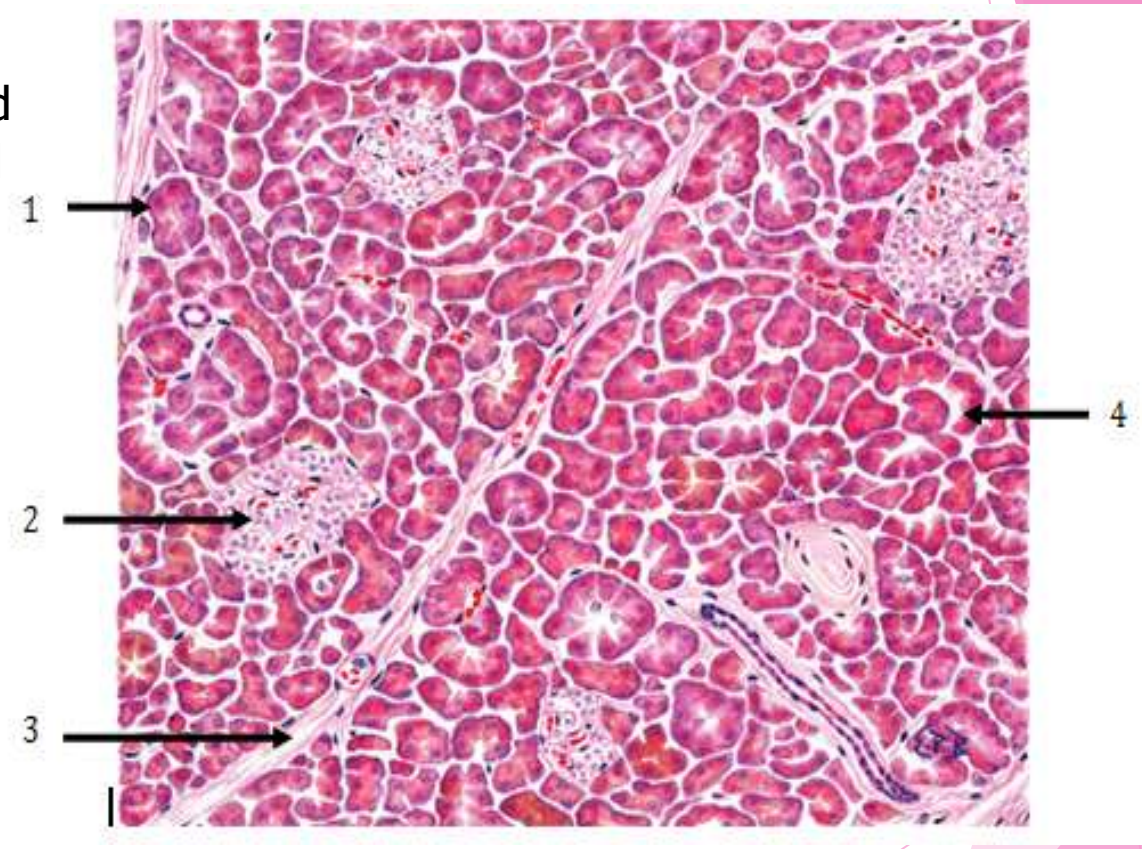
Rokitansky-Aschoff sinuses



Eroschenko, 2008

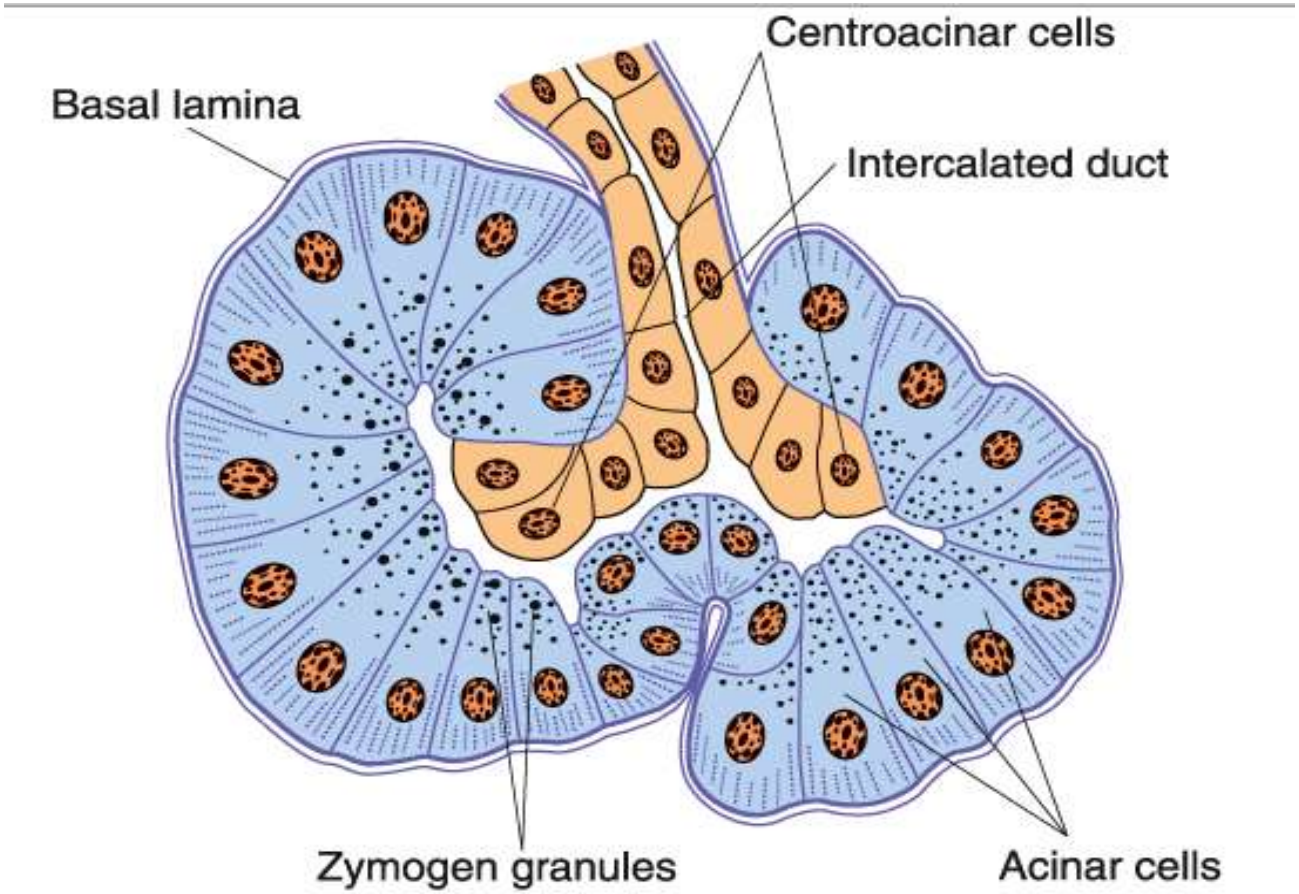
pankreas

Endokrin gland
Eksokrin gland

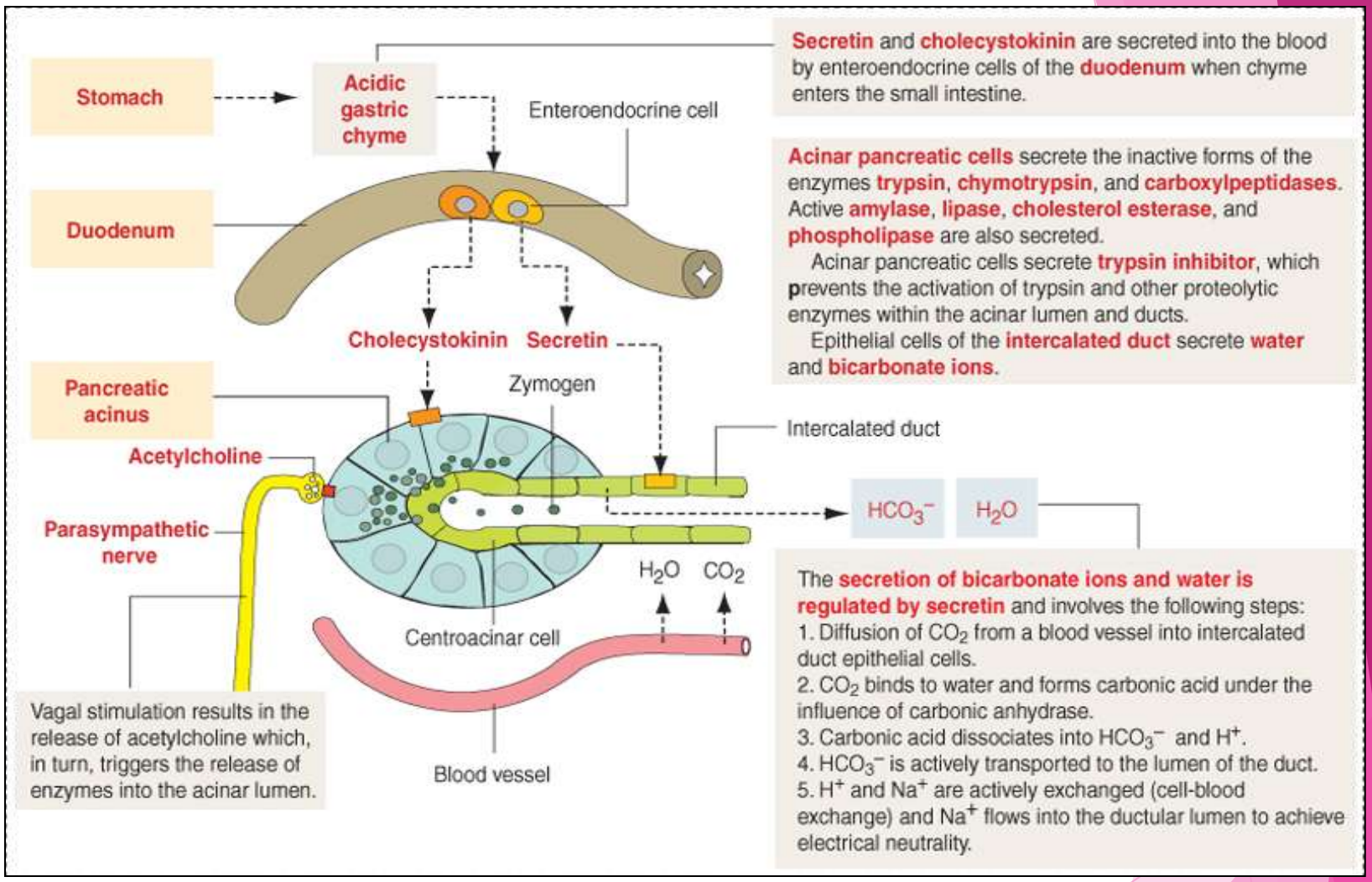


Eroschenko, 2008

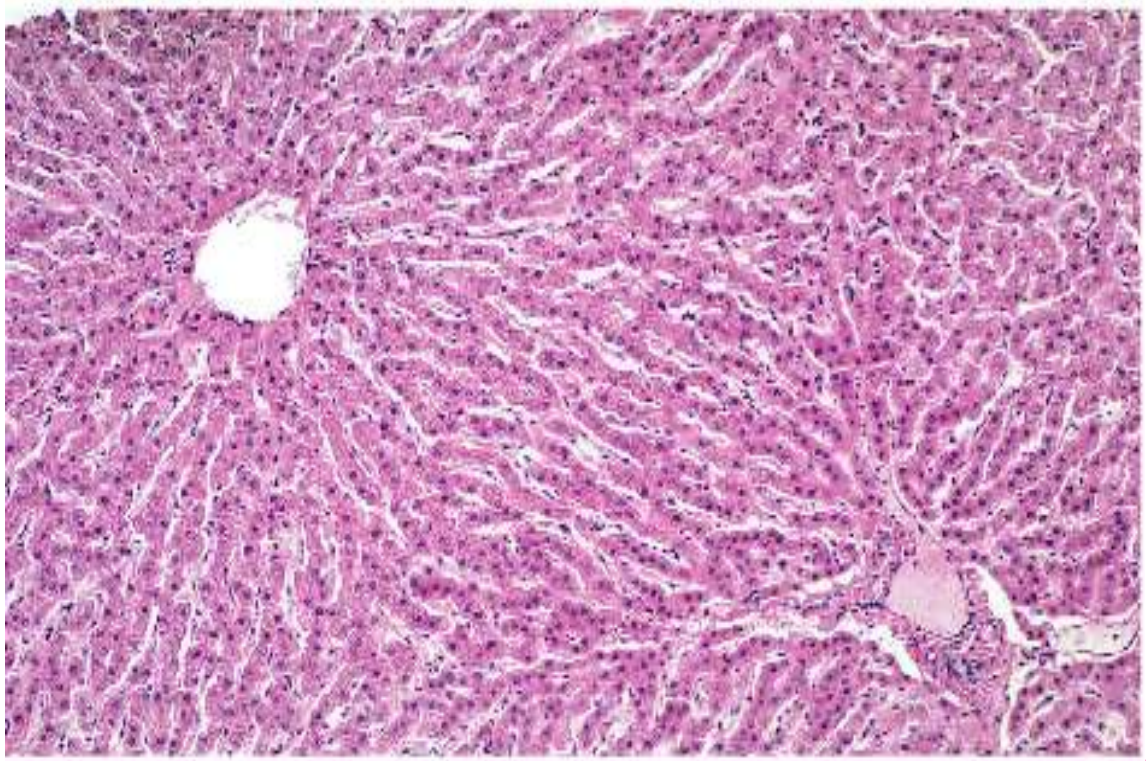
asinus

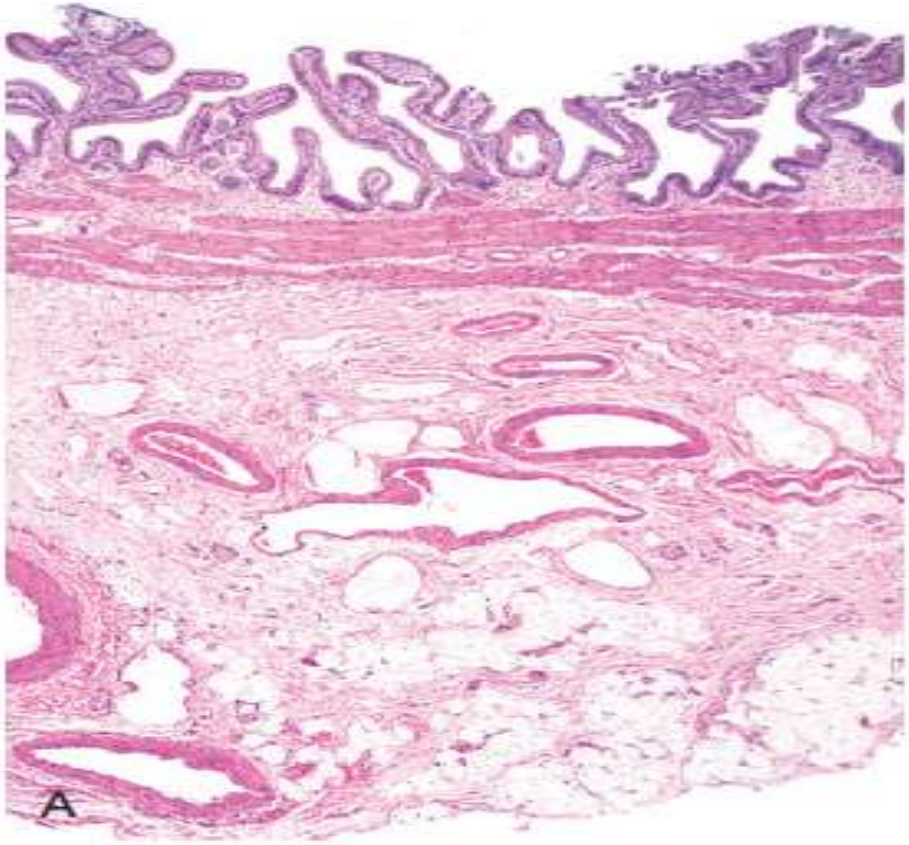


Mescher, 2012



Kierzenbaum, 2007

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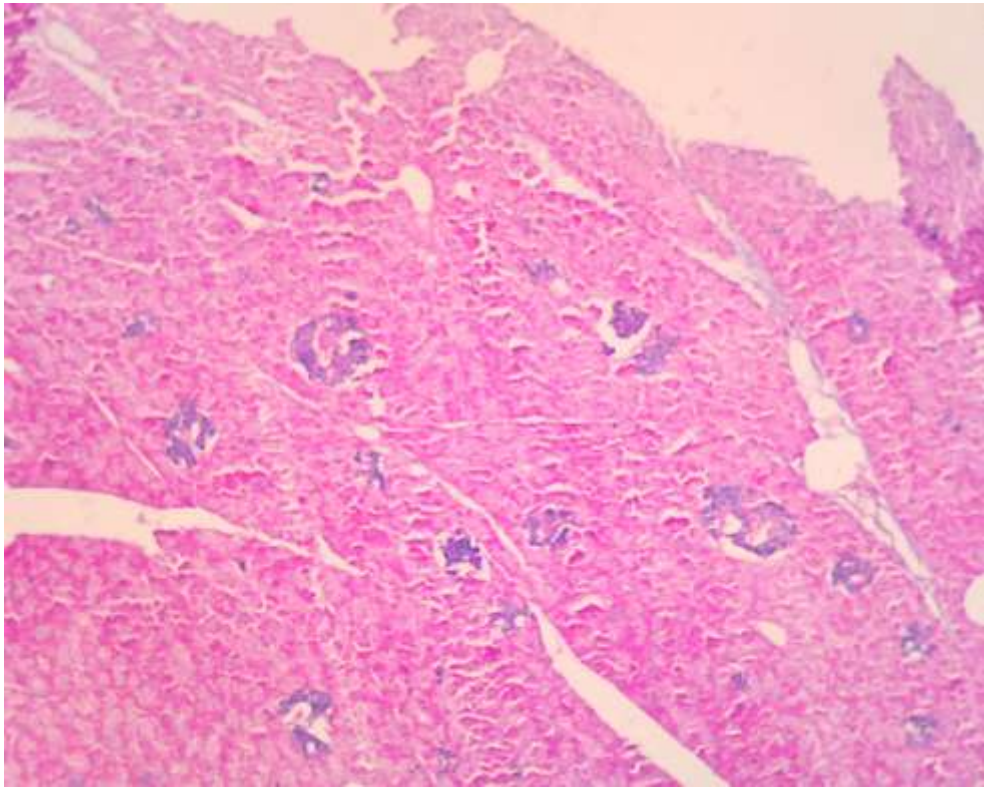

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