



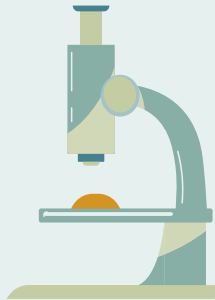
MED439
KING SAUD UNIVERSITY

Revised & Approved



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439

Liver and spleen

Color index:

Slides



Important



Doctors notes



Extra



[Editing file](#)

► Objectives:

By the end of this lecture, the student should be able to describe:

1. The histological structure of liver with special emphasis on:

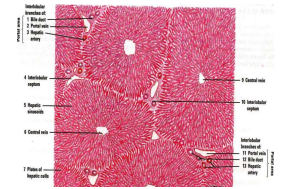
- Classical hepatic (liver) lobule.
- Hepatocytes.
- Portal tract (portal area).
- Hepatic (liver) blood sinusoids.
- Space of Disse (perisinusoidal space of Disse)
- Bile canaliculi.

2. The histological structure of spleen with special emphasis on:

- White pulp.
- Red Pulp.

► Liver

<p>Stroma</p>	<ul style="list-style-type: none"> • Capsule: Glisson's Capsule cover the liver & formed of irregular plates of CT • Septa divide the liver (absent in human but prominent in pigs and camels) & Portal areas (Portal tracts in the corner of hepatic lobules surrounded by CT). • Network of reticular fibers
<p>Parenchyma</p>	<p>Classical liver (hepatic) lobules not demonstrated by fibrous septa (polygonal may be hexagonal or 5 cuz it has many sides and one at Leste directed to blood sinusoids).</p>

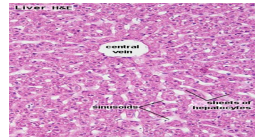


Classical liver (hepatic) lobule

It is formed of a polygonal mass of liver tissue, bounded by interlobular septa with portal areas at the periphery & central (centrolobular) vein in the center.

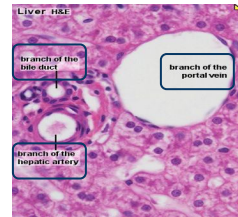
Contents

Borders



- Anastomosing plates of hepatocytes
- Liver blood sinusoids (hepatic blood sinusoids): In between the plates
- Spaces of Disse hepatocytes separated from the blood sinusoids (perisinusoidal spaces of Disse)
- Central vein radiating as from plates or root of hepatocytes.
- Bile canaliculi تشبيه الصحراء اللي ينصب فيها ماء ويعد ' concavity to form canculi not duct له يصير له فترة تلاقيه صنع له مجرى .

- Septa: C.T. septa (e.g. in pigs).
- Portal areas 'called portal area cuz the largest structure is portal vein'= Portal tracts = Portal triads: Are located in the corners of the classical hepatic lobule (usually 3 in No.)
- Contents of portal aera:
 - C.T.
 - Bile ducts (interlobular bile ducts)
 - Venule (Branch of portal vein).
 - Arteriole (Branch of hepatic artery).



► Contents of classical liver lobule

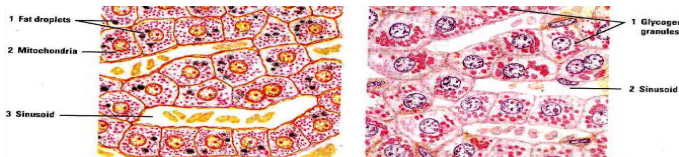
Anastomosing plates of hepatocytes	Liver blood sinusoids	Spaces of Disse (perisinusoidal spaces of Disse)	Central vein	Bile canaliculi
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Cuboidal with 3 sides 'one must face the blood sinusoid with microvilli for absorption and secretion , second to the concavity of the bile calculi ':

Hepatocytes (LM)

Are grouped in interconnected plates.

- Liver sinusoids are located in the spaces between these plates.
- Are polyhedral in shape.
- Nucleus: 1 or 2, vesicular (large & pale) with prominent nucleoli.
- Cytoplasm: acidophilic but the nuclei is active cell that's more pale .



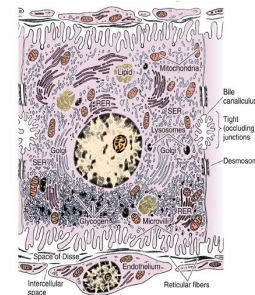
Hepatocytes (EM)

• Organelles:

- 1- Mitochondria: +++++ 'active cell'
- 2- ER (sER & rER): abundant (cell=مصنع) for hormones, proteins ...etc
- 3- Golgi complex.
- 4- Lysosomes. 'And peroxisomes Cuz the blood is coming from the Portal blood may have microorganisms'
- 5- Peroxisomes.

• Inclusions (Deposits):

- 1- Glycogen convert it into glucose for energy
- 2- Lipid (few droplets) fatty liver
- 3- Lipofuscin brown (old age) why?
Cuz the liver cell is long-living = م تتحلل فقط لو قل العدد كثير renew يصير لها



► Contents of classical liver lobule

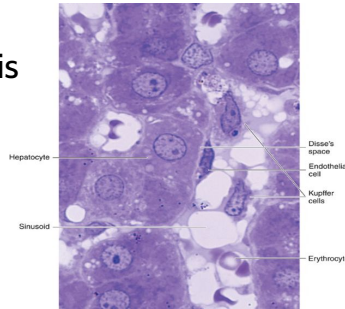
Anastomosing plates of hepatocytes	Liver blood sinusoids	Spaces of Disse (perisinusoidal spaces of Disse)	Central vein	Bile canaliculi
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(1) Endothelial Cells:

- Fenestrated & discontinuous → allow for free passage of plasma
- Basal lamina is absent *عشان يبقى بوابة مفتوحة*

(2) Kupffer Cells:

- Are macrophages
- Are found on the luminal surface of the endothelial cells
- Function: phagocytosis



Contents:

- 1- Microvilli of hepatocytes. Protruded into space of disse
- 2- Plasma of blood.
- 3- Hepatic stellate cells (Ito cells) (Fat-storing cells named according to function):
 - contain vitamin A (*عشان كذا لما الاطفال يصير عندهم نقص يوصونهم الاطباء باكل الكبد*)
 - rich lipid.
 - form reticulin (reticular fibers to Ito cell) in case of inflammation*activation يصير به empty لازم يصير لازم وماينفعش لأن لما تموت يصير المكان activation of more Ito cells to secrete more reticulin .*
- 4- Reticular fibers: (type III collagen).(reticulin)
- 5-Natural Killer (NK) cells.(lymphocytes) effective against infection and cancer

► Spleen

Stroma

- **Capsule:**
 - covered by visceral layer of peritoneum; mesothelium
 - formed of fibromuscular C.T. (Dense fibrous C.T. + smooth muscle cells) طالما فيه **contractile activity** = so when there's blood lose the spleen contract to empty the blood into the circulation in case of emergency.
- **Trabeculae:**
 - Irregular, incomplete & divide the spleen into intercommunicating compartments (lobules).
- **Reticular C.T black in colour**

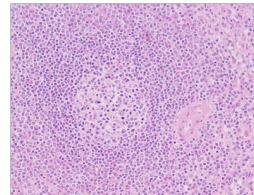
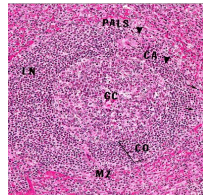


Parenchyma (divided by their color by naked eye)

(No cortex, No medulla, No afferent lymphatic vessel 'الوحيد اللي عندها هذا' = lymph node')

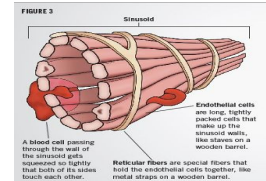
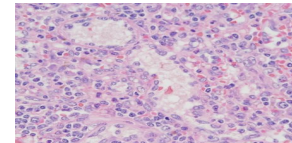
White pulp

- **Periarterial lymphatic sheaths (PALS):** housing T lymphocytes
طول حياتها عشان **immune competent prominent** = thymus got atrophy لان
 - **Lymphoid follicles** (with germinal centers): housing B lymphocytes.
- N.B. Both have the acentrically located central artery (central arteriole) (follicular arteriole).



Red pulp

- **Splenic (pulp) cords:** Extravasated **blood cells**, plasma cells, **macrophages** & reticular cells and fibers.
- **Splenic blood sinusoids:** lined with elongated fusiform endothelial cells with large intercellular spaces & supported by discontinuous **allowing the passages of cells**, circular basement membrane **to maintain the wall of sinusoids**.

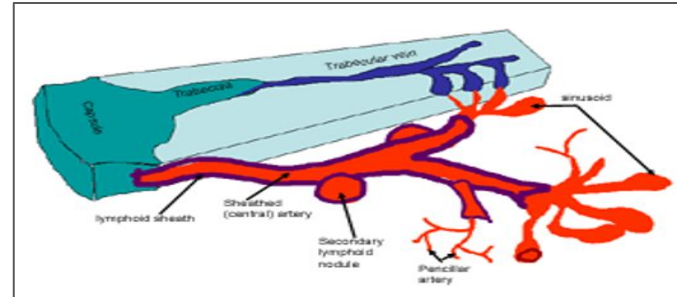
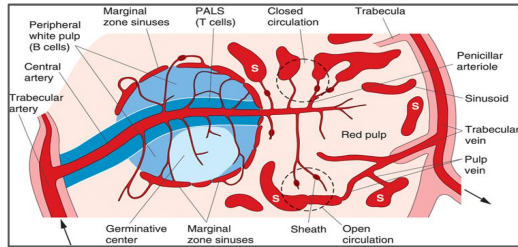


► Cells of parenchyma of spleen

1. Lymphocytes.
2. Plasma cells.
3. Macrophages.
4. Blood elements (RBCs, leukocytes and blood platelets).

► Splenic Microcirculation

open circulation → free blood in space of red pulp large divided into small venules to maintain the spleen vein that carry the portal blood and remove the pathogens then to liver to IVC
close circulation → sinusoid



: يحاط باول طبقة Splenic artery لما يبدأ بمشي

A- lymphocytes then N- macrophages and lymphocytes

MCQs

Q1) Which of the following not found in human?

- A- Network of reticular fibers of liver
- B- Septa of the liver
- C- Kupffer Cells
- D- Trabeculae of spleen

Q2) Which of the following found in the portal area of the liver?

- A- Blood sinusoids
- B- Bile canaliculi
- C- Bile duct
- D- Central vein

Q3) Which of the following is true about hepatocytes?

- A- It has acidophilic cytoplasm
- B- It has only sER
- C- Non-prominent nucleoli
- D- It's columnar in shape

Q4) Which of the following is true about liver blood sinusoids?

- A- It has Ito Cells
- B- It has basal lamina
- C- Its endothelium is discontinuous
- D- Its endothelium is continuous

Q5) The stroma of the spleen is formed of?

- A- Fibrous C.T
- B- Smooth muscles only
- C- Fibromuscular C.T
- D- Skeletal muscles only

Q6) Which type of cells do Lymphoid follicles house?

- A- Macrophages
- B- T cells
- C- B cells
- D- Plasma cells

Team leaders

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