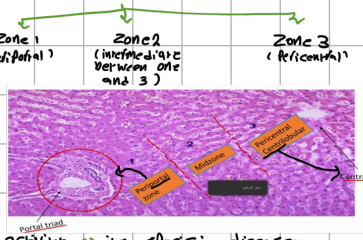
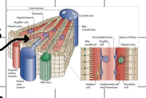
Lecture One

- The liver: Brown, smooth and shiny (glisson capsule)
- Hexagonal lobules → 6 acini → Each acini divided into 3 zones



- Each zone has its own metabolic activity → its specific diseases.
- aggressive deseases affect all 3 zones.
- liver's weight is 1400 - 1600 g (2.5 of body weight), it's blood supply is portal vein (60-70%) and hepatic artery (30-40%).
- The parenchyma is organized into plates of hepatocytes which are radially oriented around hepatic (central) vein.
- Hepatocytes show minimal variation in size.
- nuclei may vary in size, number, ploidy especially with age.
- Vascular sinusoids present between cords of hepatocytes



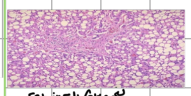
- liver's Functions: 1. Metabolic (Glu) 2. Synthetic (Albumin clotting Factors) 3. Detoxification (Drugs, hormons, NH_3) 4. Storage (Glycogen, TG, Fe, Cu, Vit) 5. Excretory (Bile)

Liver Diseases

- they related to storage disorders → the stored material accumulate disturbing the normal Function.
- may be: 1. Primary 2. Secondary.
- Hepatic injury →
  - Inflammation "hepatitis" (acute or chronic/Mild or sever)
    - usually start in zone 1.
  - Degenifation
  - steatosis
  - Necrosis
  - Regeneration
  - Fibrosis
  - cirrhosis → Macronodular / Micronodular
  - ductular proliferation.

1. Degenifation → Substances may accumulate in viable hepatocytes, including Fat, iron, copper (indicates the chronicity of the disease) and retained billary material → Farnery degeneration.
- ↓ O_2 (Hypoxia) → ↓ ATP → ↓ Na/K pump Function → Na accumulates inside the cell → ↑ osmotic pressure → the water go towar the cell. Balloony degeneration.
- The cell looks large, clear spaces with irregular clumped cytoplasm.

2. Steatosis (Fatty change) →
- Reversible initially. (the liver has high capacity of regeneration except in sever injuries)
- Microvesicular changes (ALD, Reye syndrome, acute Fatty change of Pregnancy, with more accumulation of Fats → Macrovesicular (DM obese).
- Both Micro and Macro vesicular have the same complications.
- The liver looks yellow, greasy and enlarged (4-5 kg)



Fat infiltration

- It indicates dead cells → Pyknosis (condensation of chromatin), Karyolisis (Fading of basophilia) and Karyorrhexis (fragmentation).

3. Necrosis → sever
- Depending on type
  - Coagulative necrosis
  - Lytic Necrosis
  - Councilman bodies.
- Depending on the cause
  - Ischemic necrosis
    - Vascular injury
  - Toxic necrosis
    - due to drugs chemicals, suicidal attemps.
- Depending on location
  - centrilobular
  - Mid Zonal
    - Zone 2
    - Rare
  - peri portal
    - Zone 1
    - interface hepatitis.
  - Focal
  - Diffuse.

→ Depending on type:

A. Coagulative necrosis: when cells die due to a lack of blood supply around central vein.
- Eosinophilia like-cell (Pink), Anucleated cells (No nucleus).

B. Lytic necrosis (Liquefaction): caused by infection, Pus formation.
- Macrophages and neutrophils.
- Both dead and alive.
- Inflammation should be present.

→ Depending on locations:

1. Centrilobular. 2. Mid zonal 3. Periportal such as (interface hepatitis)
- Interface hepatitis → inflammation from the portal tract (PT) into the periportal zone, with disruption of the limiting plate.
  - severe and high risk to chronicity.

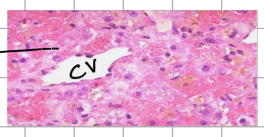
4. Focal necrosis: Involves larger groups of hepatocytes within a lobule

A. Piecmeal necrosis → Death of small groups of cells near an inflammatory area.

B. Bridging necrosis → connects more than one zone (severe)
- it can be replaced by Fibrosis tissue (Irreversible), means that the disease is chronic

Diffuse → Massive and submassive
- Very large area of the liver.
- Related to drug and toxin exposure.

Necrosis ←



4. Regeneration → compensatory hyperplasia.
- Mitosis or cell cycle markers
- Cells of the canal Hering are the progenitor for hepatocytes and bile duct cells (oval cells)
- 90-95% of hepatocyte should be lost in order to lose its Function.

5. Fibrosis:- accumulation of extracellular matric proteins including collagen.

↳ occures in chronic liver diseases. ↳ Irreversible.

↳ (1) portal or (2) periportal. ↳ (3) pericentral ↳ around the central vein.

↳ (4) pericellular Fibrosis ↳ may be deposted directly within the sinusoids around single or multiple hepatocytes

↳ (5) Bridging Fibrosis.

6. Cirrhosis ↳ After complete Fibrosis of the liver.

↳ Micronodular or macronodular.

↳ lead to liver failure.

↳ Diagnosing of liver diseases.

1. Histo, clinical manifestation then & lab tests ↳ hepatic integrity (AST ALT), Biliary excretory function (urin bilirubin, serum bile acids).