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Liver, Pancreas and Gallbladder

Monday, January 14, 2008
1:00 PM

I. Liver and Gallbladder

A. Liver

- i. Pale spots are either central veins or small branches of portal veins
- ii. Central veins (terminal hepatic venules)
 - 1) Outflow of liver to hepatic vein
 - 2) Surrounded by hepatocytes
 - 3) All by itself in the center of a lobule
 - 4) Connected to sinusoids
- iii. Portal veins/hepatic triad
 - 1) Portal veins surrounded by connective tissue
 - a) No smooth muscle
 - b) Largest vessel of triad
 - c) Connected to sinusoids
 - 2) Bile duct
 - a) Circle of prominent nuclei
 - b) Cuboidal epithelium
 - 3) Hepatic artery branch
 - a) Ring of smooth muscle
 - b) Looks like normal arteriole
- iv. Liver tissue
 - 1) Hepatocytes
 - a) Line up in plates
 - b) EM shows lots of organelles and glycogen appears as black clusters near smooth ER
 - c) Cell surface has two types
 - i) Facing blood and space of Disse
 - ii) Surface involved w/ bile canaliculus w/ junctional complexes to isolate bile from blood
 - 2) Sinusoids between plates of hepatocytes
 - a) Lined by thin layer of endothelium
 - i) EM shows discontinuous lining to allow passage into Disse
 - ii) Numerous microvilli
 - iii) No organized basal lamina
 - b) Will see Kupfer cells (macrophages)
 - i) EM shows lysosomes
 - 3) Space between hepatocytes and endothelial cells = "space of Disse"
 - a) Blood flows from portal veins/hepatic arteries --> sinusoids --> central veins
 - b) Bile flows from canaliculi --> canals of Hering (low cuboidal cells) --> bile ducts in portal canals --> hepatic ducts --> common hepatic duct
 - 4) Hepatic outflow does not follow organization of liver lobules vs. inflow at periphery of each lobule
 - a) Classic: Microscope based --> connective tissue surrounds hexagon w/ central vein in middle
 - b) Portal: bile produced in one lobule goes to one duct; triangle w/ central veins as three corners and triad in center
 - c) Liver Acinus of Rappaport: spans btwn two triads; elliptical w/ hepatic artery and portal vein as core
 - i) Zone 1 - closest to vessels, gets most oxygen/blood; toxins kill it off first,

but most likely to survive is hypoxic

- ii) Zone 2 - intermediate
- iii) Zone 3 - most isolated, most subject to hypoxia

- 5) Collagen
 - a) Around portal canals and less around central veins
 - b) Thin layers around sinusoids

- v. Bile Canaliculi
 - 1) Chicken wire arrangement
 - 2) Extends btwn plates of hepatocytes

B. Gall Bladder

- i. Extensive folds of mucosa extending into lumen get distended when gallbladder is full
- ii. Tall, simple columnar epithelium and underlying connective tissue (Lamina propria)
- iii. Muscularis externa is scattered bundles of smooth muscle
- iv. Adventitia is dense CT binding gall bladder to liver
- v. Surface of bladder facing abdominal cavity is a serosa

II. Pancreas

A. Exocrine

- i. Divided into smaller areas by slits of open space/CT
- ii. Lighter spots are islets of Langerhans, endocrine
- iii. Large number of acini w/ some fat cells
 - 1) Periphery of each acinus stains blue/purple (basal side of cells) due to abundance of RER
 - 2) Apical portion should be pink because of Golgi and secretory granules
- iv. Smaller cells in central region of acinus are centroacinar and represent initial portion of duct that extends into larger excretory ducts outside lobule
- v. Intercalated ducts appear btwn lobules w/ nuclei btwn acini; pale cytoplasm
 - 1) Contribute bicarbonate and Na/H₂O to exocrine secretion
 - 2) Lining epithelium of interlobular ducts is simple cuboidal epithelium or simple columnar in larger ducts

B. Endocrine

- i. Islets of Langerhans
 - 1) Pale areas of cells
 - 2) Scattered distribution
 - 3) Alpha, beta, gamma responsible for glucagon, insulin and somatostatin
 - 4) Don't have to recognize individual cell types
- ii. Vascular Supply much richer to endocrine portions of pancreas
- iii. Chrome-alum staining allows distinction of cell types
 - 1) Alpha cells stain reddish, periperal
 - 2) Beta cells more central, stain purple
- iv. EM of endocrine cells shows basal RER, apical secretory granules