

The Normal Liver Histology (Part 1)

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HISTOPATHOLOGY SIMPLIFIED:

This six part series will give simple tips on diagnosis of common liver histopathology for post graduate students. This will comprise of

1. Normal liver histopathology
2. Biliary atresia, Allagile syndrome
3. Giant cell hepatitis, PFIC
4. wilson, Autoimmune
5. Rejection, Acute, chronic
6. hepatoblastoma

THE NORMAL LIVER HISTOLOGY

Under a microscope normal liver have a regular structure based on portal tracts and terminal hepatic veins. The portal tracts contain multiple structures including hepatic artery, portal vein and interlobular bile duct(Figure 1). All these are embedded in connective tissue. Few lymphocytes can also be seen in portal tracts. Small bile ducts are lined by cuboidal epithelium and have a basement membrane. The artery has an inner intimal layer lined with endothelium and a muscular wall. The portal vein has an endothelial lining with a basement membrane and scanty adventitial fibrous connective tissue. The individual hepatocyte is polygonal in shape with eosinophilic cytoplasm. The nucleus is centrally placed, and one or more nucleoli are easily identified. The liver has a lobular architecture.

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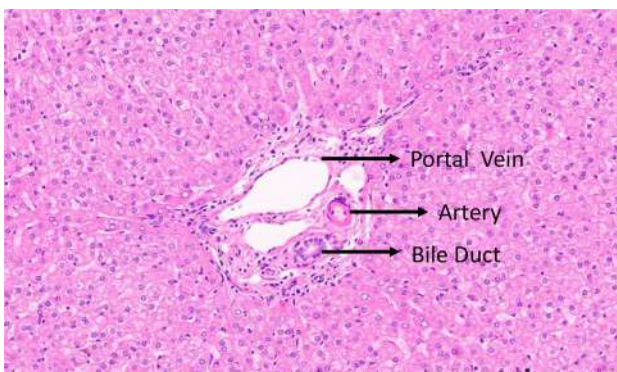


Figure1 : Portal tract displaying portal vein, hepatic artery and bile duct

Portal Vein: endothelial lining with a basement membrane and scanty adventitial fibrous connective tissue.

Hepatic artery: The artery easily identified with an inner intimal layer lined with endothelium and a thick muscular wall.

Bile duct: Small bile ducts are lined by cuboidal epithelium and have a basement membrane.

A lobule is a hexagonal structure containing a terminal hepatic venule (central vein) at its centre with plates of hepatocytes radiating centrifugally towards portal tracts at the periphery (figure 2). The lobule is divided into three regions: a pericentral region around the central vein, a periportal region around the portal tract, and a mid-lobular region situated in between.

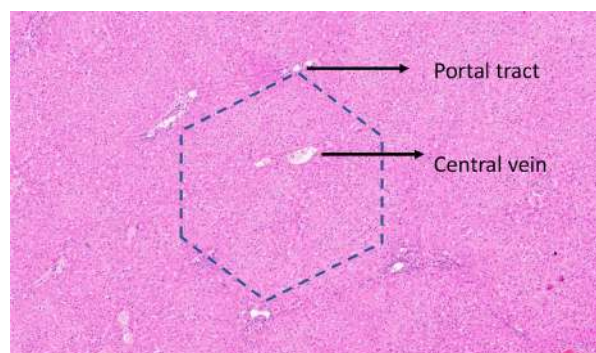


Figure 2: Hepatic lobule with hepatic venule at the centre and peripheral portal tracts. An imaginary hexagon has been drawn connecting portal tracts with central vein.

SPECIAL STAINS

Masson trichrome

Most common special stain applied to liver specimens. Imparts a blue color to collagen against a red background of hepatocytes and other structures (Figure 3). It stains type 1 collagen that is normally present in the portal tracts and vessel walls. It is used for staging of chronic liver diseases

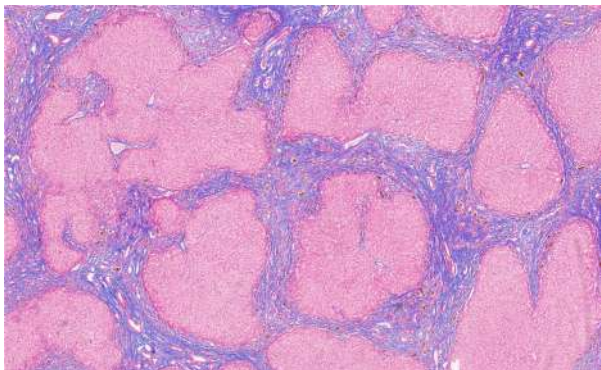


Figure 3: Masson trichrome stain showing collagen (blue) running from portal to portal tract indicating bridging fibrosis

Reticulin Stain

Uses silver impregnation to detect reticulin fibers, which are made of type 3 collagen. The fibers appear black against a gray to light pink background (figure 4). In the liver, such fibers are present as part of the extracellular matrix in the space of Disse. Helps in the assessment of the architecture of the hepatic plates, such as expansion in regenerative and neoplastic conditions, compression of plates in nodular regenerative hyperplasia, and collapse of the reticulin framework in necrosis

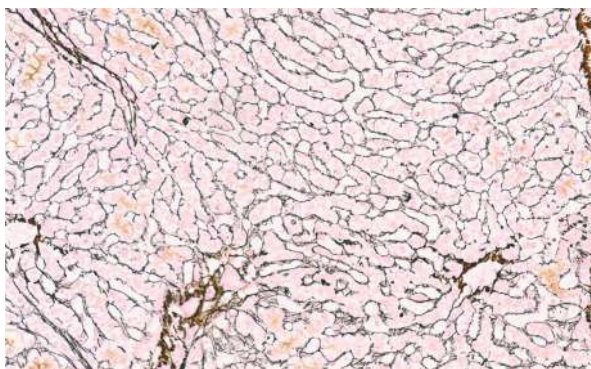


Figure 4: Reticulin Stain

Perl's Iron Stain

The Perl's iron stain (Prussian blue reaction) is a stain for detecting iron. Iron is stored in the hepatocytes as a soluble form (ferritin) and an insoluble form (hemosiderin). With the H&E stain, hemosiderin is seen as coarsely granular brown refractile granules in the cytoplasm, whereas ferritin is not seen. Pearl's stain highlights hemosiderin as coarse blue granules, while ferritin is seen as a faint blue cytoplasmic blush (figure 5)

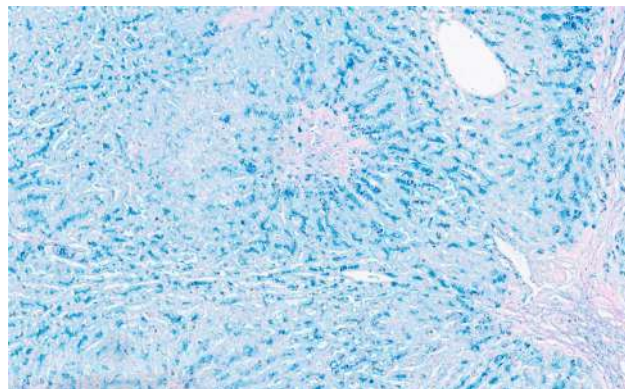


Figure 5: Perl's Iron Stain

Rhodanine stain

Rhodanine stain is an excellent stain to detect copper. Copper is excreted in bile and accumulates in the liver in chronic biliary diseases. Staining for **copper** is also used in suspected Wilson's disease. Copper deposits appears as brick red while nuclei appears pale blue (figure 6)

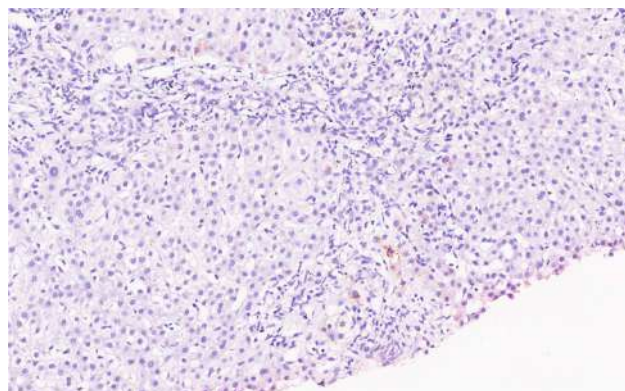


Figure 6: Rhodamine stain, Copper deposits appears as brick red