

LIVER HISTOMORPHOLOGICAL STRUCTURE

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Abstract: Hepatocytes are the main functional cells of the liver, accounting for approximately 80% of the liver mass. In three dimensions, hepatocytes are located in plates anastomosed with each other. The cells have a polygonal shape and their sides are connected with sinusoids (sinusoidal face) or neighboring hepatocytes (lateral faces). Part of the lateral faces of hepatocytes have changed to form bile canaliculi. Microvilli are numerous on the sinusoidal surface and sparsely fall into the bile ducts. The morphological structure of the liver is discussed in the article.

Key words: liver morphology, hepatocytes, endomembrane system.

Enter: One of the main structural and functional elements of hepatocytes is the endomembrane system of the cytoplasm, represented by the endoplasmic reticulum, Golgi complex, lysosomes and other organelles, which ensures the full functioning of body systems. The capsule of the liver is made of dense connective tissue and covered with mesothelium. The interstitial tissue located between the liver lobes starts from the capsule. The central vein is located in the middle of the lobe. The main mass of the particle is made up of hepatocytes. Hepatocytes are located in two rows in the beams. Beams can branch and form anastomoses. They are located radially from the periphery of the lobe towards the central vein. Blood capillaries inside the lobes lie between the beams and they also flow from the periphery towards the center into the central vein. The wall of capillaries consists of flat endotheliocytes. In the junctions of endotheliocytes, there are gill-like parts with small holes (pores). Among the endotheliocytes there are many star-shaped macrophages scattered without forming a single layer. They enter the system of monocytes and can become free (mobile) macrophages while performing their tasks. There is no basement membrane in places other than the beginning and end of capillaries. Capillaries are surrounded by a narrow sinusoidal space (space of Disse). The end of hepatocytes facing the cavity is covered with microvilli. Perisinusoidal lipocytes are also located among hepatocytes around the cavity. It is believed that they form fibrous structures like fibroblasts and accumulate fat-soluble vitamins. Components of blood plasma and, in pathological conditions, blood cells pass into the cavity from the capillaries.

Between the rows of hepatocytes, which form the liver beam, there are bile capillaries that do not have their own wall and are 0.5-1.0 μm in diameter. Bile capillaries start from the central end of the beams in a dead end, go to the periphery of the lobe and open into the interlobular bile ducts through the cholangioles. The walls of cholangioles are short tubes consisting of two to three oval-shaped cells. The ends of hepatocytes facing bile capillaries also have microvilli.

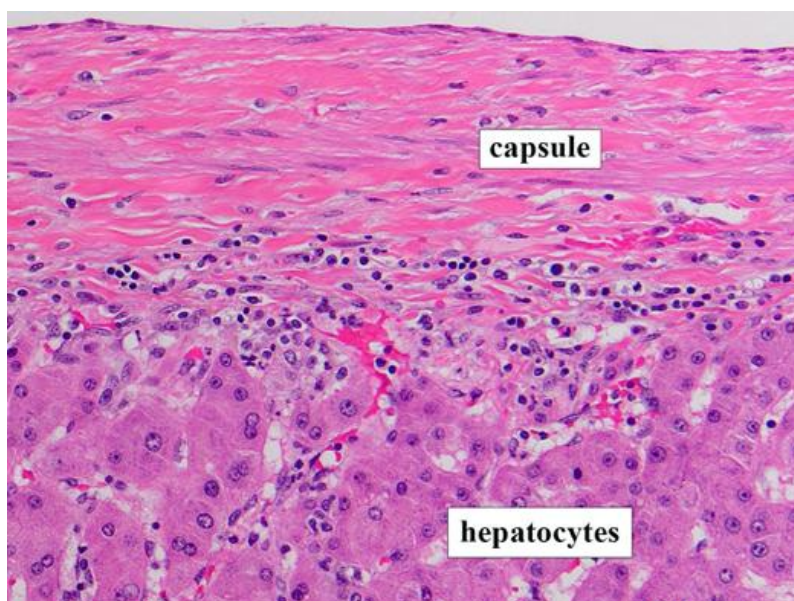
Hepatocytes, or liver epitheliocytes, are 20-25 μm irregular polygonal cells that perform most of the functions specific to the liver. Some hepatocytes have two or more nuclei, some have polyploid nuclei. As the animal ages, polyploidy increases.

The cytoplasm of hepatocytes is also stained with basic dyes due to its richness in RNA. They contain all the common organelles characteristic of cells. Granular cytoplasmic network is involved in protein synthesis, arganular cytoplasmic network is involved in carbohydrate exchange. Many mitochondria evenly distributed in the cytoplasm, peroxisomes located around the tubules of the cytoplasmic network and involved in fat exchange, plate complex and lysosomes are the regular organelles of hepatocytes. As we mentioned above, the surfaces of hepatocytes facing blood and bile capillaries have microvilli. Hepatocytes store glycogen, lipid and pigment inclusions. Glycogen synthesis and re-use is related to food digestion. It is observed that bile formation starts from the periphery and spreads towards the center in the liver lobe, and accumulation of glycogen is in the opposite direction.

Research methods. Liver biopsies were taken from different animals of different ages, first anesthetized, frozen, dehydrated in formalin alcohol, concentrated in ether alcohol, and embedded in paraffin. After cutting with a microtome, it was stained with hematoxylin, eosin and examined under a microscope.



The capsule surrounds the liver parenchyma consisting of hepatocytes. Hepatocytes are large polygonal cells with eosinophilic (pink) cytoplasm, round nuclei, and prominent nucleoli.



1. Subcapsular liver biopsy showing the fibrous capsule surrounding the hepatocytes.

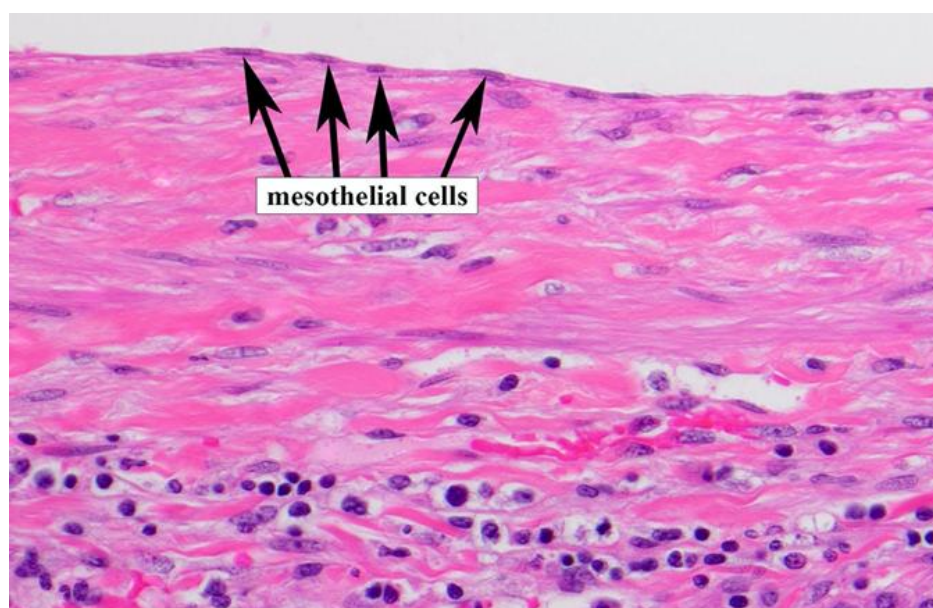
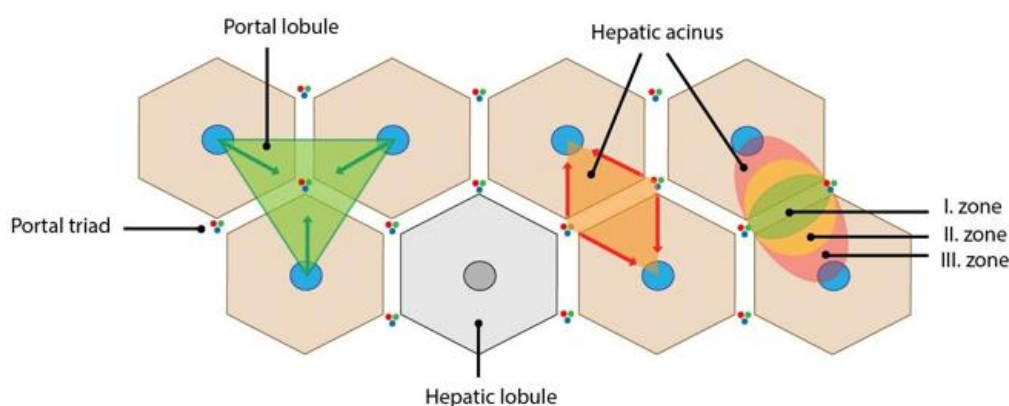


Figure 2. Subcapsular liver biopsy with mesothelial cells lining the outermost layer of the capsule.

Microscopically, the organization of the liver parenchyma can be represented by three different schemes: (1) hepatic lobule, (2) portal lobule, and (3) hepatic sinus. Exits the liver through the

hepatic vein to the inferior vena



cava.

Figure 3. Organizational units of the liver including (1) hepatic lobule (2) portal lobule and (3) hepatic sinus.

In the liver, PT consists of HA, PV and BD (Fig. 4). HA and PV are lined by endothelial cells. HA is small with thick walls and PV is larger with thin walls. BD is approximately the same as the hepatic artery and is lined with a single layer of cuboidal (square) epithelium. Sometimes lymphatics can also be seen. Structures in the portal tract are surrounded by fibrous connective tissue. Although it is normal to see a few scattered inflammatory cells (eg, lymphocytes), neutrophils or plasma cells should be absent.

A layer of hepatocytes immediately adjacent to the portal tract defines the limiting plate.



Figure 4. The portal tract consists of branches of the hepatic artery (HA), portal vein (PV), and bile duct (BD), which are surrounded by connective tissue (CT). The limiting plate (black dashed line) is defined by a layer of hepatocytes immediately adjacent to the portal tract.

Central vein: The CV is lined by a single layer of endothelial cells and drains blood from the PT through the sinusoids. Sheets of hepatocytes spread outward from the CV toward the PT (Figure 5).

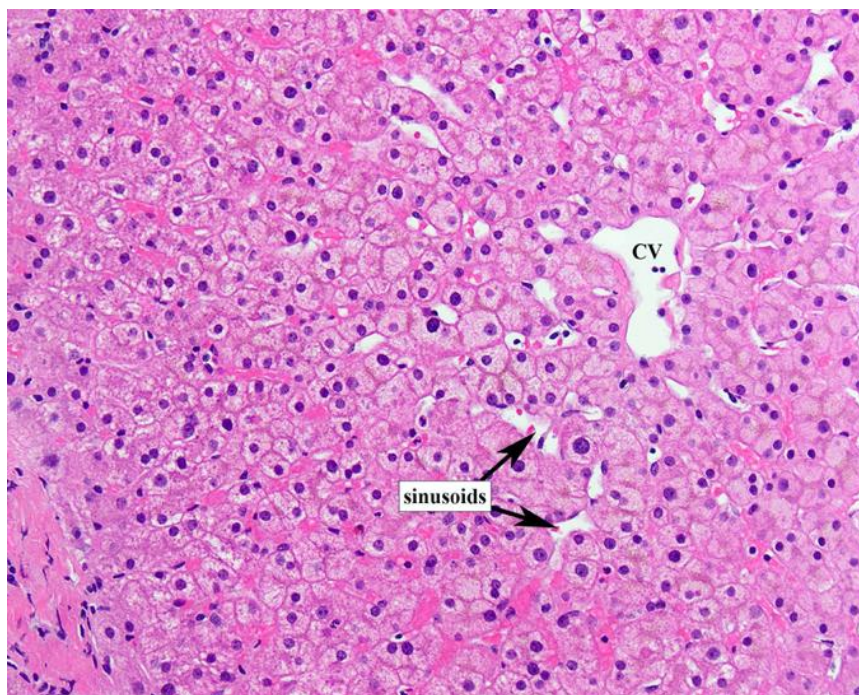


Figure 5. Sheets of hepatocytes spread from the central vein (CV) toward the PT. The CV drains the blood from the PT through the sinusoids.

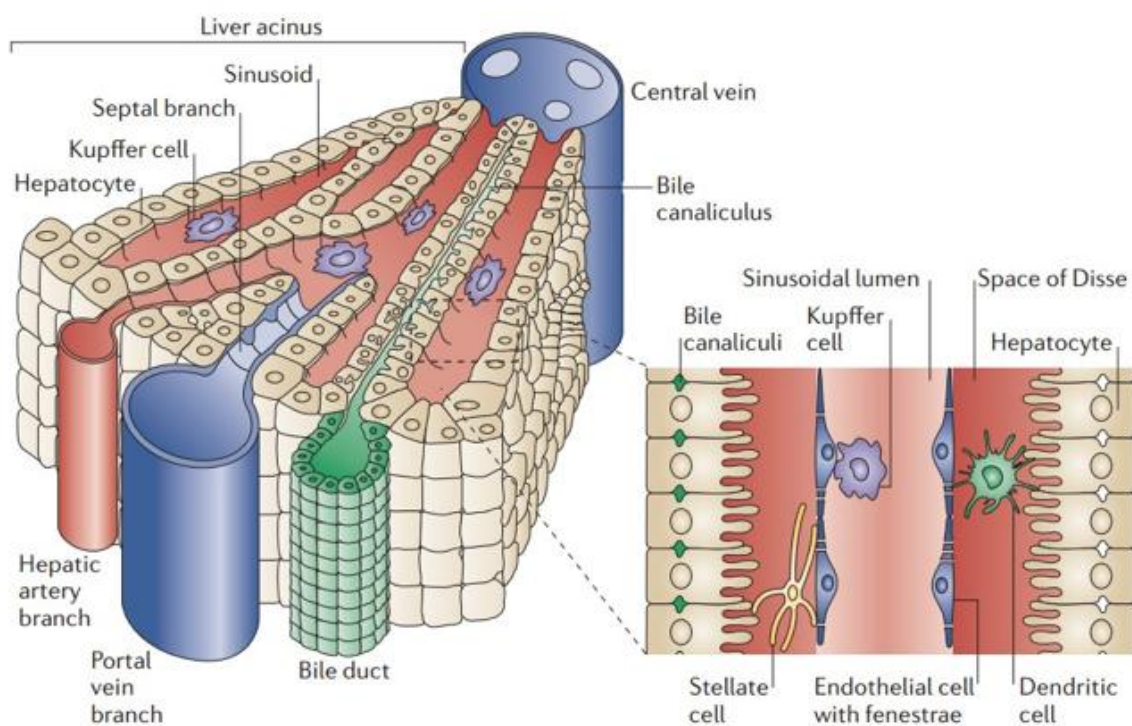


Figure 6. Hepatocytes are distinguished by sinusoids, which are lined with fenestrated endothelial cells. The space of Disse is located between endothelial cells and hepatocytes. [DH Adams and B. Eksteen, "Aberrant homing of mucosal T cells and extraintestinal manifestations of inflammatory bowel disease," *Nature Reviews Immunology*. 2006, doi: 10.1038/nri1784.]

Summary

- liver hepatocytes or liver epitheliocytes are 20-25 μm irregular polygonal cells that perform most of the functions specific to the liver.
- among the endotheliocytes there are many star-shaped macrophages scattered without forming a single layer.
- many mitochondria evenly distributed in the liver cytoplasm, peroxisomes located around the tubules of the cytoplasmic network and participating in fat exchange, plate complex and lysosomes are regular organelles of hepatocytes.

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