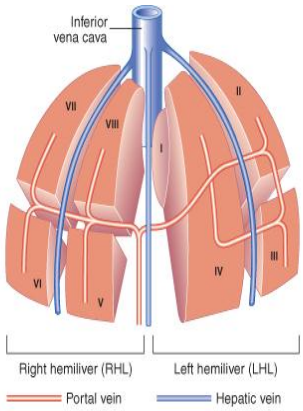
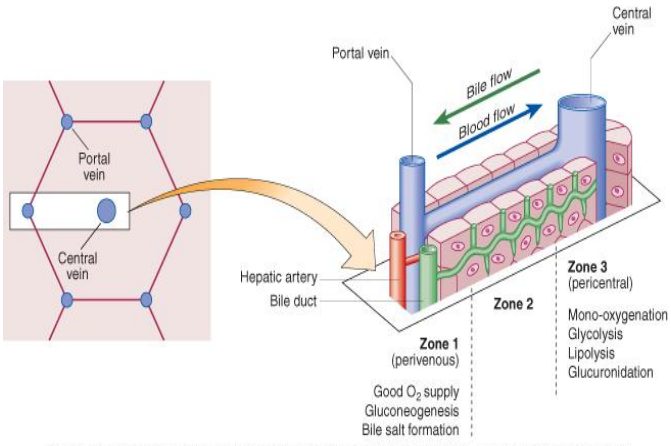
The liver is one of the heaviest organs in the body, weighing 1.2-1.5 kg. Covered by Glisson capsule.

It has traditionally been divided into the left and right lobes, by the falciform ligament, fissure of the ligamentum teres and fissure of the ligamentum venosum. Advances in hepatic surgery, however, have indicated a more useful division into right and left hemilivers based on the hepatic blood supply. The right and left hemilivers are further divided into a total of eight segments in accordance with subdivisions of the hepatic and portal veins. The segments each have their own hepatic artery branch and biliary tree. Each segment is made up of multiple smaller units known as lobules, comprised of a central vein, radiating sinusoids separated from each other by single liver cell (hepatocyte) plates and peripheral portal tracts. However, the hepatic lobule has no functional significance.

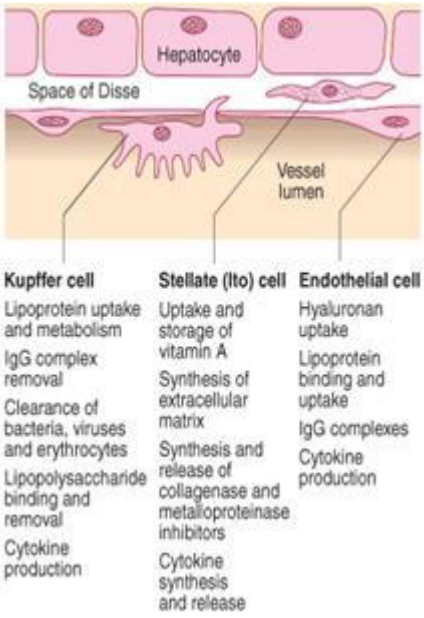


The functional unit of the liver is the hepatic acinus ; which anatomically is almost the reverse of the hepatic lobule. Blood flows into the hepatic acinus via the single terminal branches of the portal vein and hepatic artery located in the portal tracts, and along the hepatic sinusoids; it then drains into several hepatic venous tributaries at the periphery of the acinus. In contrast, the flow of bile is in the opposite direction along the biliary canaliculi into terminal bile ductules (cholangioles) and subsequently into the interlobular bile ducts located in the portal tracts.

The hepatocytes in each acinus can be divided functionally into three different zones, in accordance with their position relative to the terminal portal tract. The hepatocytes in zone 1 are closest to the terminal branches of the portal vein and hepatic artery and therefore are supplied firstly with oxygenated blood, and secondly with blood containing the highest concentration of nutrients and toxins. The hepatocytes in zone 3 are furthest from the portal tracts and closest to the hepatic veins and are therefore relatively hypoxic compared with the hepatocytes in zone 1.



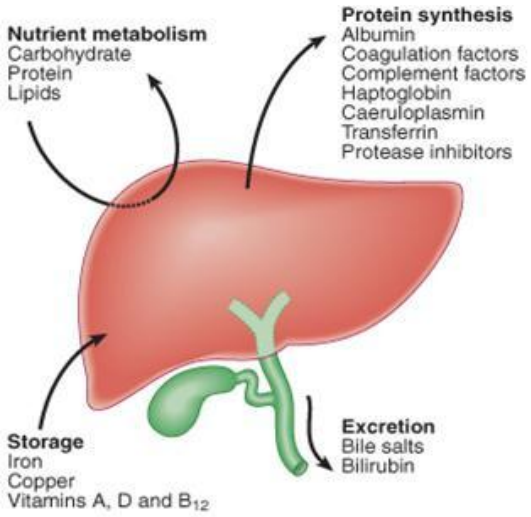
Approximately 15% of the liver is composed of cells other than hepatocytes .Foremost among these are the Kupffer cells, derived from blood monocytes. These cells constitute the largest single mass of tissue-resident monocytes in the body and account for 80% of the phagocytic capacity of this system. They remove aged and damaged red blood cells, bacteria, viruses, antigen-antibody complexes and endotoxin. In addition, these cells are able to produce a wide variety of inflammatory mediators that may act locally or may be released into the systemic circulation.



Stellate cells are found in the space of Disse and play an important role in regulating blood flow through the liver. Following liver injury, these cells are activated by cytokines produced by Kupffer cells and hepatocytes. Activated stellate cells become transformed into a myofibroblast phenotype and are an important source of extracellular matrix components such as collagen during the genesis of cirrhosis.

Endothelial cells line the hepatic sinusoids. These capillary vessels of the liver differ from other capillary beds in the body. No basement membrane is visible by electron microscopy and the endothelial cells have large fenestrae (0.1 microns), allowing free flow of fluid and particulate matter to the hepatocytes and other cells lining the space of Disse.

PHYSIOLOGY



The liver performs a wide variety of functions. Following a meal, more than half the glucose absorbed is taken up by the liver and stored as glycogen or converted to glycerol and fatty acids, thus avoiding marked hyperglycaemia. Amino acids are used for hepatic and plasma protein synthesis and excess amino acids are catabolised to urea. In contrast, during fasting the liver releases glucose, derived either from the breakdown of glycogen or from gluconeogenesis using amino acids released from extrahepatic tissues such as muscle Synthesis of urea, and endogenous protein and hepatic amino acid release are suppressed during fasting. In both the fed and fasting state the liver plays a central role in lipid metabolism, producing very low-density lipoproteins and further metabolizing low- and high-density lipoproteins

- The liver plays a central role in the metabolism of bilirubin, bile salts, drugs and alcohol.
- Some vitamins, such as A, D and B_{12}, are stored by the liver in large amounts, while others, such as vitamin K and folate, are stored in smaller concentrations and disappear rapidly if dietary intake is deficient.
- The liver is also able to metabolize vitamins to more active compounds, e.g. tryptophan and vitamin D.
- Vitamin K is essential for the hepatic synthesis of coagulation factors II, VII, IX and X .
- The liver stores minerals such as iron, in ferritin and haemosiderin, and copper.

AIMS OF INVESTIGATIONS IN PATIENTS WITH SUSPECTED LIVER DISEASE

- Detect hepatic abnormality
- Measure the severity of liver damage
- Define the structural effects on the liver
- Identify the specific cause
- Investigate possible complications

LIVER FUNCTION TESTS USED TO ASSESS LIVER DISEASE

- Bilirubin*
- Aminotransferase
- Alkaline phosphatase
- Gamma-glutamyl transferase
- Albumin