

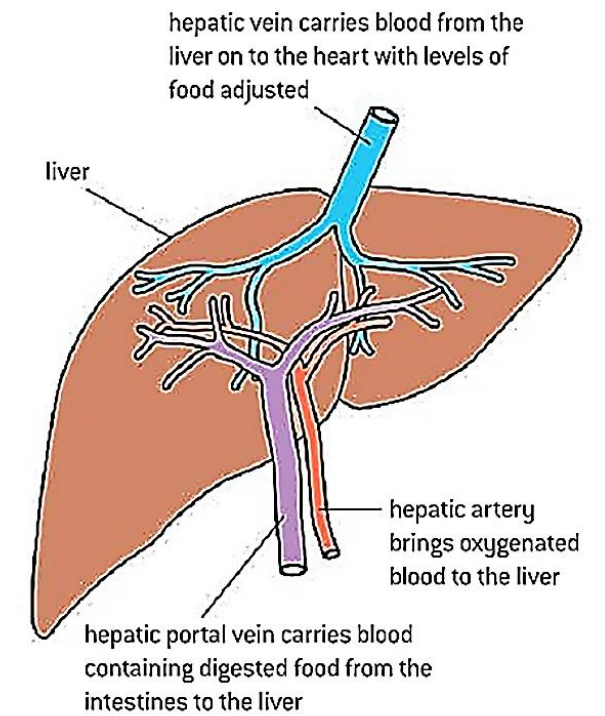
# Functions of the liver

- It plays a key role in the regulation of circulating glucose by either storing glucose as glycogen or breaking glycogen down to glucose. When levels of glucose are high, insulin is released. The insulin stimulates hepatocytes to take up the glucose and store it as glycogen. When the levels of blood glucose fall, hormones such as glucagon will be released. This release will result in the breakdown of glycogen, glycerol, amino acids and fatty acids in the liver releasing glucose to the blood stream.
- Because the body cannot store proteins or amino acids, excess quantities of these in the diet are broken down in the liver to be utilized as energy sources. The liver processes the resulting nitrogenous waste.
- The liver is responsible for managing circulating lipids which arrive in a variety of forms. Some forms such as chylomicrons arriving from the intestine are broken down. The liver processes lipids in one form and distributes it in other forms. For example, very low density lipoproteins (VLDL) are synthesized in hepatocytes. Their purpose is to transport the triglycerides synthesized in the liver into blood plasma for storage or use in the body . Surplus cholesterol is converted into bile salts.

Lipoprotein class	Density (g ml <sup>-1</sup> )	Diameter (nm)	% Protein	% Cholesterol	% Phospholipid	% Triglycerides
HDL	1.063–1.210	5–15	33	30	29	8
LDL	1.019–1.063	18–28	25	50	21	4
IDL	1.006–1.019	25–30	18	29	22	31
VLDL	0.95–1.006	30–80	10	22	18	50
Chylomicrons	<0.95	100–1000	<2	8	7	84



- Surplus cholesterol is converted to bile salts. Although cholesterol is absorbed from food in the intestine, a large quantity is synthesized each day by hepatocytes (liver cells). Cholesterol is a raw material needed for the synthesis of vitamin D as well as for the synthesis of steroid hormones. It is a structural component of membranes and it is used in the production of bile. The liver regulates the amount of circulating lipids such as cholesterol and lipoproteins, either synthesizing them as required, or breaking them down and secreting cholesterol and phospholipids in the bile. The amount of cholesterol synthesized by the body varies to some degree with diet. Excess saturated fat in the diet increases the production of cholesterol.
- Endoplasmic reticulum and Golgi apparatus in hepatocytes produce plasma proteins. The rough endoplasmic reticulum of hepatocytes within the liver produce 90% of the proteins in blood plasma, including such proteins as fibrinogen and albumin. Albumin is a carrier protein that binds to such things as bilirubin. For this reason it is referred to as a transport protein, though it also plays a role in maintaining osmotic balance in the blood. Fibrinogen is a protein that is essential for clotting.
- The liver removes toxins from the blood and detoxifies them. An important role of the liver is detoxification. Liver cells absorb toxic substances from the blood and convert them into non-toxic or less toxic substances, using a range of chemical conversions. For example, alcohol is converted into a less toxic substance by the enzyme ethanol dehydrogenase. The liver converts toxic ammonia into urea. The liver also works to detoxify biochemicals which are foreign to the organism's normal biochemistry such as poisons or drugs. One means by which the liver does this is to convert hydrophobic compounds into more easily excreted hydrophilic compounds.



▲ Figure 1 Blood flow to and from the liver

