



## Significance of Liver in Regulating and Storage of Different Metabolic Components

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### DESCRIPTION

One of the important roles of the liver is to store various substances that are essential for the body's health and survival. These substances include carbohydrates, fats, vitamins, minerals, iron, and glycogen. Carbohydrates are main source of energy for the body. They are broken down into glucose, which is used by the cells for various processes. The liver plays a central role in maintaining blood glucose levels by storing excess glucose as glycogen, a branching glucose polymer. This is stimulated by insulin release after a meal. The liver can store around 100 g of glycogen, which can be released into the bloodstream when blood sugar levels drop or when the body needs energy quickly. This process is regulated by glucagon and adrenaline hormones. The liver also converts some glucose into fat and stores it as triglycerides in the liver cells.

Fats are another source of energy for the body and also serve as building blocks for cell membranes and hormones. The liver is involved in fat metabolism by producing bile, a fluid that helps the small intestine break down and absorb fats, cholesterol, and some vitamins. It consists of bile salts, cholesterol, bilirubin, electrolytes, and water. The liver stores bile in the gallbladder, a small sac under the liver, and releases it into the duodenum when food enters the stomach. The liver also synthesizes cholesterol from acetyl-CoA and regulates its level in the blood by converting it into bile acids or lipoproteins. Minerals are inorganic elements that are involved in various physiological processes in the body. Some of them are stored in the liver as well as other organs and tissues. Iron is an essential component of hemoglobin, which carries oxygen in the blood. It is also involved in enzyme activity and immune system function. Iron is stored in the liver as ferritin or hemosiderin.

Copper is a cofactor for many enzymes that are involved in energy production, iron metabolism, antioxidant defense, connective tissue formation, and neurotransmitter synthesis. Copper is stored in the liver as metallothionein or ceruloplasmin. Vitamin D can be obtained from food or synthesized by the skin from sunlight exposure. It is converted to 25-hydroxy vitamin D in the liver and then to 1,25-dihydroxy

vitamin D in the kidneys. Vitamin D is essential for calcium and phosphate homeostasis, bone health, and immune system function. Vitamin E is a family of antioxidants that protect cell membranes from oxidative damage. It can be stored in the liver or adipose tissue. Vitamin K can be derived from plant or animal sources or produced by intestinal bacteria. It is necessary for blood clotting by activating coagulation factors. Vitamin B12 is mainly found in animal products and is required for DNA synthesis, red blood cell production, and nerve function. It is stored in the liver as methylcobalamin or adenosylcobalamin. Zinc is a cofactor for over 300 enzymes that are involved in DNA synthesis, protein synthesis, wound healing, immune system function, and taste perception. Zinc is stored in the liver as metallothionein. Magnesium is a cofactor for over 300 enzymes that are involved in energy production, muscle contraction, nerve transmission, bone formation, and blood pressure regulation. Magnesium is stored in the liver as magnesium-ATP complex. The liver's storage functions can also be impaired by genetic disorders, such as glycogen storage diseases, hemochromatosis, Wilson's disease, or alpha-1 antitrypsin deficiency. These disorders affect the metabolism or transport of the stored substances and cause their accumulation or deficiency in the liver or other organs.

### CONCLUSION

The liver is a storage organ that buffers periods of nutritional abundance or scarcity by storing various substances that are essential for the body's health and survival. These substances include carbohydrates, fats, vitamins, minerals, iron, and glycogen. The liver also regulates their availability and utilization by various mechanisms. The liver's storage functions are significant for maintaining homeostasis and preventing diseases caused by deficiency or excess of these substances. The liver's storage functions can be improved by dietary and lifestyle modifications, such as reducing alcohol consumption, avoiding excess fructose intake, increasing fiber intake, exercising regularly, and maintaining a healthy weight. In some cases, medication or surgery may be required to treat the underlying cause of the storage dysfunction.

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