



Understanding Liver Function in Human Health

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DESCRIPTION

The liver is one of the largest and most active organs in the human body, performing a wide range of biochemical activities that maintain internal balance. Located in the upper right portion of the abdomen, it acts as a processing center where nutrients are transformed, toxins are neutralized, and essential proteins are produced. Every moment, blood flows through the liver carrying substances absorbed from the digestive tract, allowing this organ to modify, store, or eliminate them as needed.

One of the primary roles of the liver involves metabolism. After food is digested and absorbed, carbohydrates, proteins, and fats are transported to the liver. Carbohydrates are converted into glucose, which serves as a major energy source for the body. When glucose levels rise, the liver stores excess amounts as glycogen. During periods when blood sugar drops, glycogen is broken down and released as glucose to maintain stable levels. This continuous adjustment ensures that organs such as the brain receive a steady supply of energy.

Protein metabolism is another vital function carried out by the liver. Amino acids derived from dietary proteins are processed and used to synthesize important compounds. Among these are plasma proteins like albumin, which helps maintain fluid balance in the bloodstream, and clotting factors that are essential for stopping bleeding. The liver also converts ammonia, a toxic byproduct of protein breakdown, into urea, which is then excreted through the kidneys. This conversion prevents harmful accumulation of ammonia in the body.

Fat metabolism is equally significant. The liver breaks down fatty acids to produce energy and synthesizes lipoproteins that transport lipids through the bloodstream. It also plays a role in cholesterol regulation by producing and removing cholesterol as required. Additionally, the liver generates bile, a substance necessary for the digestion and absorption of dietary fats in the small intestine. Bile is stored in the gallbladder and released when fatty foods are consumed, aiding in efficient digestion.

Detoxification represents another essential responsibility. The liver processes various substances, including medications, alcohol, and environmental chemicals. Specialized enzyme systems modify these compounds, making them less harmful and easier to eliminate. Some toxins are converted into water-soluble forms that can be excreted through urine, while others are secreted into bile and removed via the digestive tract. This constant filtration helps protect the body from potentially damaging substances encountered in daily life.

The liver also plays a role in storing essential nutrients. Vitamins such as A, D, E, and K are stored within liver cells, along with vitamin B12 and minerals like iron and copper. These reserves ensure that the body has access to critical nutrients even during periods of inadequate intake. Iron storage is particularly important, as the liver regulates its release for the production of hemoglobin in red blood cells.

Immune function is closely linked to liver activity. Specialized cells known as Kupffer cells reside within the liver and act as part of the body's defense system. They capture and break down bacteria, viruses, and other foreign particles that enter the bloodstream. By filtering blood coming from the digestive tract, the liver reduces the risk of systemic infections and contributes to overall immune stability.

Another important aspect of liver function involves the regulation of hormones. The liver breaks down excess hormones circulating in the blood, ensuring that their levels remain balanced. This includes hormones related to growth, metabolism, and reproduction. By controlling hormone breakdown, the liver supports proper communication between different organs and systems.

In clinical practice, liver function is assessed through blood tests that measure enzyme levels, protein production, and bilirubin concentration. Elevated levels of enzymes such as Alanine Amino Transferase (ALT) and aspartate Amino Transferase (AST) may indicate liver cell damage. Bilirubin levels provide insight into the liver's ability to process waste products, while albumin levels reflect its synthetic capacity. These tests,

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combined with imaging studies when needed, offer valuable information about liver health.

In summary, the liver performs a wide array of tasks essential for survival, including metabolism, detoxification, nutrient storage, immune defense, and hormone regulation. Its ability to adapt

and regenerate highlights its importance, yet it remains vulnerable to long-term damage if not properly cared for. Understanding how the liver functions encourages healthier lifestyle choices and promotes awareness of conditions that can affect this vital organ.