LIVER FUNCTION TEST

The liver is located in the upper right portion of the abdomen. It is the largest gland in the human body that performs several important functions. It is the only organ that has the ability to regenerate efficiently.

Liver Anatomy

Structure of Liver

The liver is a triangular, bilobed structure consisting of a larger right lobe and a smaller left lobe. The falciform ligament separates the two lobes.

A layer of fibrous tissue called Glisson's capsule covers the liver. This capsule is covered by the peritoneum. This protects the liver from physical damage.

It has two main sources of blood:

- **Hepatic Portal Vein** carries nutrient-rich blood from the digestive system.
- **Hepatic Artery** carries oxygenated blood from the heart.

Functions of Liver

The important functions of the liver are mentioned below:

Production of Bile

Bile, which helps in the digestion and absorption of fats, vitamins and cholesterol is produced in the liver.

Absorption of Bilirubin

Bilirubin is formed by the breakdown of haemoglobin. The iron released is stored in the liver to make next-generation blood cells.

Supporting Blood Clots

Bile is responsible for the absorption of vitamin K. If bile is not produced, clotting factors will not be produced.

Metabolization of Fats

Bile helps in the breakdown and digestion of fats.

Carbohydrate Metabolization

The carbohydrates stored in the liver as glycogen are broken down into glucose and released into the blood to maintain glucose levels.

Storage of Vitamins and Minerals

Vitamins A, D, E, K, and B12 are stored in the liver. It also stores iron in the form of ferritin to form new red blood cells.

Metabolization of Proteins

Bile helps in the digestion of proteins.

Filtering Blood

The compounds such as hormones, alcohol, etc are filtered by the liver from the blood.

Immunological Function

The liver contains Kuffer cells involved in immune activity. These destroy any disease-causing agents.

Albumin Production

Albumin transports fatty acids and steroids to maintain correct pressure and prevent leakage of blood vessels.

Angiotensinogen Synthesis

This hormone is responsible for the narrowing of blood vessels which results in an increase in blood pressure.

Regeneration of Liver

The liver has the ability to regrow in all vertebrates. The functions of the liver are not lost during the growth process. In humans, regeneration takes 8-15 days.

In mice, the same process takes around 5-7 days.

Liver Diseases

Fascioliasis

This is caused by a parasite “liver fluke”. The parasite can lie dormant in the liver for months or even years.

Cirrhosis

This can be caused due to alcohol consumption, toxins and hepatitis. Here, the scar cells replace liver cells in a process known as fibrosis. The functionality of liver cells is destroyed, which might lead to liver failure.

Hepatitis

It is the inflammation of the liver caused by viruses such as hepatitis A, B and C. In most cases, it leads to liver failure.

Alcoholic Liver Disease

Uncontrolled alcohol consumption leads to liver damage. It is the most common cause of cirrhosis.

Fatty Liver Disease

This is the result of alcohol abuse or obesity. In this disease, the vacuoles of fat buildup in the liver cells.

Liver Cancer

Alcohol and hepatitis are the major cause of liver cancer. Hepatocellular carcinoma and cholangiocarcinoma are the two types of liver cancer.

Liver function tests (LFTs) are blood tests that measure enzymes, proteins, and bilirubin to assess liver health, detecting damage or diseases like hepatitis and cirrhosis. Key tests measure ALT, AST, ALP, albumin, and bilirubin levels, with abnormal results indicating potential damage or bile duct issues.

Key Liver Function Tests

- **Alanine Transaminase (ALT):** Highest in the liver; elevated levels strongly indicate liver damage.
- **Aspartate Transaminase (AST/SGOT):** Found in liver and other tissues; high levels signal injury to the liver or other organs.
- **Alkaline Phosphatase (ALP):** Elevated levels may indicate liver injury or bile duct blockage.
- **Bilirubin:** Evaluates waste products produced by the liver; high levels indicate jaundice or malfunction.
- **Albumin & Total Protein:** Measures proteins produced by the liver; low levels indicate chronic liver disease.
- **Gamma-glutamyltransferase (GGT):** Detects bile duct or liver damage.

Normal ranges vary between different sexes and body sizes, as well as between different laboratories. On average, normal ranges are:

- Alanine transaminase (ALT): 0 to 45 IU/L.
- Aspartate transaminase (AST): 0 to 35 IU/L.
- Alkaline phosphatase (ALP): 30 to 120 IU/L.
- Gamma-glutamyltransferase (GGT): 0 to 30 IU/L.
- Bilirubin: 2 to 17 micromoles/L.
- Prothrombin time (PT): 10.9 to 12.5 seconds.
- Albumin: 40 to 60 g/L.

- Total proteins: 3 to 8.0 g/dL.

Purpose and Symptoms:

These tests help diagnose liver issues, monitor treatment, or evaluate damage caused by conditions like fatty liver, hepatitis, or alcohol abuse. Symptoms prompting an LFT include jaundice (yellowing of skin/eyes), dark urine, abdominal pain, fatigue, and nausea.

ResultsInterpretation:
Normal ranges vary by lab, sex, and age. High ALT/AST generally signifies hepatocyte (liver cell) injury, whereas high ALP/GGT suggests cholestasis (blocked bile flow).

What can a liver function test diagnose?

These blood tests may not be enough to decisively diagnose a specific liver disease, but they can point your healthcare provider in the right direction and help rule out other possibilities. You might need further tests, such as imaging tests, a liver biopsy or blood tests for specific viruses to help make your final diagnosis. Possible diagnoses may include:

- Fatty liver disease.
- Toxic hepatitis.
- Autoimmune hepatitis.
- Viral hepatitis (A, B or C).
- Hemochromatosis.
- Wilson’s disease.
- Alpha-1 antitrypsin deficiency.
- Primary biliary cholangitis (PBC).
- Cirrhosis.
- Liver cancer.