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QUESTION

Write on the various ways to assess the integrity of liver following an exposure to a named toxicant.

ANSWER

Liver function tests (LFTs or LFs), also referred to as a hepatic panel, are groups of blood tests that provide information about the state of a patient's liver These tests include [prothrombin time](https://en.wikipedia.org/wiki/Prothrombin_time) (PT/INR), [activated Partial Thromboplastin Time](https://en.wikipedia.org/wiki/Activated_Partial_Thromboplastin_Time)(aPTT), [albumin](https://en.wikipedia.org/wiki/Albumin), [bilirubin](https://en.wikipedia.org/wiki/Bilirubin) (direct and indirect), and others. The liver transaminases [aspartate transaminase (AST or SGOT)](https://en.wikipedia.org/wiki/Aspartate_transaminase) and [alanine transaminase (ALT or SGPT)](https://en.wikipedia.org/wiki/Alanine_transaminase) are useful biomarkers of liver injury in a patient with some degree of intact liver function.

This testing is performed on a patient's/animal’s blood sample. Some tests are associated with functionality (e.g., albumin), some with cellular integrity (e.g., [transaminase](https://en.wikipedia.org/wiki/Transaminase)), and some with conditions linked to the biliary tract ([gamma-glutamyl transferase](https://en.wikipedia.org/wiki/Gamma-glutamyl_transferase) and [alkaline phosphatase](https://en.wikipedia.org/wiki/Alkaline_phosphatase)). Several biochemical tests are useful in the evaluation and management of patients/animal with hepatic dysfunction. These tests can be used to detect the presence of liver disease, distinguish among different types of liver disorders, gauge the extent of known liver damage, and monitor the response to treatment. Some or all of these measurements are also carried out on those individuals/animals taking certain medications, such as anticonvulsants, to ensure that the medications are not adversely impacting the person's liver.

A series of special blood tests can often determine whether or not the liver is functioning properly. These tests can also distinguish between acute and chronic liver disorders.

The most commonly performed blood tests include the following:

Serum bilirubin test: This test measures the levels of bilirubin in the blood. Bilirubin is produced by the liver and is excreted in the bile. Elevated levels of bilirubin may indicate an obstruction of bile flow or a problem in the processing of bile by the liver..This test is used to measure the level of albumin (a protein in the blood) and aides in the diagnosis of liver disease. [Bilirubin](https://www.healthline.com/health/bilirubin-blood) is a waste product from the breakdown of [red blood cells](https://www.healthline.com/health/rbc-count). It’s ordinarily processed by the liver. It passes through the liver before being excreted through your stool.

A damaged liver can’t properly process bilirubin. This leads to an abnormally high level of bilirubin in the blood. A high result on the bilirubin test may indicate that the liver isn’t functioning properly.

The normal range for total bilirubin is typically 0.1–1.2 milligrams per deciliter (mg/dL). There are certain inherited diseases that raise bilirubin levels, but the liver function is normal.

* Serum alkaline phosphatase test: This test is used to measure the level of alkaline phosphatase (an enzyme) in the blood. Alkaline phosphatase is found in many tissues, with the highest concentrations in the liver, biliary tract, and bone. This test may be performed to assess liver functioning and to detect liver lesions that may cause biliary obstruction, such as tumors or abscesses.
* Serum aminotransferases (transaminases): This enzyme is released from damaged liver cells.
* Prothrombin time (PTT) test: The prothrombin time test measures how long it takes for blood to clot. Blood clotting requires vitamin K and a protein that is made by the liver. Prolonged clotting may indicate liver disease or other deficiencies in specific clotting factors.
* Alanine transaminase (ALT) test: This test measures the level of alanine aminotransferase (an enzyme found predominantly in the liver) that is released into the bloodstream after acute liver cell damage. This test may be performed to assess liver function, and/or to evaluate treatment of acute liver disease, such as hepatitis.
* Aspartate transaminase (AST) test: This test measures the level of aspartate transaminase (an enzyme that is found in the liver, kidneys, pancreas, heart, skeletal muscle, and red blood cells) that is released into the bloodstream after liver or heart problems.
* Albumin test: [Albumin](https://www.healthline.com/health/albumin-serum) is the main protein made by your liver. It performs many important bodily functions. For example, albumin:
* stops fluid from leaking out of your blood vessels
* nourishes your tissues
* transports hormones, vitamins, and other substances throughout your body

An albumin test measures how well your liver is making this particular protein. A low result on this test can indicate that your liver isn’t functioning properly.

The normal range for albumin is 3.5–5.0 grams per deciliter (g/dL). However, low albumin can also be a result of poor nutrition, kidney disease, infection, and inflammation.

* Gamma-glutamyl transpeptidase test: This test measures the level of gamma-glutamyl transpeptidase (an enzyme that is produced in the liver, pancreas, and biliary tract). This test is often performed to assess liver function, to provide information about liver diseases, and to detect alcohol ingestion.
* Lactic dehydrogenase test: This test can detect tissue damage and aides in the diagnosis of liver disease. Lactic dehydrogenase is a type of protein (also called an isoenzyme) that is involved in the body's metabolic process.
* 5'-nucleotidase test: This test measures the levels of 5'- nucleotidase (an enzyme specific to the liver). The 5'- nucleotidase level is elevated in persons with liver diseases, especially those diseases associated with cholestasis (disruption in the formation of, or obstruction in the flow of bile).
* Alpha-fetoprotein test: Alpha-fetoprotein (a specific blood protein) is produced by fetal tissue and by tumors. This test may be performed to monitor the effectiveness of therapy in certain cancers, such as hematomas’.
* Mitochondrial antibodies test: The presence of these antibodies can indicate primary biliary cirrhosis, chronic active hepatitis, and certain other autoimmune disorders.

Liver function tests, also help determine the health of the liver by measuring the levels of proteins, liver enzymes, and bilirubin in your blood.

A liver function test is often recommended in the following situations:

* to check for damage from liver infections, such as [hepatitis B](https://www.healthline.com/health/hepatitis-b) and [hepatitis C](https://www.healthline.com/health/hepatitis-c)
* to monitor the side effects of certain medications known to affect the liver
* excessive intake of alcohol

WAYS TO ASSESS THE INTEGRITY OF LIVER AFTER EXPOSURE TO ALCOHOL

The ALT and AST tests measure [enzymes](https://www.healthline.com/health/enzyme-markers) that the liver releases in response to damage or disease. The albumin test measures how well the liver creates albumin, while the bilirubin test measures how well it disposes of bilirubin. ALP can be used to evaluate the bile duct system of the liver. The serum albumin is present at higher levels in alcoholic liver cirrhosis.

## Having abnormal results on any of these liver tests typically requires follow up to determine the cause of the abnormalities. However, these enzymes can also be found in other places besides the liver. The combination of elevated MCV and GGT has a 95% sensitivity for alcohol abuse. GGT levels become elevated after 24 hours to 2 weeks of heavy alcohol consumption and return to normal within 2 to 6 weeks of abstinence, which allows detection of heavy drinking. Further testing

If the symptoms or liver function test suggest an advanced form of ARLD (either alcoholic [hepatitis](https://www.nhs.uk/conditions/hepatitis/) or [cirrhosis](https://www.nhs.uk/conditions/cirrhosis/)), further tests may be required such as:

Imaging tests

Scans may be needed to produce detailed images of the liver.

This may include:

* [Ultrasound scan](https://www.nhs.uk/conditions/ultrasound-scan/)
* CT scan
* [MRI scan](https://www.nhs.uk/conditions/mri-scan/)

Some scans may also measure the stiffness of the liver, which is a good indication of whether the liver is scarred.

Liver biopsy

During a liver [biopsy](https://www.nhs.uk/conditions/biopsy/), a fine needle is inserted into the body (usually between the ribs).

A small sample of liver cells is taken and sent to a laboratory to be examined under a microscope.

The biopsy is usually carried out under [local anaesthetic](https://www.nhs.uk/conditions/local-anaesthesia/), either as a day case or with an overnight case.

The liver tissue will be examined to determine the degree of scarring in the liver and the cause of the damage.

Endoscopy

An endoscope is a long, thin, flexible tube with a light and a video camera at one end.

During an [endoscopy](https://www.nhs.uk/conditions/endoscopy/), the instrument is passed down the oesophagus (the long tube that carries food from the throat to the stomach) and into the stomach.

Pictures of your oesophagus and stomach are transmitted to an external screen. The doctor will be looking for swollen veins (varices), which are a sign of cirrhosis.

How a liver function test is performed

Blood may drawn in a hospital or at a specialized testing facility. To administer the test:

1. ..The healthcare provider will clean your skin before the test to decrease the likelihood that any microorganisms on your skin will cause an infection.
2. . They’ll likely wrap an elastic strap on your arm. This will help your veins become more visible. They’ll use a needle to draw samples of blood from your arm.
3. .After the draw, the healthcare provider will place some gauze and a bandage over the puncture site. Then they’ll send the blood sample to a laboratory for testing.