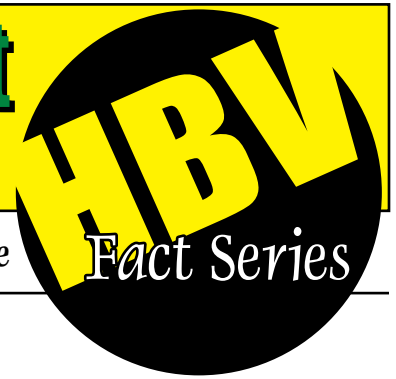


# Hepatitis B Fact Sheet

A Publication of the Hepatitis C Support Project

a series of fact sheets written by experts in the field of liver disease



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## How to Interpret (and Understand)

# Liver Tests

It is important for people chronically infected with the hepatitis B virus (HBV) to regularly monitor the health of their liver, usually through lab tests performed on a blood sample. The tests analyze a variety of enzymes and other substances, which provide a report card on the health of a liver.

These tests should be conducted every three, six, or 12 months at a minimum, and more frequently if there is liver damage and/or the person is undergoing treatment. The test results can be confusing, below is an explanation of some of these key lab tests.

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Lab test results (in addition to viral load or HBV-DNA levels), how long a person has been infected, and age will help determine whether treatment is recommended, or if a liver biopsy is needed to reveal more detailed information about the health of the liver.

It is important to be pro-active and obtain and maintain a file of all lab reports in order to manage one's health and make informed treatment decisions. Lab results can also vary from one lab to another, so blood samples should always be sent to the same lab in order to get consistent lab test results over months and years when important treatment choices are made.

### More HBV Tests:

There are many different types of diagnostic tests that are discussed in more detail in other HBV Fact Sheets:

Hepatitis B **antigens** are proteins that make up different parts of the virus. Several diagnostic tests measure the presence of specific antigens.

**Antibodies** are substances produced by the body to fight a viral infection. Hepatitis B antibody tests are used to stage infection and to find out if the body has resolved or cleared the hepatitis B viral infection.

**HBV DNA** is the genetic material that makes up the virus and is used for several diagnostic tests.

**Liver biopsy** is a procedure in which a sample of liver tissue is taken for laboratory examination. Liver biopsies are used to monitor liver disease progression in people with hepatitis B.



## Liver Tests

## Liver Biochemical/ Function Tests

**Alanine aminotransferase (ALT)**, previously called SGPT, is an enzyme produced by liver cells (hepatocytes). The level of ALT in the blood increases when liver cells are damaged or die at higher rates than normal. The more liver cells that are damaged, the higher the ALT level may be. Drugs, alcohol use, some over-the-counter painkillers, toxins, viruses, herbs, and other substances can also cause abnormal increases in ALT levels.

However, ALT levels are not always true indications of how healthy a liver is. An ALT level shows only the condition of liver cells on the day the blood was drawn for the test. Liver cell damage and spikes in ALT levels may have been occurring, but unless a person had a blood test on the day of the “spike,” it would never be documented or known. Recently, researchers are finding that when HBV patients with “normal” ALT levels have their liver enzymes tested weekly or monthly, they indeed do have increases in their ALT levels.

Only a liver biopsy that extracts a needle-sized sliver of liver tissue can reveal the true condition of the liver. ALT levels can remain low even when the liver

is inflamed or develops scar tissue, such as during a child’s “immune tolerant stage” of HBV infection when the immune system has not noticed the infection and begun attacking infected liver cells. Some HBV-infected adults and children with normal ALT levels have been known to develop liver damage. That is why it is important to have a variety of tests to assess liver health.

Normal ALT levels are commonly reported as 0-30 IU/L (international units per liter) for men and 0-19 IU/L for women. Normal ALT levels for children and teens are generally about 30 IU/L, or whatever a lab identifies as the upper limit of normal. Physicians rely heavily on ALT levels and viral load when deciding whether to prescribe treatment.

**Aspartate aminotransferase (AST)**, previously called SGOT, is an enzyme similar to ALT but is less specific for liver disease. In many cases of liver inflammation, the ALT and AST levels are elevated.

**The normal range for AST is 10 to 34 IU/L.**

**Alkaline phosphatase** is an enzyme produced in the bile ducts and the bone, and found in the liver. Levels are increased in hepatitis, cirrhosis, and other ill-

nesses. Some medications may also cause increased levels.

**Normal ranges are 44 to 147 IU/L.**

**Gamma-glutamyl transpeptidase (GGT or GGPT)** is also an enzyme produced in the bile ducts that may be elevated in people with bile duct diseases. Hepatitis and heavy alcohol consumption also increase GGT.

**Normal ranges are 0 to 51 IU/L.**

**Bilirubin** is the major breakdown product of old red blood cells. Hemoglobin is released from the red blood cells; the “heme” portion is further broken down into bilirubin. When liver function is impaired, as with acute hepatitis or end stage liver disease, bilirubin accumulates in the blood and causes yellowing of the skin and eyes, called jaundice. With HBV infection, bilirubin levels are usually normal until a significant amount of liver damage has occurred. Bilirubin is often reported as total, indirect (the amount of “unconjugated” bilirubin or free bilirubin that has not been attached to a glucuronide molecule), and direct (the amount of “conjugated” bilirubin or bilirubin that has been chemically attached to a glucuronide in the liver and then excreted from liver cells into the bile and stored in the gallbladder or transferred to the duodenum).

**Normal range of total bilirubin is 0.3 to 1.9 mg/dL (milligrams per deciliter).**

**Albumin** is a protein that is synthesized by the liver and circulates in the blood. Low albumin levels indicate poor liver function and contribute to peripheral edema (accumulation of fluid in the feet and ankles) and ascites (accumulation of fluid in the abdominal area) sometimes seen in very late stage liver disease. Albumin levels are usually normal in chronic liver disease until significant liver damage is present.

**Normal ranges from 3.4 to 5.4 g/dL.**

**Prothrombin time (PT)** is a blood clotting test and it is prolonged (or elevated) when the blood concentrations of some of the blood clotting factors made by the liver are low. In chronic liver disease, the PT is usually not elevated until cirrhosis is present and liver damage is fairly significant.

**Normal ranges from 11 to 13.5 seconds.**

**Alpha fetoprotein (AFP)** is not part of liver function tests, but doctors order this test along with liver enzyme tests, because an increase in AFP can indicate the presence of a liver tumor or cancer caused by hepatitis B.

AFP, produced by the liver, is more commonly measured to diagnose fetal distress or fetal abnormalities in pregnant women. But when chronic hepatitis B is present, elevated AFP levels can signal liver tumors or cancer. AFP tests have uncovered liver tumors in people whose ALT levels have been normal.

**Normal AFP levels are less than 10 ng/mL.**

## Complete Blood Counts (CBC)

**CBCs** measure the three components of blood: red cells, white cells, and platelets.

**White cell (leukocyte) count** provides information on the body's ability to fight infection. A high total white count means the body is actively fighting an infection; a low total white count means the body's ability to fight infection is impaired.

Low white blood count may be caused by advanced liver disease or medications. In addition to total count, a CBC gives the breakdown of each type of white cell. The types are neutrophils, lymphocytes, monocytes, eosinophils, and basophils.

**Neutrophil count** is used to determine when a person's ability to fight common infections is impaired. Low neutrophil

count is called neutropenia. Interferon can also cause neutropenia. Chemotherapy definitely causes neutropenia.

**Normal white cell count ranges from 4,500 to 10,000 white blood cells/mcL (cells per microliter).**

**Red cell count** provides information on the body's ability to carry oxygen to cells, as well as the size of the red blood cells. The most important values are hemoglobin and hematocrit (together referred to as H&H), which measure the ability to provide the body with oxygen. Low H&H is known as anemia, a serious condition that produces fatigue. Advanced liver disease can produce anemia.

**Normal hemoglobin ranges from 13.8 to 17.2 gm/dL in men and 12.1 to 15.1 gm/dL in women; normal hematocrit ranges from 40.7 to 50.3 percent in men and 36.1 to 44.3 percent in women.**

**Platelet count** provides information on the blood's ability to clot. Low platelet count is called thrombocytopenia and is dangerous because of the risk of internal and external bleeding. Advanced liver disease can cause thrombocytopenia. Normal platelet count ranges

## Liver Tests

from 150 to 400 K/cu MM (or 150,000 to 400,000/mm<sup>3</sup>).

## Chemistry Panel

**Chemistry panels** measure minerals (electrolytes), sugar (glucose) and fats (lipids) in the blood, as well as liver and kidney functions.

**Electrolytes** are minerals essential to life. Blood tests usually monitor the following electrolytes: sodium, potassium, chloride, calcium, iron, phosphorus, and sometimes magnesium. Chronic diseases may cause electrolyte abnormalities. If untreated, electrolyte imbalances may be life threatening.

**Glucose** is the measurement of blood sugar. High blood sugar is called hyperglycemia, and may be an indication of diabetes. Low blood sugar is called hypoglycemia.

**Normal glucose ranges from 60 to 100 mg/dL.**

**Lipids** are fats. The most commonly measured lipids are triglycerides and cholesterol.

High triglycerides and cholesterol can be an indication of damaged arteries and potential heart disease, which are serious medical problems.

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**Kidney functions** measured by lab tests include blood urea nitrogen (BUN), creatinine and uric acid. The kidneys are essential in eliminating body wastes and regulating blood pressure, hence a disturbance in kidney function can be a life-threatening problem.

Viral hepatitis can cause kidney damage, and some anti-viral medications, including adefovir, have been found to

cause kidney problems at high doses. Creatinine is the most common measurement of kidney function.

**Normal creatinine levels in urine collected over a 24-hour period can range from 500 to 2,000 mg/day.**

## Bottom Line

Remember, keep and file copies of lab tests, become familiar with the results, and consult with a health care provider before drawing conclusions or making health care decisions. This is another piece of staying in charge of one's health.

HCSP • VERSION 2.0 • March 2009

The information in this fact sheet is designed to help you understand and manage HBV and is not intended as medical advice. All persons with HBV should consult a medical practitioner for diagnosis and treatment of HBV.

For more information about hepatitis B, visit the following websites.  
**Hepatitis B Foundation: [www.hepb.org](http://www.hepb.org) • [HIVandHepatitis.com](http://HIVandHepatitis.com)**

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