

Hepatitis C

Laboratory Tests and Hepatitis C

If you have hepatitis C, your doctor will use laboratory tests to check your health. This handout will help you understand what the major tests are and what the results mean.



Lab Tests A to Z

Your doctor can see how well your liver is working by testing your blood. The most common tests that are used to check how well your liver is working and your biliary system (or *the tubes that lead out of the liver*) are called Liver Function Tests (LFTs). When your liver is working well, the LFT levels are low. When your liver is not working as well as it should, these levels can become much higher. These levels show the chemicals that your liver uses to do its work (called *liver enzymes*) and bilirubin (pronounced “billy-ru-bin”). Albumin (pronounced “al-byoo-men”) is a protein made by the liver.

Your doctor may also order a liver panel, which generally includes the following tests:

ALT/SGPT	Alanine Aminotransferase
AST/SGOT	Aspartate Aminotransferase
AlkP	Alkaline Phosphatase
TBil	Total Bilirubin
DBil	Direct Bilirubin

In this handout, you will find tables describing many laboratory tests, including the ones mentioned above.

Keep in mind that normal range numbers will vary based on your age and sex, and the medicines you are taking. If you are not sure what your test result means or are concerned about the results, talk with your VA health care provider.

AFP (Alpha-fetoprotein)

Normal Range: 0 - 8.9 ng/ml

Definition: This is a protein that is often used as a tumor marker for liver cancer. AFP is not normally present in healthy adults, other than pregnant women.

Explanation of Test Result: High levels may mean active liver disease. This test is also used for detection of liver cancer (*hepatocellular carcinoma*).

Alb (Albumin)

Normal Range: 3.3 - 5.2 mg/dl

Definition: This is the major protein in the blood made only by the liver. It makes up the largest part of the Total Protein level. It maintains the fluid balance in your body.

Explanation of Test Result: A low level may mean advanced liver disease because the liver is not able to produce the normal amount. Low levels may also be due to malnutrition, kidney disease, or bowel and intestinal disease.

AlkP (Alkaline phosphatase)

Normal Range: 40 - 125 U/L

Definition: Also known as Alk Phos, this is an enzyme made in the liver’s bile ducts, bone, kidney, and intestine.

Explanation of Test Result: High levels mean more advanced liver disease, especially problems with the liver’s bile ducts. Levels can also be high if there is bone disease.

ALT/SGPT (Alanine Aminotransferase)**Normal Range:** 7 - 56 U/L**Definition:** This is an enzyme made in liver cells. If liver cells are damaged or die, ALT leaks out into the bloodstream.**Explanation of Test Result:** This is the most important test to follow in a person with liver disease. A high ALT may mean a high degree of liver cell damage. However, ALT levels can also vary and do not always reflect the degree of liver cell damage. A liver cell biopsy will give the most accurate information. The ALT enzyme is a more accurate marker of liver damage than the AST enzyme. One goal of treatment for hepatitis C is a normal ALT level.**Antibody****Definition:** This is a protein developed by your body that protects you from an antigen.**Anti-HBs (hepatitis B surface antibody)****Explanation of Test Result:** If this test is positive, you have antibodies against the hepatitis B virus. You are likely to be immune (or *protected*) against the hepatitis B virus.**Anti-HBc (hepatitis B core antibody)****Explanation of Test Result:** If this test is positive, you have developed an antibody to the core of the virus and have been exposed to the hepatitis B virus. You may be currently infected, were infected and fought it off, have chronic infection, or a false positive test.**Anti-HCV (hepatitis C antibody)****Explanation of Test Result:** If this test is positive, you may be infected with hepatitis C virus. This test does not tell whether you were exposed and fought off the infection, have chronic infection, or if it is a false positive test. Another test called RIBA (recombinant immunoblot assay) may be used to confirm the hepatitis C antibody test result.**Antigen****Definition:** The antigen is the part of the virus that signals your body to protect itself.**AST/SGOT (Aspartate Aminotransferase)****Normal Range:** 5 - 35 U/L**Definition:** This is an enzyme made in liver cells, similar to the ALT. It is also made in muscles and can be released from damaged muscle, heart, kidney, and brain tissue. Therefore, the AST level can be affected by many conditions other than liver disease.**Explanation of Test Result:** Elevated levels can mean liver damage. Often the AST and ALT levels will elevate at the same time.**Basophils****Normal Range:** 0.01 - 0.20 K/ μ l**Definition:** These are white blood cells that are similar to Neutrophils.**CBC (Complete Blood Count)****Normal Range:** See specific tests: RBC, Hgb, HCT, WBC, Platelets**Definition:** A CBC tests for all the blood cells, including red blood cells and the different types of white blood cells.**Cholesterol****Normal Range:** Healthy levels of cholesterol vary depending on the risk of heart disease and other medical factors.**Definition:** Cholesterol is synthesized in the liver. It helps to build hormones, vitamins, and cell membranes.**Explanation of Test Result:** High levels of cholesterol are associated with atherosclerosis and heart disease. Low levels are a marker of poor liver function.

CREAT (Creatinine)**Normal Range:** 0.6 - 1.4 mg/dl**Definition:** This is a breakdown product of creatinine phosphate, which is a protein found in muscle. It is made entirely by the kidneys.**Explanation of Test Result:** Abnormal levels usually indicate problems with the kidneys or renal system.**DBili (Direct Bilirubin)****Normal Range:** 0.1-1.0 mg/dl**Definition:** Direct, or *conjugated*, bilirubin is a breakdown product from hemoglobin that has been further processed by the liver.**Explanation of Test Result:** High levels mean liver damage, or blockage in the ducts (*tubes*) of the liver. High levels also cause yellowing of the skin and whites of the eyes (called *jaundice*).**Eosinophils****Normal Range:** 0.04 - 0.50 K/ μ l**Definition:** These are white blood cells that are similar to Neutrophils.**Ferritin****Normal Range:** 29 - 300 μ g/L**Definition:** This protein stores iron in the liver.**Explanation of Test Result:** Ferritin is the primary storage form of iron in the body. High levels may mean liver disease or hemochromatosis.**Genotype****Definition:** The genotype is a mixture of genes within a virus. Genotypes help determine the genetic character of the viruses, such as the hepatitis C virus. Currently, there are six known hepatitis C genotypes.**GGT (Gamma-glutamyltranspeptidase)****Normal Range:** 7 - 64 U/l**Definition:** This is an enzyme made in the bile ducts. High levels may mean problems with the liver's bile ducts.**Explanation of Test Result:** GGT is a very sensitive test, and can elevate if you use drugs or alcohol.**Globulin****Normal Range:** 1 - 2.8 g/dl**Definition:** These proteins and albumin make up Total Protein.**Explanation of Test Result:** Levels of these proteins may vary in liver disease.**HBeAg (hepatitis B e antigen)****Explanation of Test Result:** If you test positive, you are currently infected and probably have high levels of hepatitis B virus in your blood. You may be very infectious to others.**HBsAg (hepatitis B surface antigen)****Explanation of Test Result:** If you test positive, you are currently infected with hepatitis B.**HCT (Hematocrit)****Normal Range:** 42 - 52 percent**Definition:** This measures the percentage of red blood cells per volume of blood sample.**Explanation of Test Result:** Low levels may mean anemia. With anemia, hemoglobin may also be low.

HCV RNA Quantitative or Qualitative (Hepatitis C Viral Load)

Normal Range: Undetectable in people without hepatitis C or who have been successfully treated for hepatitis C.

Definition: The qualitative test tells whether or not there is any detectable hepatitis C virus in your blood. The quantitative test determines the amount of hepatitis C virus in the blood.

Explanation of Test Result: The qualitative HCV RNA test is commonly used to confirm the diagnosis of chronic hepatitis C. The quantitative test is used mostly to measure response to treatment. It may also be used prior to treatment to help estimate the chances that treatment will be successful. People with very high viral loads may not respond as well to treatment as those with lower viral loads. The viral load does not reflect the degree of liver damage or the severity of chronic hepatitis C infection.

Hgb (Hemoglobin)

Normal Range: 14 - 18 g/dl

Definition: This is a protein portion of red blood cells that carries oxygen.

Explanation of Test Result: Low levels may mean anemia, which is a common side effect of ribavirin treatment.

INR (International normalized ratio)

Definition: This is a system of reporting the results of blood clotting tests.

Explanation of Test Result: In the INR system, results of blood clotting tests are standardized so health care providers all over the world are able to read the results.



Iron

Definition: This is a mineral that plays a role in hemoglobin formation.

Explanation of Test Result:

- Percent Iron Saturated in Blood measures overall percentage of iron in blood. Normal range is 16 - 60 percent.
- Serum Iron measures level of iron in blood and is used to test for both low iron and iron overload, such as hemochromatosis. Normal range is 50 - 150 µg/dl.

LYMPHS (Lymphocytes)

Normal Range: 0.8 - 3.5 K/µl

Definition: These are white blood cells that produce antibodies to fight viral infections.

Monocytes

Normal Range: 0.2 - 0.8 K/µl

Definition: These are white blood cells that destroy foreign bacteria and other matter.

NEUTS (Neutrophils)

Normal Range: 2.2 - 8.6 K/µl

Definition: These are white blood cells that play a key role in inflammation, allergic reactions, pus formation, and in destroying bacteria and parasites.

Explanation of Test Result: Low neutrophil can mean infection or inflammation. Interferon treatment is associated with low neutrophil levels. Therefore, you must have normal levels of neutrophils to start interferon.

Platelets

Normal Range: 140 - 400 /mm³

Definition: These are small blood cells that help blood clot when injury occurs.

Explanation of Test Result: Platelets may be low in advanced liver disease or while on interferon treatment. A low count may increase the chance of bleeding. Therefore, you must have normal levels of platelets to start interferon treatment.

Protein, total**Normal Range:** 6.0 - 8.5 g/dl**Definition:** Total protein includes large particles in the blood made of albumin and globulins.**Explanation of Test Result:** Low levels of total protein indicate a more advanced stage of liver disease.**PT (Prothrombin Time)****Normal Range:** 9.8 - 13.8 seconds**Definition:** This is a measure of the time that it takes for your blood to clot. Prothrombin is a protein that is changed to thrombin during clotting.**Explanation of Test Result:** High PT may mean advanced liver disease. It may also be high if you are taking coumadin (or *warfarin*) for a heart condition, or if you have a vitamin K deficiency.**PTT (Partial Thromboplastin Time)****Normal Range:** 24.2 - 36.0 seconds**Definition:** This is another measure of clotting time.**Explanation of Test Result:** In addition to PT, this result shows if blood is clotting at a normal time. It is higher than normal in people with clotting disorders or patients on certain medicines, such as heparin.**Quasispecies****Definition:** When the virus changes and makes copies, it can make errors. This leads to minor genetic differences in viruses in an individual infected with a single genotype.**RBC (Red Blood Cells)****Normal Range:** 4.7 - 6.1 /mm³**Definition:** These are small cells that carry oxygen in the blood.**Explanation of Test Result:** Lab values show over- or under-production. Low levels may mean anemia.**RIBA™****(recombinant immunoblot assay)****Definition:** This is a more specific test than the hepatitis C antibody test that helps confirm a diagnosis of hepatitis C virus infection.**T3, total****Normal Range:** 45 - 137 ng/dl**Definition:** T3 is a form of thyroid hormone.**Explanation of Test Result:** T3 levels may be abnormal in liver disease.**T4, free****Normal Range:** 9 - 24 pmol/l**Definition:** T4 is a form of thyroid hormone.**Explanation of Test Result:** T4 levels may be abnormal in liver disease.**TBili (bilirubin, total)****Normal Range:** 0.1 - 1.2 mg/dl**Definition:** TBili is a breakdown product from hemoglobin in old red blood cells. Usually, it is removed from the blood by the liver, broken down, and sent to the intestines through the bile ducts.**Explanation of Test Result:** High levels mean liver damage, or blockage in the ducts (or *tubes*) of the liver. High levels also cause yellowing of the skin and whites of the eyes (called *jaundice*).

Triglycerides

Normal Range: 10 - 190 mg/dl

Definition: These are fatty substances in the blood.

Explanation of Test Result: Triglyceride levels may become high during interferon treatment. Levels usually return to normal after treatment has stopped.

TSH (Thyroid Stimulation Hormone)

Normal Range: 0.4 - 6.0 μ IU/ml

Definition: This hormone causes other thyroid hormones (T3 and T4) to be produced. Thyroid hormones help the body function and metabolize foods.

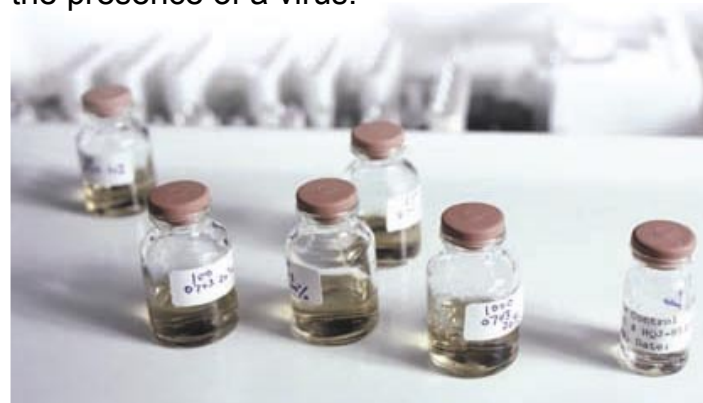
Explanation of Test Result: High levels of TSH are associated with interferon treatment and hypothyroidism.

WBC (White Blood Cells)

Normal Range: 4.8 - 10.8 /mm³

Definition: This test measures the overall number of white blood cells. White blood cells are made in bone marrow. There are five types of WBC: Neutrophils, Eosinophils, Basophils, Monocytes, and Lymphocytes. Each of them do slightly different jobs. All of them are used for fighting infections.

Explanation of Test Result: Low WBC may mean bone marrow depression, a common side effect of interferon treatment. Low levels can also be caused by reactions to toxins or to the presence of a virus.



Who can I contact for more information?

Call your local VA medical center and visit the Veterans Affairs Hepatitis C Web site at <http://www.hepatitis.va.gov/>

Contact the Centers for Disease Control and Prevention (CDC) Hepatitis Toll-Free Information Line at 1-888-4 HEPACDC (1-888-443-7232) and visit the Web site at <http://www.cdc.gov/ncidod/diseases/hepatitis>

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