

## **Hepatitis B-Understanding Your Disease, Symptoms, and Lab Results**

### **An Informative Overview by Monica Buel**

Hepatitis B is a disease of the liver caused by the Hepatitis B virus (A.D.A.M. Editorial, 2012). The Hepatitis B virus is a blood-borne pathogen and can be transmitted via infected blood and bodily fluids such as semen and vaginal discharge (A.D.A.M. Editorial, 2012). Upon infection with Hepatitis B, the virus enters into the liver, invading the liver cells (Mayo Clinic Staff, 2011). The virus begins to multiply (Mayo Clinic Staff, 2011). This multiplication causes inflammation, which presents itself as the signs and symptoms of Hepatitis B (Mayo Clinic Staff, 2011).

Signs and symptoms of Hepatitis B do not appear until about three months after the initial infection (Mayo Clinic Staff, 2011). These symptoms include abdominal pain, dark urine, fever, weakness and fatigue, and yellowing of the skin and whites of the eyes (jaundice) (Mayo Clinic Staff, 2011). Additional symptoms include headache, loss of appetite, nausea and vomiting, joint pain, and diarrhea (WebMD, 2010).

In the majority of cases, Hepatitis B goes away on its own with rest, healthy diet, and other precautions that can be discussed with your physician (Mayo Clinic Staff, 2011). In other cases Hepatitis B can become chronic leading to liver failure, cancer, or cirrhosis (A.D.A.M. Editorial, 2012).

If you are reading this now, you have either been diagnosed with Hepatitis B or are in the works of diagnosing Hepatitis B. Diagnosis begins with a physical exam and medical history. Any apparent risks for Hepatitis B will be discussed and any factors such as alcohol use and family history of liver disease will be touched on as well. The final factor in diagnosing Hepatitis B lies within the blood work. Understanding your blood work can often be the most difficult task in comprehending your disease. The following overview represents the blood work of a patient with Hepatitis B. You will find that each result will be outlined with detail in order to help you better understand your results and condition.

<b>Patient Total Bilirubin</b>	<b>Normal Range</b>	<b>Result</b>
0.7 mg/dL	0.1-0.2 mg/dL	Abnormal High Bilirubin

- When the hemoglobin in your red blood cells break down, bilirubin results as a byproduct (Lindh, 2010). A healthy liver filters this bilirubin out of your bloodstream (Lindh, 2010). The liver then sends that bilirubin to the gall bladder where it is released into the small intestine (Lindh, 2010). When there is a disease or disorder of the liver the bilirubin cannot get through the gall bladder and instead stays circulating in the blood. Bilirubin is a yellow-orange substance. It is this yellow-orange color that leads to the jaundice you have seen in your skin and the whites of your eyes.

<b>Patient Albumin</b>	<b>Normal Range</b>	<b>Result</b>
1.9 mg/dL	3.4-5.4 mg/dL	Abnormal Low Albumin

- Albumin is a protein found in the plasma (Lindh, 2010). It is a transport protein. Albumin is made in the liver. If blood work comes back with a low albumin level, one can suspect liver disease.

<b>Patient ALT</b>	<b>Normal Range</b>	<b>Result</b>
70 units/L	Less than 45 units/L	Abnormal High ALT

- Alanine aminotransferase (ALT) is an enzyme found in the liver (Lindh, 2010). If blood work comes back with a higher than normal value, liver damage is indicated.

<b>Patient AST</b>	<b>Normal Range</b>	<b>Result</b>
102 units/L	10-34 units/L	Abnormal High AST

- Aspartate Aminotransferase (AST) is also found in the liver (Lindh, 2010). Together with other enzymes, a high AST level can indicate liver disease.

<b>Patient ALP</b>	<b>Normal Range</b>	<b>Result</b>
184 IU/L	44-147 IU/L	Abnormal High ALP

- ALP is present in the liver (Lindh, 2010). A high alkaline phosphatase (ALP) is indicative of liver disease.

<b>Patient LDH</b>	<b>Normal Range</b>	<b>Result</b>
154 IU/L	105-133 IU/L	Abnormal High LDH

- Lactate dehydrogenase (LDH) is an enzyme found in the liver (Lindh, 2010). High levels of LDH indicate tissue damage.

<b>Patient GGT</b>	<b>Normal Range</b>	<b>Result</b>
107 IU/L	0-51 IU/L	Abnormal High GGT

- Gamma glutamyltransferase (GGT) is in high concentrations in the liver (Lindh, 2010). Abnormal levels usually diagnose liver disease.

Now that we have looked at your abnormal test results, let's put this all together and focus on the bigger picture. Albumin is made in the liver (Lindh, 2010). You can see from your test results that those with Hepatitis B have a decreased albumin level. This is due to the liver damage resulting in a liver no longer able to produce albumin. Bilirubin is filtered out by a healthy liver (Lindh, 2010). With a damaged liver, the liver is no longer able to properly filter out the bilirubin, causing the abnormal increase in bilirubin you see in your test results. When there is a disease or disorder of the liver, the bilirubin cannot get through the gall bladder and instead stays circulating in the blood. ALT, AST, ALP, LDH, and GGT are all enzymes found within the liver (Lindh, 2010). An enzyme is a molecule that resides inside your cells. When your cells are damaged, such as the cells in your liver, the enzymes are released. The release of these enzymes is what causes the abnormal high enzymes seen in your lab results. Hepatitis B is

a disease of the liver; your liver is damaged. It only makes sense with liver damage that liver enzymes are released.

ALT, AST, ALP, LDH, and GGT are all related. All five of these enzymes are found in the liver. These enzymes are also found within other body tissues. In order to rule out any other disease or damage and focus on liver damage, it is crucial that the majority of these five results come back with abnormal readings. A single abnormal enzyme reading could mean damage in one of multiple tissues. When the number of abnormal enzyme readings increase, we can start to suspect and look into liver and disease.

Besides the test results shown above, there are a few other results that could be abnormal within liver disease. These will be explained below.

Patient BUN	Normal Range	Result
3 mg/dL	8-25 mg/dL	Abnormal Low BUN

- Blood urea nitrogen (BUN) levels in the blood reflect the metabolic function of the liver (Lindh, 2010). In patients with liver disease or damage, BUN levels will be decreased.

Patient Creatinine	Normal Range	Result
0.2 mg/dL	0.8-1.4 mg/dL	Abnormal Low Creatinine

- Creatinine is a byproduct of muscle breakdown (Lindh, 2010). Decreased levels of creatinine are seen in advanced and severe liver disease.

Patient Uric Acid	Normal Range	Result
10 mg/dL	3-7 mg/dL	Abnormal High Uric Acid

- Uric acid is produced when purine is metabolized (Lindh, 2010). An increase in uric acid can lead to liver-disease suspicion.

Patient Total Protein	Normal Range	Result
2.4 mg/dL	6-8.3 mg/dL	Abnormal Low Total Protein

- Total protein is the amount of protein, albumin, and globulins combined (Lindh, 2010). The liver produces albumins and globulins (Lindh, 2010). With liver disease, there is a decreased production of albumin and globulins therefore resulting in a decreased total protein.

<b>Patient HDL</b>	<b>Normal Range</b>	<b>Result</b>
130 mg/dL	Above 60 mg/dL	Abnormal High HDL

- High-density lipoproteins are bound to cholesterol and transported to the liver where they are excreted in the form of bile (Lindh, 2010). When there is liver disease, the liver cannot successfully excrete the HDL's as bile and there is a buildup.

<b>Patient anti-HBc</b>	<b>Normal Result</b>	<b>Result</b>
Positive	Negative	Patient positive for Hepatitis B

- The antibody to Hepatitis B antigen test will test if a patient is positive for Hepatitis B (Mayo Clinic Staff). If a patient tests positive, it means there is a chronic Hepatitis B infection.

With a positive Hepatitis B antigen test and the abnormal liver enzyme tests, it can be concluded that you may be diagnosed with Hepatitis B. It is clear to see that the stem of this diagnosis is liver disease and it is the liver that ultimately needs to be treated. Once the liver is treated and back to functioning normally, all test results should be back to normal levels. Hepatitis B is caused by a virus. A virus can never be killed; it can only go dormant. Focus must be placed on treating and alleviating the symptoms of the infection.

Those with acute Hepatitis B may have a virus that is short lived and will go dormant on its own (Mayo Clinic Staff, 2011). With acute infections, the focus will be alleviation of signs and symptoms while your body fights off the virus (Mayo Clinic Staff, 2011). Chronic Hepatitis B may require antiviral medications or even a liver transplant (Mayo Clinic Staff, 2011). Antiviral medications will slow damage to the liver and help fight the virus. If there is severe liver damage, a liver transplant may be necessary. The human body cannot function without a liver and therefore chronic Hepatitis B without treatment or transplant will result in death.

It is life-changing to be diagnosed with Hepatitis B. It may help to know that you are not alone. A 2012 Hepatitis B Colorado surveillance report shows that 139 confirmed cases were reported with 344 cases being reported as probable (Colorado Department of Public Health and Environment, 2012). One case was reported as suspected (Colorado Department of Public Health and Environment, 2012). Of these total cases, reported 201 were female and 283 were male cases (Colorado Department of Public Health and Environment, 2012). The age group containing the majority of cases is that of 30-39 years with the ethnicity majority being Asian/Pacific Islander (Colorado Department of Public Health and Environment, 2012).

Right now you are probably wondering where to go for support and information. The American Liver Foundation is a great support group focusing on Hepatitis C. The statewide chapters of the American Liver Foundation are a source for referrals for Hepatitis B support groups. They can be reached at 1-800-GO-LIVER. Another great resource is the Hepatitis B Foundation. They have a great website with no shortage of information and other listed community resources. Their web address is [www.hepb.org](http://www.hepb.org). A third community resource is the Hepatitis B Information and Support List. The Hepatitis B Information and Support List is a worldwide information and support group. One can subscribe at [hblist.net](http://hblist.net).

## Works Cited

- A.D.A.M. Editorial. "Hepatitis B." *Hepatitis B*. U.S. National Library of Medicine, 25 Nov. 2012. Web. 21 Oct. 2013. <<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001324/>>.
- Colorado Department of Public Health and Environment. *Hepatitis B in Colorado 2012 Surveillance Report*. Viral Hepatitis Program, August, 2012. Web. 4 Feb. 2014.
- "Hepatitis B Exams and Tests: Blood Tests, Imaging, Biopsy, and More." *WebMD*. WebMD, n.d. Web. 21 Oct. 2013. <<http://www.webmd.com/hepatitis/hepb-guide/hepatitis-b-exams-and-tests>>.
- Lindh, Wilburta Q. "Chapter 44 Special Laboratory Tests." *Delmar's Comprehensive Medical Assisting: Administrative and Clinical Competencies*. Clifton Park, NY: Delmar Cengage Learning, 2010. 1277-296. Print.
- Mayo Clinic Staff. "Hepatitis B." *Mayo Clinic*. Mayo Foundation for Medical Education and Research, 01 Sept. 2011. Web. 21 Oct. 2013. <http://www.mayoclinic.com/health/hepatitisb/DS00398/DSECTION=causes>