HIV and Hepatitis B (HBV)

Hepatitis B is caused by the hepatitis B virus (HBV). HBV is a noncytopathic virus. This means that the virus itself does not cause direct damage to liver cells. Instead, it is the immune system’s aggressive response to the virus that usually leads to inflammation and damage to the liver (hepatitis). However, HBV can cause damage to the genetic material inside liver cells. This can lead to liver cancer which, like hepatitis, can also be fatal.

People who have not been infected with HBV can be vaccinated against the virus to prevent infection.

HBV is very similar to HIV in the ways it is transmitted: through direct blood-to-blood contact and through sexual activity. However, blood levels of HBV are much higher than for HIV or the hepatitis C virus, making this virus much easier to transmit in certain situations (e.g., from mother to child during delivery).

HBV is present in blood, semen, and vaginal fluids and is transmitted primarily through sexual activity. Another major transmission route is sharing injection drug equipment (including needles, cookers, tourniquets) and, to a lesser extent, non-injection drugs (cocaine straws and crack pipes) due to the possibility of exposure to blood. Pregnant women who have hepatitis B can also transmit the virus to their babies, most likely during birth.

The number of new hepatitis B infections in the U.S. has declined from about 260,000 a year in the 1980s to about 21,000 in 2015, with the greatest decline occurring in children and adolescents due to routine HBV vaccination.

What happens when someone is infected with HBV?
Soon after HBV enters the body, it infects cells in the liver called hepatocytes. In response to this infection, the immune system targets the virus and targets the hepatocytes already infected with the virus. This causes inflammation of the liver (hepatitis).

HBV can cause acute hepatitis, meaning short-term inflammation of the liver, until the immune system is able to clear the virus from the body, usually within six months of becoming infected with the virus. However, HBV can become a chronic infection. This means that the immune system is not able to get rid of the virus within six months after infection. In other words, the virus continues to reproduce in the person’s liver for several months or years after infection. This can increase the risk of liver damage and liver cancer. What’s more, someone with chronic HBV
infection can transmit the virus to others.

Less than 10 percent of adults infected with HBV go on to experience chronic HBV infection. Without medical intervention, babies infected with HBV around the time of birth go on to experience chronic HBV infection approximately 90 percent of the time, which is why it is important that pregnant women know whether or not they are infected with the virus before giving birth. Medication can be given to the baby after birth to help prevent hepatitis B. Young children who are infected with HBV have a 25 to 50 percent risk of developing chronic hepatitis B. With adults, the risk of developing chronic HBV infection depends on the health of the immune system. For example, people with impaired immune responses who are recovering from organ transplants, undergoing chemotherapy, undergoing dialysis for kidney problems, receiving steroid therapy to suppress the immune system, or are HIV-positive are more likely to develop chronic HBV infection than patients with normal immune responses. In other words, people living with HIV are more likely to develop chronic HBV infection after being infected with the virus than people who are HIV negative (with healthy immune systems).

What are the symptoms?
Not everyone who is infected with HBV will experience symptoms of acute hepatitis—between 30 and 40 percent of people infected with the virus do not experience any noticeable symptoms. If symptoms do occur, they usually do so within four to six weeks after being infected and can last anywhere from one or two weeks to several months.

The symptoms of acute hepatitis B can include:

- Abdominal pain, especially around the liver
- Dark urine and/or pale stool
- Feeling tired and rundown (fatigue)
- Fever
- Joint and/or muscle pain
- Loss of appetite
- Nausea
- Vomiting
- Yellowing of the skin, whites of the eyes and under the fingernails (jaundice)

If the immune system is not able to control acute HBV infection within six months, symptoms of chronic hepatitis B are possible. Not everyone with chronic hepatitis B experiences symptoms. Some people with chronic hepatitis B experience occasional symptoms, while others experience symptoms that never seem to go away. Symptoms of chronic hepatitis B can include those typically seen in acute hepatitis B. They tend to be mild to moderate in intensity and typically
If hepatitis B progresses to serious liver damage, such as liver cancer or cirrhosis, symptoms may become more prominent. In addition to fatigue, there may be muscle weakness, bruising, poor appetite, nausea, weight loss, itchy skin, cola-colored urine, gray-colored stools, jaundice (yellow skin and whites of the eyes) and fluid accumulation in the lower extremities (edema). Some symptoms of advanced cirrhosis are a bloated belly from fluid accumulation (ascites), bleeding from blood vessels in the digestive tract (varices) and confusion (hepatic encephalopathy).

Symptoms of hepatitis, whether acute or chronic, should always be brought to the attention of a health care provider.

How is it diagnosed?
There are laboratory tests to diagnose HBV infection and laboratory tests to monitor people with chronic hepatitis B.

Hepatitis B is first diagnosed using a blood test that looks for certain antigens (fragments of HBV) and antibodies (produced by the immune system in response to HBV). Initial blood tests to diagnose HBV infection look for one antigen, HBsAg (the hepatitis B surface antigen), and two antibodies, anti-HBs (antibodies to the HBV surface antigen) and anti-HBc (antibodies to the HBV core antigen). There are actually two types of anti-HBc antibodies produced: IgM antibodies and IgG antibodies. IgM antibodies are produced early in the course of infection. IgG antibodies are produced later in the course of infection and replace IgM antibodies.

The blood test used to check for HBV infection can be quite confusing, given that a number of different combinations of antigens and antibodies are possible and can mean different things. Here’s a look at the most important test results to know:

<table>
<thead>
<tr>
<th>HBsAg</th>
<th>ANTI-HBc (TOTAL)</th>
<th>ANTI-HBc (IgM)</th>
<th>ANTI-HBs</th>
<th>HEPATITIS B STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Never infected with the virus. (Consider getting the vaccine).</td>
</tr>
<tr>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>Acute infection. Infection likely took place over the last six months and is still active. Possible explanations: 1. Infection has resolved. 2. Infection likely took place over the past six months and is in the process of clearing. 3. A low-level chronic infection. 4. A false-positive anti-HBc and still susceptible to infection.</td>
</tr>
<tr>
<td>Negative</td>
<td>Positive</td>
<td>Positive</td>
<td>Negative</td>
<td>Immune from infection that likely took place more than six months ago and is now resolved.</td>
</tr>
<tr>
<td>Negative</td>
<td>Positive</td>
<td>Negative</td>
<td>Positive</td>
<td>Immune due to successful HBV vaccination.</td>
</tr>
<tr>
<td>Positive</td>
<td>Positive</td>
<td>Negative</td>
<td>Negative</td>
<td>Chronic HBV infection.</td>
</tr>
</tbody>
</table>
HBsAg: **Negative**
ANTI-HBc (TOTAL) Negative
ANTI-HBc (IgM) Negative
ANTI-HBs Negative
HEPATITIS B STATUS Never infected with the virus. (Consider getting the vaccine).

HBsAg: **Positive**
ANTI-HBc (TOTAL) Positive
ANTI-HBc (IgM) Positive
ANTI-HBs Positive
HEPATITIS B STATUS Acute infection. Infection likely took place over the last six months and is still active.

HBsAg: **Negative**
ANTI-HBc (TOTAL) Positive
ANTI-HBc (IgM) Positive
ANTI-HBs Negative
Possible explanations:
1. Infection has resolved.
2. Infection likely took place over the past six months and is in the process of clearing.
3. A low-level chronic infection.
4. A false-positive anti-HBc and still susceptible to infection.

HBsAg: **Negative**
ANTI-HBc (TOTAL) Positive
ANTI-HBc (IgM) Negative
ANTI-HBs Positive
HEPATITIS B STATUS Immune from infection that likely took place more than six months ago and is now resolved.

HBsAg: **Negative**
ANTI-HBc (TOTAL) Negative
ANTI-HBc (IgM) Negative
ANTI-HBs Positive
HEPATITIS B STATUS Immune due to successful HBV vaccination.

HBsAg: **Positive**
ANTI-HBc (TOTAL) Positive
ANTI-HBc (IgM) Negative
ANTI-HBs Negative
HEPATITIS B STATUS Chronic HBV infection.

Depending on these results, additional diagnostic tests may be necessary. Somebody who has
never been infected with HBV or has been vaccinated against the virus does not require any additional testing. Someone who was recently infected with HBV and has acute hepatitis B may want to get another blood test after six months have passed to make sure that the necessary immune response has occurred. People with chronic HBV infection require additional testing to learn more about their hepatitis B.

If you have chronic hepatitis B, your health care provider will usually order additional tests to determine if the infection is active. Click here to read more about lab tests for hepatitis B.

How is hepatitis B different for people with HIV?
Although healthy adults who are infected with HBV have a less than 10 percent chance of seeing the infection develop into chronic hepatitis B, when a person living with HIV is infected, this risk jumps to almost 25 percent. In other words, people with HIV are more likely to develop chronic hepatitis B as a result of HBV infection than HIV-negative people with strong immune systems.

A number of reports have also suggested that as HIV progresses, the body’s immune response to HBV gradually decreases or is sometimes lost. This can cause the virus to become active again after being inactive, which can once again increase the risk of liver damage.

It is not entirely understood what impact HIV has on the severity of chronic HBV infection. There have been a number of reports showing that people infected with both viruses have higher HBV viral loads and more cirrhosis, regardless of immune system status. There are also data from studies suggesting that people with HIV with chronic hepatitis B are more than twice as likely as their HIV-negative counterparts to experience liver failure, thus requiring consideration of a liver transplant. It is not yet known if people with HIV with chronic hepatitis B are at a higher risk of liver cancer than their HIV-negative peers, but given the strong link between HBV and liver cancer, this would seem to be likely.

It is important for people living with HIV/HBV to work closely with their health care providers in order to safely and effectively monitor and treat both conditions.

How is it treated?
People with acute hepatitis B do not require treatment. Bed rest, drinking lots of fluids, and over-the-counter pain relievers (products containing ibuprofen, such as Motrin and Advil, are considered to be safer than products containing acetaminophen, such as Tylenol, in people with acute hepatitis) are usually all that is needed for someone who is experiencing symptoms because of acute hepatitis B.

Treatment is only recommended for people with chronic hepatitis B. The goal of therapy is to reduce HBV viral load to undetectable levels and to return liver enzymes to normal levels, with the intent of getting rid of both HBeAg and HBsAg. If these antigens are cleared from the bloodstream, the virus is less likely to rebound once treatment is stopped.
Although a number of medications are used to treat hepatitis B, some specific treatments are recommended for people who are coinfected with HIV. The latest hepatitis B practice guidance published in 2018 by the American Association for the Study of Liver Diseases, advise the following treatment guidelines for people coinfected with HIV and hepatitis B:

“All patients with HBV and HIV coinfection should initiate antiretroviral therapy (ARVT), regardless of CD4 count. The ARVT regimen should include 2 drugs with activity against HBV. Specifically, the backbone of the ARVT regimen should be tenofovir disoproxil fumarate (TDF) or tenofovir alafenamide (TAF) plus lamivudine or emtricitabine.

Patients who are already receiving effective ARVT that does not include a drug with antiviral activity against HBV should have treatment changed to include TDF or TAF with emtricitabine or lamivudine. Alternatively, entecavir is reasonable if patients are receiving a fully suppressive ARVT.

When ARVT regimens are altered, drugs that are effective against HBV should not be discontinued without substituting another drug that has activity against HBV.”

Here are the preferred medications used to treat HBV when coinfected with HIV:

Emtricitabine (Emtriva): Emtricitabine is a nucleoside analog reverse transcriptase inhibitor. It is used with ARVT along with either, tenofovir disoproxil fumarate or tenofovir alafenamide in people who are coinfected with HBV and HIV.

Lamivudine (Epivir, Epivir-HBV): Lamivudine is a nucleoside analog reverse transcriptase inhibitor. It is used with ARVT along with either tenofovir disoproxil fumarate or tenofovir alafenamide in people who are coinfected with HBV and HIV.

Tenofovir alafenamide (Vemlidy): Tenofovir alafenamide (TAF) is the newest drug to be approved by the FDA for the treatment of chronic hepatitis B infection in adults with compensated liver disease. It is a nucleoside analog reverse transcriptase inhibitor. TAF is used along with either emtricitabine or lamivudine, and ARVT in people who are coinfected with HBV and HIV.

Tenofovir disoproxil fumarate (Viread): Tenofovir disoproxil fumarate (TDF) is a nucleoside analog reverse transcriptase inhibitor. It is used along with either emtricitabine or lamivudine, and ARVT in people who are coinfected with HBV and HIV.

Entecavir (Baraclude): Entecavir is a a nucleoside analog reverse transcriptase inhibitor. It may be used in people who are not taking TDF or TAF but are receiving a fully suppressive ARVT.

It is very important that people with chronic hepatitis B take their medications exactly as prescribed. Missing doses can cause HBV to become resistant to HBV medications. Prematurely stopping HBV medications can also cause HBV viral load and liver enzymes to quickly increase, which can damage the liver and cause severe symptoms. This can also happen in people who have HBV who develop resistance to the medications they are using. In turn, for people with chronic
hepatitis B who are receiving treatment, it is very important to be monitored frequently and carefully by a health care provider.

How can hepatitis B be prevented?
The best way to prevent hepatitis B virus (HBV infection) is to be vaccinated. A new HBV vaccine (Heplisav-B) was approved for adults over age 18 years. Heplisav-B is given in two doses, one month apart. Two older HBV vaccines are available: Recombivax HB and Engerix-B. Both vaccines require three injections administered over a six-month period. The side effects of the hepatitis B vaccine are usually mild and may include soreness at the injection site and mild flulike symptoms.

There is also a combined hepatitis A (HAV) and HBV vaccine available (Twinrix), which also requires three injections administered over a six-month period but offers the added advantage of providing protection against both viral infections.

In clinical trials, Heplisav-B was effective 95 percent in adults. Older HBV vaccines are generally effective for more than 90 percent of adults and children who receive all three doses. People with compromised immune systems may be less likely to develop immunity to HBV through vaccination.

If you do not think you were ever infected with hepatitis B, talk to your health care provider. The vaccine is recommended for:

- Infants within 24 hours of birth
- All children 18 years old or younger who have not been vaccinated previously
- Sex partners or household contacts of individuals who are HBsAg positive
- Sexually active people who are not in long-term, mutually monogamous relationships (for example, more than one sex partner during the previous six months)
- Anyone seeking evaluation or treatment for a sexually transmitted infection
- Men who have sex with men
- Injection drug users
- People with hepatitis C virus and other chronic liver diseases
- People with jobs in which there is a risk of infection (such as emergency medical technicians, doctors and nurses)
- Residents and staff of facilities for developmentally disabled individuals
- Travelers to regions with moderate or high rates of HBV infection
- Hemodialysis and peritoneal dialysis patients
• People living with HIV
• Anyone receiving care in a correctional setting
• All other persons seeking protection against HB

Booster doses of hepatitis B vaccine are recommended for hemodialysis patients and immunocompromised persons. For hemodialysis patients, the need for booster doses should be assessed by yearly testing for hepatitis B surface antibody (anti-HBs). A booster dose should be administered when anti-HBs levels decline to < 10 mIU/mL. For immunocompromised persons, the need for booster doses has not been well researched. It is recommended that annual anti-HBs testing be considered for those with risk for exposure; when anti-HBs levels are < 10 mIU/mL, HBV booster doses may be administered. Hepatitis B booster doses are not recommended for people with normal immune status who have been vaccinated.

If you have not been vaccinated against hepatitis B, there are still things you can do to prevent HBV infection. These include using a condom or another type of latex barrier while having sex. If you are an injection drug user and share equipment, cleaning your syringes with bleach will not help you avoid hepatitis B. It’s always best to use new needles to prevent the risk of HBV infection. Also, don’t share items that may have been contaminated with someone else’s blood, such as toothbrushes, razors, and needles used for body piercing, tattooing, or acupuncture.

If you have not been vaccinated against hepatitis B and fear that you were recently exposed to HBV, it is possible to receive a single injection of hepatitis B immune globulin (HBIG). HBIG is recommended following exposure to hepatitis B virus because it provides immediate, short-term protection against the virus. A dose of the hepatitis B vaccine is given at the same time. Two additional doses of hepatitis B vaccine are given to complete the series and ensure long-term protection.

Pregnant women with hepatitis B can pass the virus to their infants during birth. This can be prevented through a series of vaccinations and HBIG for their babies at birth.

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