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# Hepatitis B: Questions and Answers

## *Information about the disease and vaccines*

### **What causes hepatitis B?**

Hepatitis B is a liver disease caused by the hepatitis B virus (HBV).

### **How does HBV spread?**

The spread of HBV occurs when blood from an HBV-infected person enters the body of a person who is not infected. This can occur through having sex with an HBV-infected person without using a condom (the efficacy of latex condoms in preventing infection with HBV is unknown, but their proper use may reduce spread of HBV).

Sex contact is the most common reason for the spread of HBV infection in the United States. The spread of HBV from male to female or female to male accounts for about 1 out of 3 acute (recently acquired) HBV infections in adults. The risk of spreading HBV increases if the male or female has multiple sex partners, a history of a sexually transmitted disease, or has sex with an HBV-infected person. About 1 out of 4 acute HBV infections occur among men who have sex with men.

HBV is also easily spread by sharing drugs, needles, or “works” when “shooting” drugs. The risk of HBV infection from HBV-contaminated needlesticks is much greater than the risk of spreading HIV by this method. In the United States, illegal drug use injection accounts for about 16 out of 100 acute HBV infections. Other types of percutaneous (through the skin) exposures, including tattooing and body piercing, have also been reported to result in the spread of HBV when good infection control practices have not been used. Unsafe injections in medical settings are a major source of HBV spread in many developing countries and might be a risk for United States residents traveling abroad, if medical care is required in settings that have poor infection control practices.

HBV is also spread through needlesticks or sharps exposures on the job and from an infected mother to her baby during birth. Breastfeeding has not been associated with the spread of HBV.

HBV can also be spread during childhood. Most early childhood spread occurs in households of people with chronic (life-long) HBV infection, but the spread of HBV has also been seen in daycare centers and schools. The most likely way that the

spread of HBV occurs during early childhood involves contact between an infected person’s body fluids (e.g., their blood or drainage from their wounds or skin lesions) and breaks in the child’s skin. HBV can be spread also when an HBV-infected person bites another person who is not infected. HBV can be spread also by an infected person pre-chewing food for babies, and through contact with HBV from sharing personal-care items, such as razors or toothbrushes. The virus remains infectious and capable of spreading infection for at least seven days outside the body. Virus can be found on objects, even in the absence of visible blood.

HBV is not spread through food or water, sharing eating utensils, hugging, kissing, coughing, and sneezing or by casual contact, such as in an office or factory setting. People with chronic HBV infection should not be excluded from work, school, play, childcare, or other settings.

### **How long does it take to show signs of illness after coming in close contact with a person who has HBV infection?**

The incubation period ranges from 45 to 160 days (average 120).

### **What are the signs and symptoms of hepatitis B?**

About 7 out of 10 adults with acute hepatitis B have signs or symptoms when infected with HBV. Children under age 5 years who become infected rarely show any symptoms. Signs and symptoms of hepatitis B might include nausea, lack of appetite, tiredness, muscle, joint, or stomach pain, fever, diarrhea or vomiting, headache, dark urine, light-colored stools, and yellowing of the skin and whites of the eyes (jaundice). People who have such signs or symptoms generally feel quite ill and might need to be hospitalized. Every year, approximately 100-200 Americans die of fulminant (overwhelming acute infection) hepatitis B.

### **How serious is hepatitis B?**

Hepatitis B is very serious. About 9 out of 10 infants (who do not receive appropriate prophylaxis at birth), 30 out of 100 children younger than age 5, and 2-6 out of 100 adults who are infected with HBV are unable to clear HBV from their bodies and become chronically infected. This serious condition is

discussed below. Even though people might eventually recover from their acute infection, a feeling of tiredness and poor health might last for months.

#### **What does it mean to have chronic HBV infection?**

People with chronic HBV infection are infectious and can transmit HBV to others. Usually, chronically infected people do not feel sick and do not realize they are infected. They generally have HBV infection for their entire lives. They are also at high risk of developing chronic liver disease, including cirrhosis (scarring of the liver), liver failure, and liver cancer.

#### **What are the complications of chronic HBV infection?**

An estimated 15-25 people out of 100 with chronic HBV infection eventually develop serious liver disease. Chronic HBV infection is responsible for most HBV-related sickness and death, including cirrhosis, liver failure, and liver cancer. When people are infected at a very young age, these forms of liver disease do not appear usually until young adulthood or middle age.

#### **Is HBV infection a serious problem in the world?**

In the United States, an estimated 3,000-4,000 people die each year of HBV-related cirrhosis, and another 1,000-1,500 die each year of HBV-related liver cancer. Worldwide, the medical consequences of chronic HBV infections are a huge problem. Approximately 350 million people around the world are chronically infected with HBV and approximately 1 million of these people die each year from cirrhosis leading to liver failure or liver cancer. The medical literature states that hepatitis B is the 10<sup>th</sup> leading cause of death worldwide.

#### **What is the risk of getting HBV infection while traveling in other countries?**

Short-term travelers to regions (Asia, Sub-Saharan Africa, Amazon Basin, Eastern Europe, and the Middle East) in which there are moderate to high rates of HBV infection are typically at risk for infection only through exposure to blood in medical, healthcare or disaster-relief activities; receipt of medical care that involves blood exposures; or sexual activity or drug use. The Centers for Disease Control and Prevention recommends hepatitis B vaccination for travel to any of these places, regardless of the length of stay.

#### **How common is hepatitis B in the United States?**

About 5 out of 100 people in the United States will contract HBV infection sometime in their lifetime, if not vaccinated. Approximately 0.8 to 1 million

people have chronic HBV infection at the present time. Most of these people do not know they are infected.

During 1990-2005, the overall occurrence of reported cases of acute hepatitis B declined to a great extent. In 2005, the estimated number of new HBV infections was about 51,000—a decrease from an estimated 232,000 new infections in 1990. Racial and ethnic disparities for acute HBV infection were nearly eliminated for Asians/Pacific Islanders, American Indians/Alaska Natives, and Hispanics. However, in 2005, the occurrence of acute hepatitis B among blacks remained nearly three times higher than that among other racial/ethnic groups. In 2005, the highest occurrence of acute hepatitis B occurred among people ages 25-44 despite their race or ethnicity.

The overall decrease in the occurrence of acute hepatitis B in the United States is most likely due to the increased use of hepatitis B vaccine and changes in risk-reduction behaviors among at-risk populations in response to the HIV/AIDS epidemic. During 1990-2005, the greatest decline in cases was among children and adolescents, the group with the largest increase in hepatitis B vaccination coverage. Reporting of hepatitis B still remains a problem as many people do not exhibit symptoms recognized as hepatitis B and many cases/infections are missed and therefore not reported to health authorities.

Despite the dramatic decrease in the number of new HBV infections in the United States, chronic HBV infection remains a major problem. As stated above, about 1 million people have chronic HBV infection currently and most of these people do not know they are infected because they haven't been tested. Most cases of chronic HBV infection in the U.S. are found in immigrants or refugees from areas of the world with moderate or high rates of hepatitis B. Some of these areas of the world include Asia, Africa, the Pacific Islands, and eastern Europe. People from these areas of the world should be tested to find out if they are chronically infected.

#### **How does a person know if s/he has HBV infection?**

A blood test called IgM anti-HBc is needed to diagnose acute hepatitis B. There are additional blood tests for hepatitis B that determine other aspects of HBV infection. These other blood tests can tell whether or not a person is currently infected and whether or not a person has been infected in the past. If the tests indicate a person has been infected in the past, testing will also determine whether the person has developed protective antibodies to the

virus (i.e., they have gotten over the infection and will not get infected with HBV again [this is called immunity]) or whether they still have virus in their blood, indicating they might have chronic HBV infection.

#### Is there a medication to treat hepatitis B?

There are several Food and Drug Administration (FDA)-approved medications that might help a person who has chronic HBV infection. These medications don't usually get rid of the virus, but they might decrease the chance of the infected person developing severe liver disease. Not everyone is a candidate for these medications. Researchers continue to seek additional cures for hepatitis B. There is no treatment (other than supportive care) for people with acute hepatitis B.

#### How long can a person with HBV infection spread HBV?

A person with acute or chronic HBV infection is contagious as long as they have the virus in their blood, which can only be determined by blood testing. In general, a person with acute hepatitis B gets rid of the virus in their blood in six months. If this does not happen, it is likely the person will become chronically infected with HBV for life.

#### What are some important Do's and Don'ts for people with chronic HBV infection?

##### DO's

- Cover all cuts and open sores with a bandage.
- Discard used items such as bandages and menstrual pads carefully so no one is accidentally exposed to your blood.
- Wash hands well after touching your blood or infectious body fluids.
- Clean up blood spills; then clean the area again with a bleach solution (one part household chlorine bleach to 10 parts of water).
- Tell your sex partner(s) you have hepatitis B so they can be tested and vaccinated (if not already infected or vaccinated). Partners should have their blood tested 1-2 months after three doses of vaccine are completed to be sure the vaccine worked.

#### What hepatitis B blood tests are available and what do they mean?

<b>Hepatitis B surface antigen (HBsAg)</b>	A positive test means that you have hepatitis B virus in your blood and can pass the virus to others. You could be recently infected or you could have chronic (life-long) infection. A negative test means that you do not have the virus in your blood.
<b>Antibody to hepatitis B surface antigen (anti-HBs)</b>	A positive test means that you are immune (cannot get hepatitis B). This positive test occurs when you were either vaccinated with hepatitis B vaccine successfully or you had the actual infection. Either way, this immunity means you will not get hepatitis B again.
<b>Antibody to hepatitis B core antigen (total anti-HBc)</b>	A positive test means you currently have or have had infection with hepatitis B virus at some undefined time period. The positive test has no relationship to having received hepatitis B vaccine; however, the test might be used prior to vaccination to see if you had already been infected.
<b>IgM antibody subclass of anti-HBc (IgM anti-HBc)</b>	A positive test means that you were recently (within 6 months) infected with hepatitis B virus.
<b>Hepatitis B "e" antigen (HBeAg)</b>	If this test is positive, you are infected with hepatitis B virus and have a large amount of hepatitis B virus in your blood. You are at increased risk of serious liver problems due to your chronic hepatitis B virus infection.
<b>Antibody to hepatitis B "e" antigen (Anti-HBe)</b>	This blood test might be positive if you have chronic hepatitis B virus infection or if you have already recovered from your infection. If have chronic hepatitis B virus infection and this test is positive, this means that you have low levels of hepatitis B virus circulating in your blood and are at lower risk of liver problems due to your chronic hepatitis B virus infection.
<b>HBV Deoxyribonucleic acid (HBV-DNA)</b>	When this test is positive, it means you are infectious to others and the hepatitis B virus is active in your body, possibly causing liver damage. The test is often used to determine success or failure of drug therapy if given for chronic hepatitis B virus infection.

- Use condoms (rubbers) during sex unless your sex partner has had hepatitis B or has been immunized and has had a blood test (as described above) demonstrating immunity to HBV infection. (Condoms might also protect you from other sexually transmitted diseases).

- Tell household members to see their doctors for testing and vaccination for hepatitis B.
- Tell your doctors that you are chronically infected with HBV.
- See your doctor every 6-12 months to check your liver for abnormalities, including cancer.
- If you are pregnant, tell your doctor that you have HBV infection. It is critical that your baby is started on hepatitis B shots within a few hours of birth.

#### **DON'Ts**

- Don't share chewing gum, toothbrushes, razors, washcloths, needles for ear or body piercing, or anything that might have come in contact with your blood or infectious body fluids.
- Don't pre-chew food for babies.
- Don't share syringes and needles.
- Don't donate blood, plasma, body organs, tissue, or sperm.

#### **What should you do if you have been exposed to HBV?**

If you think you've been exposed to HBV, don't delay. Contact your doctor or clinic. If you have not been vaccinated, it is recommended that you receive treatment with hepatitis B immune globulin (HBIG). This is a blood product containing protective HBV antibodies. You should also get the first dose of hepatitis B vaccine as soon as possible, preferably at the same time as the HBIG is given, but at a different site on your body. Following this, you will need to complete the full hepatitis B vaccine series (usually a total of three doses over a six-month period).

#### **Can you get hepatitis B more than once?**

No. If you get an acute case of hepatitis B and recover, you should have protective antibodies in your blood that will prevent any further infection with HBV. The medical literature does report possible mutant strains of HBV infection, but these are rare and would be highly unlikely to occur.

#### **How does HBV differ from hepatitis A virus (HAV) and hepatitis C virus (HCV)?**

HBV, HCV, and HAV are viruses that attack and injure the liver, and can cause similar symptoms. Usually people get HAV infection from close personal contact with an infected person or from ingesting fecally-contaminated food or water. HBV and HCV are spread when an infected person's blood or blood contaminated body fluids enter another person's bloodstream. HBV and HCV infections can cause chronic liver problems. HAV does not. There are vaccines that will protect people from HAV infection

and HBV infection. Currently, there is no vaccine to protect people from HCV infection. There are medications that are approved by the FDA for treatment of chronic HBV and HCV infections. If a person has had one type of viral hepatitis in the past, it is still possible to get the other types.

#### **When did hepatitis B vaccine become available?**

The first hepatitis B vaccine became commercially available in the United States in 1982. In 1986, a hepatitis B vaccine produced by recombinant DNA technology was licensed, and a second recombinant-type hepatitis B vaccine was licensed in 1989.

#### **What are the names of the hepatitis B vaccines available in the United States?**

The two recombinant vaccines (Recombivax HB® and Engerix-B®) are the only hepatitis B vaccine preparations currently used in the United States. (There are additional products licensed in the U.S. that contain these vaccines in combination with other vaccines.)

#### **What kind of vaccines are they?**

The hepatitis B vaccines used in the United States are recombinant DNA vaccines, which means they are produced by inserting the gene for HBV into common baker's yeast where it is grown, harvested, and purified. HBV infection cannot occur from receiving hepatitis B vaccine.

#### **How is this vaccine given?**

Hepatitis B vaccine should be given to infants (12 months of age and younger) in the thigh muscle. Either the thigh or the upper arm muscle may be used for young children. The upper arm muscle is the preferred site of administration for adolescents and adults.

#### **Who should get this vaccine?**

Hepatitis B vaccine, usually a three-dose series, is recommended for all children 0-18 years of age. It is recommended for infants beginning at birth in the hospital. All older children who did not get all the recommended doses of hepatitis B vaccine as an infant should complete their vaccine series as soon as possible. Most states require hepatitis B vaccine for school entry. Adolescents who are just starting their series will need two or three doses, depending on their age and the brand of vaccine used. Adults at increased risk of acquiring HBV infection should also be vaccinated. In addition, the vaccine can be given to any person who desires protection from hepatitis B.

### What groups of adults are at increased risk of HBV infection?

- Healthcare workers and public safety workers with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids
- Men who have sex with men
- Sexually active people who are not in long-term, mutually monogamous relationships
- People seeking evaluation or treatment for a sexually transmitted disease
- Current or recent injection drug users
- Inmates of long-term correctional facilities
- People with end-stage kidney disease, including predialysis, hemodialysis, peritoneal dialysis, and home dialysis patients
- Staff and residents of institutions or group homes for the developmentally challenged
- Household members and sex partners of people with chronic HBV infection
- Susceptible (non-infected) people from United States populations known to previously or currently have high rates of childhood HBV infection, including Alaska Natives, Pacific Islanders, and immigrants or refugees from countries with intermediate or high rates of chronic HBV infection. To see a list of these countries, go to [http://www.cdc.gov/ncidod/diseases/hepatitis/b/country\\_listing.htm](http://www.cdc.gov/ncidod/diseases/hepatitis/b/country_listing.htm)
- International travelers to regions with high or intermediate rates of HBV infection. To see a list of these countries, go to [http://www.cdc.gov/ncidod/diseases/hepatitis/b/country\\_listing.htm](http://www.cdc.gov/ncidod/diseases/hepatitis/b/country_listing.htm)

In addition, any adult who wishes to be protected from HBV infection should be vaccinated without having to acknowledge a specific risk factor.

If you have not been fully vaccinated with hepatitis B vaccine and you are cared for in any of the following settings, you should ask the setting's healthcare provider to fully vaccinate you with hepatitis B vaccine. These settings include:

- Sexually transmitted disease treatment facilities
- HIV testing and treatment facilities
- Facilities providing drug-abuse treatment and prevention services
- Healthcare settings targeting services to injection drug users
- Correctional facilities
- Healthcare settings targeting services to men who have sex with men

- Chronic-hemodialysis facilities and end-stage renal disease programs
- Institutions and nonresidential day care facilities for developmentally challenged people

### Who recommends this vaccine?

The Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics (AAP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), and American College of Obstetricians and Gynecologists (ACOG) recommend this vaccine.

### Is hepatitis B vaccine safe?

Yes. Hepatitis B vaccines have been demonstrated to be safe when administered to infants, children, adolescents, and adults. Since 1982, more than an estimated 70 million adolescents and adults and more than 50 million infants and children have received at least one dose of hepatitis B vaccine in the United States. The majority of children who receive this vaccine have no side effects. Serious reactions are rare.

### What side effects have been reported with this vaccine?

Of those children experiencing a side effect, most will have only a very mild reaction, such as soreness at the injection site (fewer than one out of three children) or low-grade fever. Adults are slightly more likely to experience such mild symptoms. Serious allergic reactions following hepatitis B vaccination are rare.

### How effective is this vaccine?

After three properly administered doses of vaccine, at least 9 out of 10 healthy young adults and more than 9 out of 10 infants, children, and adolescents develop protective antibodies and subsequent immunity to HBV infection.

### Why is this vaccine recommended for all babies when most of them won't be exposed to HBV for many years, if then?

There are three basic reasons for recommending that all infants receive hepatitis B vaccine, starting at birth.

First, babies and young children have a very high risk for developing chronic HBV infection if they become infected at a young age.

It is estimated that about 1 out of 3 of the nearly 1 million Americans with chronic HBV infection acquired their infection as infants or young children. Those with chronic HBV infection are most likely to spread the infection to others. Infants and children

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who become chronically infected have an increased risk of dying prematurely from liver cancer or cirrhosis.

In contrast to other vaccine-preventable diseases of childhood, HBV infection in infants and young children usually produces no symptoms. Thus, the small number of reported cases of hepatitis B among children represents the tip of the iceberg of all HBV infections in children. For every child with symptoms of hepatitis B, there are at least 100 HBV-infected children with no symptoms—hence the increased risk to spread the infection to others without knowing it.

Second, early childhood infection occurs. About 16,000 children under 10 years of age were infected with HBV every year in the United States before routine infant hepatitis B vaccination was recommended. Although these infections represented few of all HBV infections in the United States, it is estimated that 18 out of 100 people with chronic HBV infection in the United States acquired their infection during early childhood. Clearly, infections occur among unvaccinated infants born to mothers who are not HBV-infected. In addition, unvaccinated foreign-born children account for a high proportion of infections. More effort needs to be placed on vaccinating these unprotected children.

Most early childhood spread of HBV occurs in households where a person has chronic HBV infection, but the spread of HBV has also been recognized in daycare centers and schools. The most probable ways children become infected with HBV are from skin puncture (e.g., biting) or from having their mucous membranes or cuts and scratches come in contact with infectious body fluids from an HBV-infected person. HBV remains infectious for at least seven days outside the body and can be found on and spread through sharing of inanimate objects such as washcloths or toothbrushes.

Third, long-term protection following infant vaccination is expected to last for decades and will ultimately protect against acquiring infection at any age.

#### **Why should your child be protected against hepatitis B if h/she won't ever inject drugs or be sexually promiscuous?**

HBV can be transmitted in many ways in addition to sex contact and injection drug use. On average, an unvaccinated baby born in the United States has 5 out of 100 chances of developing HBV infection sometime during his or her lifetime. By avoiding obvious means of exposure, people can reduce their

odds of becoming infected. But while there are degrees of risk involved in contracting HBV infection, there is no such thing as “no risk.” Moreover, hepatitis B vaccine is the first vaccine to prevent cancer—HBV-related liver cancer.

Read “[Unusual Cases of Hepatitis B Virus Transmission \(Spread\)](#)” for examples of the spread of HBV in a variety of settings.

#### **Will your child need a booster shot later in life?**

At the present time, booster doses are not recommended routinely for people with normal immune systems. Although the level of protective antibodies in the blood of a vaccinated person seems to decline with time, the immune system retains an immunization “memory” and if the person is exposed to HBV, the system “kicks in” and provides the needed protection.

Experts are continuing to monitor the long-term effectiveness of hepatitis B vaccine and will issue recommendations on the need for booster doses if evidence shows that booster doses are necessary.

#### **Should I be tested before I get the vaccine to see if I'm already infected or immune?**

Blood testing before vaccination is not recommended for the routine vaccination of infants, children, and adolescents. However, certain children, such as those born in countries where HBV is moderate or highly endemic (see the website above for a list of these countries), should be tested to be sure they are not already infected. Testing can be done at the same visit when the first dose of hepatitis B vaccine is given. Vaccinating a person already immune to or infected with HBV will not help or harm the person.

The main reason for testing people at increased risk for HBV is to determine if they are infected. If after testing they are found to be infected, they must be referred to a health professional for ongoing medical care for chronic HBV infection.

#### **Should I get my blood tested after getting the vaccine series to make sure it worked?**

Testing after vaccination is not recommended routinely. Testing after vaccination is recommended only for people whose medical care depends on knowledge of their response to the vaccine. This includes infants born to HBV-infected mothers; healthcare and public safety workers at risk of continued exposure to blood on the job; immune compromised people (e.g., people with AIDS or on hemodialysis); and sex and needle-sharing partners of people with chronic HBV infection. Testing should be

performed 1-2 months after the last dose of vaccine.

**What should be done if a person gets the first two doses of hepatitis B vaccine but never goes back for the final dose? Should the series be restarted?**

No, the series does not need to be restarted. If the series is interrupted after the first dose, the second dose should be given as soon as possible; the second and third doses should be separated by an interval of at least 8 weeks. If only the third dose is delayed, it should be administered as soon as possible.

The minimum recommended dosing intervals are 4 weeks between the first and second doses and 8 weeks between the second and third doses. The minimum interval between the first and third doses is 16 weeks.

**Who should NOT receive hepatitis B vaccine?**

People who had a serious allergic reaction to one dose of hepatitis B vaccine should not have another dose of hepatitis B vaccine. People with a history of hypersensitivity to yeast should not receive this vaccine. People with a moderate or severe acute illness

should postpone receiving the vaccine until their condition is improved.

**Can I get this vaccine when I am pregnant?**

Yes.

**I'm an adult who wants hepatitis B vaccination. How can I pay for the shots?**

If you have insurance, the cost of hepatitis B vaccination might be covered. If not, these shots are often available at low cost through special programs or from health departments. Call your local health department for details.

**Will hepatitis B vaccination protect me from hepatitis A or hepatitis C?**

No. Hepatitis A and hepatitis C are different diseases caused by different viruses. There is a vaccine for hepatitis A, but there is no vaccine for hepatitis C at this time. For information on hepatitis A and hepatitis C, talk to your healthcare professional, call your local health department, or visit [www.immunize.org](http://www.immunize.org) and [www.cdc.gov/hepatitis](http://www.cdc.gov/hepatitis)