

INFORMATION PAPER

DHA-IHB
6 December 2017

SUBJECT: Hepatitis B Infection and Hepatitis B Vaccines

1. Purpose. To describe hepatitis B infection and the vaccines to prevent it.
2. Facts.
 - a. Microbiology. Hepatitis B virus (HBV) is a partially double- stranded DNA virus in the hepadnaviridae family. The virus contains multiple antigenic components and there is no apparent difference in infectivity or virulence of the subtypes. HBV is particularly resilient and, in some instances, remains infectious on environmental surfaces for more than 7 days.
 - b. Disease. The incubation period for hepatitis B infection ranges from 6 weeks to 6 months and averages 120 days. HBV replicates in the liver and causes hepatic dysfunction. Clinical symptoms occur more often in adults (50% of them) than infants or children, who are usually asymptomatic, but are much more likely to remain persistently, infected and become at risk for developing serious chronic liver disease. Initial symptoms may include loss of appetite, diarrhea, vomiting, jaundice and pain in the muscles, joints, and abdomen. At onset of jaundice a change in stools, liver tenderness and swelling may be noted. Approximately 5% of all acute HBV infections will result in chronic HBV infection. Chronic infections are responsible for most cirrhosis, liver cancer, liver failure, and even death.
 - c. Epidemiology. Humans are the only natural reservoir of the virus and transmission occurs by contact with contaminated secretions, including semen, vaginal secretions, blood, and saliva via bites, but not kissing. The route is percutaneous inoculation or by maternal-neonatal transmission (up to 90%). About 1/3 of people who are infected with the hepatitis B virus in the United States are unaware of it. At-risk groups include: people traveling to high-risk areas; heterosexuals with multiple partners; men having sex with men; people who have a sexually transmitted disease; healthcare personnel; laboratory workers handling blood and body fluids; people with diabetes; police, fire and emergency medical personnel who give first-aid treatment; people with blood-clotting disorders (e.g., hemophilia); people who have household contacts infected with the virus; people who live in long term care facilities; injection drug users, Asians and Alaskans. Hepatitis B vaccine is 80% to 95% effective in preventing HBV infection and clinical hepatitis among susceptible children and adults. If a protective antibody response develops \geq

10mIU/mL after vaccination, vaccine recipients are virtually 100% protected against clinical illness.

d. Vaccines.

- (1) Engerix-B® produced by GlaxoSmithKline has both pediatric and adult formulations. The prefilled syringe tip caps contain latex while the rubber stopper does not. All formulations of the vaccine are preservative free. Engerix-B is approved for use in individuals of all ages.
- (2) Recombivax-HB® produced by Merck has pediatric, adult, and dialysis formulations. The prefilled syringe tip caps and rubber stopper contain latex. All formulations of the vaccine are preservative free. Recombivax-HB is approved for use in individuals of all ages. It can also be given as a 2-dose series to adolescents ages 11-15 years. The last dose must be given before the 16th birthday.
- (3) PEDIARIX® produced by GlaxoSmithKline is a pediatric combination vaccine that contains DTaP-Hep B-IPV. The prefilled syringe tip caps contain latex while the rubber stopper does not. The vaccine is preservative free. PEDIARIX is approved for use in children as early as 6 weeks of age through 6 years of age.
- (4) TWINRIX® produced by GlaxoSmithKline is an adult bivalent vaccine of inactivated hepatitis A virus and the purified surface antigen of the hepatitis B virus. The prefilled syringe tip caps may contain latex while the rubber stopper does not. All formulations of the vaccine are preservative free. TWINRIX is approved for use in person 18 years of age or older.
- (5) COMVAX®, produced by Merck, was removed from the market in 2017.

e. Immunization.

- (1) Routine infant vaccination occurs at birth, 1-2 and 6-18 months after the initial dose. People typically receive three intramuscular doses over a 6- to 12-month period. The second dose should be given 1 month after the first dose; the third dose should be given at least 2 months after the second dose and at least 4 months after the first dose.

- (2) The vaccine dosage is age and brand dependent. See each vaccine's recommended dosage and administration schedule, which are based on maternal hepatitis-B infection status, age, and individual's health condition (e.g., hemodialysis, diabetes). Review the Advisory Committee on Immunization Practices (ACIP) guidelines for unique requirements for serology testing of individual's pre and post vaccination. See age and brand specific dosage at <http://www.health.mil/hepB>.
- (3) See the additional information paper on completing vaccine series with either Hep A/Hep B combination vaccine or the monovalent hepatitis A and hepatitis B vaccines at www.health.mil/hepB.
- (4) Special Situations.
 - a. Travel. Ideally, hepatitis B vaccination should begin ≥ 6 months before travel so the full vaccine series can be completed before departure. Because some protection is provided by 1 or 2 doses, the vaccine series should be initiated, if indicated, even if it cannot be completed before departure. Optimal protection, however, is not conferred until after the final vaccine dose is received, and travelers should be advised to complete the vaccine series. An approved accelerated vaccination schedule can be used for people traveling on short notice that faces imminent exposure or for emergency responders to disaster areas. The accelerated vaccination schedule calls for vaccine doses administered at days 0, 7, and 21–30; a booster should be administered at 12 months to promote long-term immunity. A combined hepatitis A and hepatitis B vaccine can also be used on the same 3-dose schedule (0, 7, and 21–30 days), with a booster at 12 months.
 - b. Patients with Severe Bleeding Disorders. Recombivax-HB and Engerix-B can also be given SQ in patients with severe bleeding disorders. However, the subcutaneous route is less effective, so post-series titer checks are recommended.
 - c. Preterm Infants Weighing <2,000 grams. Delay 1st dose until the chronological age is 1 month.
 - d. Infants Born to Hepatitis Surface Antigen Positive (HBsAg) Mothers. The infant requires hepatitis B immunoglobulin and vaccination.

- f. Cautions. The following people should not receive hepatitis B vaccine: those with known severe hypersensitivity to the vaccine or to yeast. Those who have a moderate to severe acute illness should be deferred until illness resolves. Vaccination is not contraindicated in persons with a history of multiple sclerosis (MS), Guillain-Barre syndrome (GBS), autoimmune disease (e.g. systemic lupus erythematosus or rheumatoid arthritis). Pregnancy/lactation is not a contraindication since the vaccines contain non-infectious HBsAg and cause no risk of infection to the fetus.
- g. Adverse Events. The most common adverse reactions after hepatitis B vaccination are irritation, redness, swelling, warmth, itching, and bruising at the injection site, and mild systemic complaints of fever of >99.0 degrees, myalgia, and malaise. Rare serious reactions include stiffness, skin rash, difficulty breathing, chest pain, hives, abdominal pain, nausea, vomiting and even death.
- h. DoD Policy. Unless seroimmune (≥ 10 mIU/mL), administer hepatitis B vaccine to military personnel at initial entry training or upon deployment to HBV endemic areas. Personnel in certain occupations must show a positive serological response to the vaccination. Of that group, those who do not respond to the first series of hepatitis B vaccine should complete a second three-dose vaccine series. The second vaccine series should be given at the usual 0, 1, 6-month schedule. Approximately 5-15% of individuals will not show protective titers following a second series of vaccine. In this situation, no further hepatitis B immunization attempts are recommended. After confirming they do not have chronic hepatitis B they are then considered unprotected to hepatitis B infection. Non-responders exposed to hepatitis B should receive a single dose of HBIG and restart the hepatitis B vaccine series with the first dose of the hepatitis B vaccine as soon as possible after exposure. Alternatively, they should receive two doses of HBIG, one dose as soon as possible after exposure and the second dose 1 month later. Healthcare personnel and others for whom post vaccination serologic testing is recommended should be retested 1 to 2 months after completion of a second vaccine series.

3. References.

- a. Immunization Action Coalition. Ask the Experts: Diseases & Vaccines. Hepatitis B. This page was updated on September 13, 2017. This page was reviewed on December 14, 2016. Retrieved from http://www.immunize.org/askexperts/experts_hepb.asp
- b. CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Post exposure Management. MMWR

Recommendations and Reports. December 20, 2013 / 62(RR10); 1-19.
<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6210a1.htm>

- c. The ABC's of Hepatitis. Centers for Disease Control and Prevention. Updated 2016.
<https://www.cdc.gov/hepatitis/resources/professionals/pdfs/abctable.pdf>.
- d. Epidemiology and Prevention of Vaccine-Preventable Diseases. The Pink Book: Course Textbook - 13th Edition (2015). Chapter 10: Hepatitis B National Center for Immunization and Respiratory Diseases. Page last reviewed: November 15, 2016. Page last updated: April 28, 2016. Retrieved from <https://www.cdc.gov/vaccines/pubs/pinkbook/hepb.html>.

San Antonio Regional Vaccine Safety Hub/877-438-8222
Approved: Chief, Immunization Healthcare Branch