

Decades of Hepatitis B Vaccination in China

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] Today, I'm talking with Dr. Stephen Hadler, deputy director for the Division of Bacterial Diseases at CDC, about a hepatitis B vaccination program in China. Welcome, Dr. Hadler.

[Stephen Hadler] Thanks for asking me to be here.

[Sarah Gregory] Ok, let's start with some basics. How is hepatitis B different from Hepatitis A?

[Stephen Hadler] These two types of hepatitis are both caused by viruses which primarily infect the liver, and both cause a typical serious illness with fatigue, malaise, weakness, sometimes fever, and a yellowing of the skin and eyes called jaundice. Generally, people who are infected will recover, but rarely these can cause what's called "fulminant" hepatitis which can lead to death due to liver failure. However, they differ in several important ways—both in how they are spread and whether they can cause an ongoing, or chronic, infection.

Hepatitis A is spread by the fecal-oral route, that is, through close contact, food, or water, and never causes chronic infection, that is, everyone recovers completely and becomes immune to a second infection.

On the other hand, hepatitis B is more serious in that it frequently causes a chronic infection, which may result in progressive damage to the liver, leading to cirrhosis, or scarring, of the liver and/or liver cancer, both of which can be fatal. Globally, an estimated 780,000 people die annually from hepatitis B-related liver disease, including approximately 300,000 each year in China. About five to 10 percent of people who are infected with the virus develop chronic infection.

Hepatitis B is spread through contact with blood or other body fluids of infected people, such as through contaminated blood transfusions, sharing contaminated needles, or sexual contact. Importantly, it can also be transmitted from an infected mother to her infant at time of birth. When this happens, the infant has as much as a 90 percent chance of becoming chronically infected. The cycle of mother-to-infant transmission helped to perpetuate the high rate of hepatitis B virus infection seen in many parts of Asia and Africa before the hepatitis B vaccination programs were started.

[Sarah Gregory] Tell us about that vaccination program.

[Stephen Hadler] Before hepatitis B vaccines became available, China had one of the highest rates of hepatitis B infection, with over 10 percent of people of all age groups, including infants and young children, being chronically infected, and over 60 percent of people infected during their lifetimes. Recognizing the problem, China was among the first countries to develop their own hepatitis B vaccines, and started vaccinating infants and children beginning in 1992. By 2002, China made vaccine available at no cost to all children, and by 2005 stopped charging for the cost to actually give the vaccine dose.

China recognized the need to protect the baby as soon as possible, and the Chinese program recommends giving the first dose of vaccine within 24 hours of birth, preferably in the birthing room, followed by doses at one and six months of age. This vaccination schedule is over 90 percent effective in preventing infection in the infant. A key part of the program has been to have all babies be born in hospitals, where the birth dose can be easily given, and over the last 15 years, China has worked hard to assure that all infants are born in hospitals, even in rural areas.

More recently, China has worked to further increase protection by including testing of pregnant women to identify those who are infected, and for infants born to these mothers to include another preventive hepatitis B immune globulin which increases the effectiveness of protection.

[Sarah Gregory] What was the purpose of this study?

[Stephen Hadler] The purpose of this study was to evaluate the effectiveness of the Chinese vaccination program in reducing hepatitis B infection among people less than 30 years of age. Similar evaluations were done in 1992, at the start of the program, and in 2006, while the program was being strengthened to reach all children, including those in the poorest and rural parts of China.

[Sarah Gregory] How was the study conducted?

[Stephen Hadler] The study was conducted in 160 villages and cities throughout China, with a total of over 31,000 people age one to 29 years surveyed in these sites. All participants had a blood sample collected to test for both hepatitis B virus and antibodies to the virus, and had their information on hepatitis B vaccination collected from both home records and local vaccination clinics. The most important analyses were the frequency of chronic infection among each of the age groups—less than five years, five to 14 years, and 15 to 29 year olds—with a comparison to those frequencies found in the two previous studies in 1992 and 2006.

[Sarah Gregory] And what were the conclusions?

[Stephen Hadler] That the comprehensive vaccination program has further reduced the rate of chronic infection in all age groups, by 76 percent compared to the pre-vaccine era. Most importantly, among children less than five years who were directly targeted for vaccination, infection risk has been reduced by 97 percent, from 10 percent in 1992 to 0.3 percent. And among people aged less than 15 years, born after the national vaccination program was fully implemented, infection rates were reduced by 92 percent to the current 0.8 percent. These rates of reduction of hepatitis B among infants are among the highest globally and indicate the outstanding success of China's comprehensive program.

[Sarah Gregory] Is this vaccination program something that needs to continue?

[Stephen Hadler] Yes. Because many women of childbearing age remain hepatitis B carriers, due to infection that occurred when they were infants, between 750,000 to one million infants are born to infected mothers in China each year. To protect these infants, this vaccination program must continue indefinitely. The Chinese government continues to work to further increase protection, monitoring the impact of the program and considering newer preventions, such as giving antiviral drugs to infected mothers to further reduce their risk of transmitting the virus to their infants.

[Sarah Gregory] How is it that if this program has been going on for 25 years there are still 750,000 to a million infected new mothers each year?

[Stephen Hadler] That is a rather large number, which is based on China's large population and number of births. Each year, an estimated 17 million infants are born in China. Previously, almost 10 percent of child-bearing age women were hepatitis B carriers, resulting in an estimated 1.6 million births to hepatitis B infected mothers annually. Currently, the rate of infection among such women is about four to five percent, yielding the estimated number births of 750,000 to one million each year. This number will steadily decrease as girls who were vaccinated and protected as infants reach child bearing age. But that will take another two decades to greatly reduce this number.

[Sarah Gregory] Do you think it would be beneficial in other countries?

[Stephen Hadler] Absolutely. The Chinese program is a model for all countries that have high rates of maternal infant hepatitis B transmission. This approach has already been widely applied throughout the Western Pacific region of the World Health Organization, in countries where disease rates are similar, and is increasingly being applied in other parts of the world.

[Sarah Gregory] Does the U.S. have a hepatitis B vaccination program?

[Stephen Hadler] Yes. The U.S. has a comprehensive program aimed at preventing hepatitis B disease in all age groups. Specifically, we recommend that all pregnant women be tested for hepatitis B virus, and that all infants born to mothers who are infected be given both vaccine and hepatitis B immune globulin within 24 hours of birth. Furthermore, we recommend that all infants receive the vaccine beginning at birth. In addition, it's recommended that any person who has not received the vaccine by age 11 to 12 years should be vaccinated. And that all adults at high risk of infection, such as health care workers, people who inject illicit drugs, men who have sex with men, and other high-risk groups, should be vaccinated.

[Sarah Gregory] You're not one of the authors of this study. How are you involved with hepatitis B?

[Stephen Hadler] No, I'm not currently working on hepatitis B in my CDC job, but previously I worked as the World Health Organization's senior advisor on hepatitis B vaccination in Beijing, China, from 2005 through 2009, helping to guide their hepatitis B vaccination program to reach all infants, particularly in the western provinces and poorest rural areas. I assisted with analysis of the prior hepatitis B survey in 2006, which had already showed great progress in reducing the hep B burden in young children. And my first 12 years in public health were with the hepatitis branch at CDC, working on some of the first studies showing the effectiveness of hepatitis B vaccine in homosexual men, and helping to develop the first U.S. recommendations for hepatitis B vaccination.

[Sarah Gregory] I know you're an associate editor for the *Emerging Infectious Diseases* journal. What does that involve?

[Stephen Hadler] As Associate Editor, I organize peer review of manuscripts in my current areas of work—mainly bacterial vaccine preventable and respiratory diseases, such as bacterial meningitis, pneumococcal pneumonia, whooping cough, as well as Legionnaires disease and

others. This involves reviewing the manuscript to see if it is potentially worthy of publication in *Emerging Infectious Diseases*, finding experts in the field who are interested to serve as peer reviewers, and based on their reviews, making recommendation to the senior EID editor whether this should be accepted, rejected, or revised for follow-up review. I find it most interesting to see some of the cutting edge work before it's formally published, and helping to guide authors on how to improve the manuscripts to make them most impactful for public health prevention.

[Sarah Gregory] Thank you, Dr. Hadler. I've been talking with Dr. Stephen Hadler about the article, Prevention of Chronic Hepatitis B after 3 Decades of Escalating Vaccination Policy, China. Listeners can read the entire May 2017 article on line at cdc.gov/eid.

I'm Sarah Gregory for *Emerging Infectious Diseases*.

[Announcer] For the most accurate health information, visit cdc.gov or call 1-800-CDC-INFO.