

## Podcast: Vaccines in pregnancy and further childhood vaccinations – Part 2

As of May 2022

In part two of this podcast, we will look at two diseases that can have devastating consequences for the foetus and the baby when infected by the mother: rubella and hepatitis B.

### Hepatitis B

Worldwide 3-5% of all humans are hepatitis B virus (abbreviated HBV) carriers and around 1 million deaths occur yearly due to HBV disease and its complications: 38% of liver cancer, 52% of liver cirrhosis, and 10% of acute hepatitis.<sup>1,2</sup>

HBV is spread by contact with infectious body fluids: blood, saliva and semen. This means it can be spread sexually, by needle, razor and toothbrush sharing, or by needle stick injury in a medical setting. It can also be transmitted by close contact with open wounds or sores, which can happen at school and in day-care settings as well. However, the most important way of transmission in the developing world is when an infected mother gives birth and thus infects the baby.

The incubation period is quite long between 1 and 6 months. HBV can cause an acute and/or chronic infection of the liver. Early symptoms are headache, nausea, vomiting, abdominal pain, fever, rash, body pains, and dark urine. Afterwards jaundice, light stools, and liver pain may appear. 1% develop a fulminant hepatitis with acute liver failure.

Infected as an adult 65% have no symptoms, 30% get an acute hepatitis, but both groups are cured, are immune and do not spread the disease further. Of the remaining 5%, 30% develop chronic hepatitis with possible complications like cirrhosis, liver failure, and liver cancer. 70% are carriers of HBV but otherwise fine. Both of these groups can infect others. The huge difference to infected newborns is that 90% of them get a chronic hepatitis.<sup>3,1</sup> This is where most of the burden of HBV-related disease results from: infections acquired in infancy through perinatal or early childhood exposure to HBV because infection acquired at an early age is more likely to become chronic than infection acquired later in life.<sup>4</sup>

Treatment for patients with a chronic HBV infection may include interferon therapy, which reduces or eliminates the virus in some patients. Because interferon is injected and has some potentially serious side effects, some patients are advised to use one of the several oral medicines, such as

lamivudine or tenofovir.<sup>3</sup> As these medicines are known to be effective against HIV it shows that these viruses are related: both use a reverse transcriptase for replication.

Since 1992, the WHO has urged to include hepatitis B vaccination in routine national immunization programs. It is a dead vaccine and is safe even for people with reduced immune function.<sup>3</sup> All infants should receive their first dose of hepatitis B vaccine as soon as possible after birth, ideally within 24 hours.<sup>4</sup> Between the date of introduction of the vaccine in the early 1980s and 2015, the proportion of children infected could be reduced to one third.

Vaccination programmes against hepatitis B are very effective for the population. An example is Taiwan where since the introduction of the vaccine liver cancer decreased by 60 %, mortality due to fulminant hepatitis by 76%, and mortality due to chronic liver diseases by 92%.<sup>4</sup>

### What can be done to prevent vertical spread from mother to child?

All pregnant women should be screened for hepatitis B infection until week 32 in pregnancy. If found out to be a carrier or having chronic hepatitis B a combination of active vaccination and administration of immunoglobulin in the new-born from birth on can reduce the risk of transmission by 86-99%.<sup>5</sup>

### Why is this not a 100%? If we are immunized as health care workers and keep our antibody levels high we are protected, aren't we?

Yes, among health-care workers and other healthy adults, hepatitis B vaccination is highly effective for the prevention of a HBV infection.

In vertical transmission there is a possibility for infection of the foetus during pregnancy. This can happen when the pregnant woman has a chronic active hepatitis. The risk depends for example on the viral load of the pregnant woman. As we cannot immunize the foetus, we can additionally try to reduce the viral load by oral medication given to the pregnant woman.

Now let's move to a disease we definitely want to prevent to get in pregnancy.

### Rubella

Rubella is caused by the rubella virus. The disease is often called German measles, described first by German doctors, but the viruses are not related.

Spread by droplets, infected individuals may be contagious as early as a week before the appearance of the rubella rash, and for up to a week after it first appears. Symptoms are low-grade fever, flu-like and respiratory problems, and the itchy rash of fine pink spots that typically begins in the face, then spreads downwards and usually lasts for 3 days. Often lymph nodes behind the ears on the neck are swollen. In children rubella infection is usually mild. Complications may occur in adults including arthritis, encephalitis, neuritis and bleeding disorder due to low platelets.

A woman who contracts rubella in pregnancy until week 20 can pass it to the developing foetus. Such pregnancies are at risk of spontaneous abortion or premature birth. If the foetus survives, the child may suffer from many birth defects, including deafness, eye defects, cardiac defects, mental

retardation, bone lesions, and other abnormalities. Together, the defects are known as Congenital Rubella Syndrome (CRS). Children born with CRS may transmit the virus to others for more than a year.<sup>3</sup> Rubella virus is generally recognized as the most common infectious cause of birth defects, accounting for an estimated 100 000 infants born with congenital rubella syndrome (CRS) every year worldwide.<sup>6</sup>

A few years before the development of a vaccine, by Maurice Hilleman in 1969, a rubella epidemic swept the United States in the years 1964/65. There were 12.5 million cases of rubella. 20,000 children were born with CRS: 11,000 were deaf, 3,500 blind, and 1,800 mentally retarded. There were 2,100 neonatal deaths and more than 11,000 abortions – some spontaneously others intentionally after the mothers were informed of the risks of abnormalities after exposure to rubella patients in pregnancy.<sup>3</sup>

There is only supportive treatment for the rubella disease. Treatment of CRS may require surgeries and other expensive care or is just not possible.

Already a single dose of the live vaccine gives a long-lasting immunity available in 95%. Rubella vaccines are today in either monovalent formulation or more commonly in combinations with measles, measles and mumps, or measles, mumps and varicella. From 2000 to 2018 reported cases worldwide declined by 97%. CRS rates are highest in African and South-East Asian regions of the WHO where vaccination coverage is lowest.<sup>6</sup>

The WHO encourages the remaining 26 countries not currently using rubella vaccination to take advantage of widespread measles vaccination initiatives to introduce rubella vaccines in order to advance rubella and CRS elimination.<sup>6</sup>

Side effects of the vaccine are generally mild, but Rubella vaccination should be avoided in pregnancy because as it is a live vaccine with a theoretical but never demonstrated risk of teratogenic outcomes. WHO recommends that, in order to provide direct protection against rubella, all non-pregnant women of reproductive age who are not already vaccinated or who have no antibodies for rubella receive one dose of a rubella containing vaccine.

Now this is a lot of information. Can you give us a summary of the most important points?

Unborn babies, neonates and infants have a higher risk to die of infections because of their immature immune system.

By giving childhood immunizations, we can reduce a lot of morbidity and mortality, not only for the children but also for the whole population.

Keeping in mind the vaccination status of women of childbearing age will have further effects on the health situation during pregnancy and for neonates.

Get acquainted with the routine vaccination programmes of your country and so promote a healthy pregnancy and childhood.

Thank you. We hope that you have enjoyed this podcast too. Until our next session, good bye and stay blessed.

Internet and other sources as of May 29, 2022:

- 1 Gerd Herold und Mitarbeiter: Innere Medizin 2022, ISBN 978-3-9821166-1-7
- 2 [www.who.int/news-room/fact-sheets/detail/hepatitis-b](http://www.who.int/news-room/fact-sheets/detail/hepatitis-b)
- 3 <https://historyofvaccines.org/>
- 4 [apps.who.int/iris/bitstream/handle/10665/255841/WER9227.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/255841/WER9227.pdf?sequence=1)
- 5 [www.sciencedirect.com/science/article/pii/S1665268119308816?via%3Dihub](http://www.sciencedirect.com/science/article/pii/S1665268119308816?via%3Dihub)
- 6 [www.who.int/teams/immunization-vaccines-and-biologicals/policies/position-papers/rubella](http://www.who.int/teams/immunization-vaccines-and-biologicals/policies/position-papers/rubella)