

The Hepatitis C Virus

Viruses are tiny structures that often cause diseases. They cannot be seen with a light microscope but rather only with an electron microscope. Unlike bacteria or fungi, we do not refer to viruses as living organisms. The reason: They have no metabolism of their own, they cannot actively move around or react to environmental stimuli, and they cannot reproduce.



Fig. 1: Virus
Source: E. Käding

The construction of viruses is simple: They consist of genetic material (either DNA or RNA) surrounded by a capsule of proteins. Some viruses also have an outer envelope consisting of a water-insoluble double layer of fat (lipids). Receptor proteins (spikes) can be found on this envelope. The virus can attach itself to a cell using these proteins.

It is not yet clear exactly what the hepatitis C virus looks like because it is very difficult to visualise with an electron microscope. It is known that it contains single-stranded RNA and has an envelope. It is probably about 50 nm in size.

This means that 150 viruses side by side would be about as wide as a red blood cell.

The virus is found in the blood of the infected organism. Infection with the virus can happen through unprotected sexual intercourse. When using recreational drugs, there is also an increased risk because of sharing contaminated utensils. As a rule, infection does not occur via blood transfusions. That's because there are good tests for checking blood supplies.

Once the virus has entered the body, it attacks the liver cells. In the process, it docks with receptors on its envelope on the outside of the host cell and releases its RNA into the cell plasma. The host cell now produces new Hepatitis C viruses using the RNA. When the host cell is "full" with new viruses, it bursts, and the viruses are released. The host cell dies in the process. The viruses infect new host cells to continue replicating.

The dead host cells are not replaced by new liver cells but rather by connective tissue. This disrupts the function of the liver. About six to eight weeks pass before the infected organism notices symptoms of a hepatitis C infection.

However, many people do not even notice the hepatitis C infection. They do not associate increased fatigue or fever with a possible hepatitis C infection. Even if the liver becomes inflamed (i.e. you develop jaundice with yellowing of the skin, mucous membranes, and eyes), the disease is usually harmless and can be treated easily. Unfortunately, hepatitis C can also become chronic. This means that one is permanently ill (often without realising it) and that the liver can be destroyed after a few years by cirrhosis or liver cancer.

The drugs used to treat hepatitis C are called antivirals. They inhibit the multiplication of the viruses in the host cells. Because the viruses can no longer reproduce, the immune system can gradually destroy them. Even after an infection has been overcome, there is always the possibility of becoming infected with the hepatitis C virus again. There is no immunity (as with measles, for example), and there is also no vaccination against hepatitis C.