SARS-CoV-2 (Novel Coronavirus)

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 made 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.

The disease COVID-19 is caused by the SARS-CoV-2 virus. This stands for "severe acute respiratory syndrome coronavirus type 2". It is colloquially known as coronavirus. The virus consists of RNA in an envelope. The envelope consists of lipids and proteins. Receptors (spikes) are distributed on the outer surface. Corona viruses are between 80 and 140 nm small – red blood cells are much larger at 7,500 nm.

The viruses are found in saliva, among other things, and are passed on through coughing, sneezing, talking, breathing, and kissing (droplet infection) as well as aerosols in the air we breathe.

Once the virus has entered the body, it attacks the cells in the nose and throat. It attaches to the host cells with its receptors and enters the cell. From there, it releases its RNA into the cytoplasm, and the host cell now produces masses of new SARS-CoV-2 viruses until the host cell itself is destroyed. The viruses released now infect further host cells in order to multiply.

After about five days, symptoms of the disease may appear. These are mostly cough, fever, and cold as well as impairments of the sense of smell and taste. COVID-19 often occurs without symptoms – especially in children. However, older adults and people with certain pre-existing conditions often become seriously ill. The viruses can also affect the lower respiratory tract (e.g. the bronchial tubes and lungs), thereby causing severe pneumonia and making artificial respiration necessary. It has also already been proven that the virus can also affect and impair other organs. Some patients develop the disease "long COVID" after surviving an infection. Sometimes for many months, the affected persons still suffer from exhaustion and respiratory problems. This makes it very difficult to work and even to cope with everyday tasks.

Although the coronavirus has only recently appeared, several vaccines have already been developed. An effective drug to treat COVID-19 disease is not yet available in Germany (status: November 2021), although research is already being conducted on this. Only the symptoms can be treated while the immune system itself fights the virus. In some countries, on the other hand, drugs for treatment are already approved.