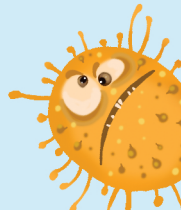
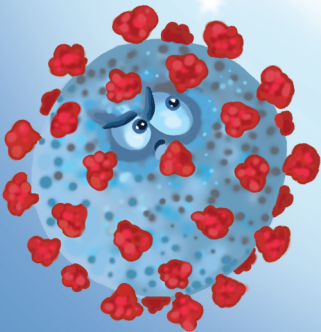
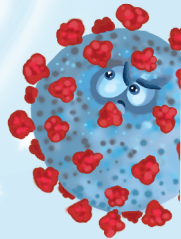
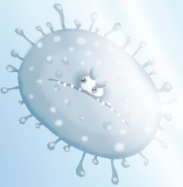
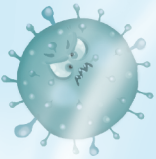
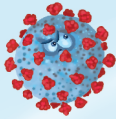


Coronavirus
AND
the immune
system
EXPLAINED
to CHILDREN





HOW DOES THE IMMUNE SYSTEM PROTECT OUR BODY FROM THREATS?

What is the immune system?

The immune system is the part of our body that protects us against disease and helps us stay healthy.

The immune system is made up of different organs, cells, and molecules that interact with each other. The functioning of the immune system is complex and magical at the same time.

What trouble does the immune system protect us from?

The immune system protects us from microorganisms that are harmful to health and are not visible to the naked eye, such as viruses and bacteria.

The immune system also provides protection against the development of cancer.

HOW DOES THE IMMUNE SYSTEM WORK?

The immune system has a difficult task

The immune system knows the difference between our body and a threat that must be eliminated.

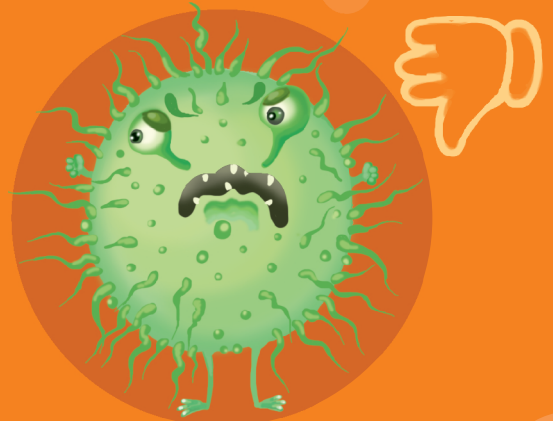
We do not want the immune system to make a mistake and fight against our own cells.

The cells that make up our body are different from the microorganisms that are harmful to health. The immune system is really ingenious and capable of learning. In particular when it is young, it learns to recognise these differences and thus knows how to act when faced with a threat.

This task is even more complex in defending against cancer, as cancer cells originate from our own cells and are therefore very similar.

When the immune system recognizes a threat, it starts to fight against it and thus protects our health.

The immune system uses a variety of effective tools. These tools may also damage our own body; it therefore needs to use them very carefully. The improper functioning of the immune system can result in diseases. If immune system attacks our own body, autoimmune disease such as multiple sclerosis can develop. Excessive activation of the immune system can lead to inflammatory diseases.



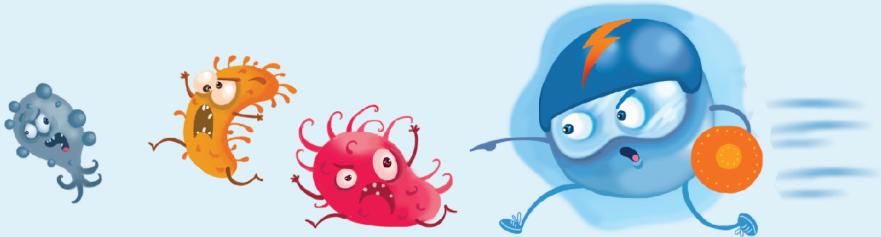
(Hint: See page 6 to learn about how the coronavirus tricks our immune system.)

THE IMMUNE SYSTEM PROTECTS US WITH TWO ARMS

Despite constant threats, we humans are mostly healthy. This means that our immune system works very well even though bacteria and viruses are all around us and even in our body such as on the skin and in the gut. The immune system comprises two main parts that work closely together and help each other.

Innate immune system

The innate immune system quickly recognises bad guys invading our body and responds to them. It can often deal with them on its own. It can, for example, eat them. The result of this struggle can be felt as a painful and reddened swelling. This is called inflammation and is a sign that our immune system is working.



Adaptive immune response

In the case of certain "bad guys", the innate immune response must call upon special units for help. These units are called the adaptive immune response. They know how to employ even more advanced tools that can identify the bad guys with more accuracy and defeat them very cleverly.

Going hand in hand

An important player in the innate immune system is a special immune cell called "antigen presenting cell" that looks for bad guys. And when it finds them, they are escorted to the "military base" which we call lymph node. Along with special units called T-cells and B-cells, they prepare an entire "army" and develop a plan on how to defeat these bad guys.

Once the adaptive immune system learns against whom and how it is to fight, it remembers as if a picture of bad guys was added to a warrant for the arrest. This is called immunological memory, which allows you to be ready to immediately deal with a threat you have previously encountered or a similar one.

(Hint: See page 7 to learn about why immunological memory is crucial for the performance of vaccines.)

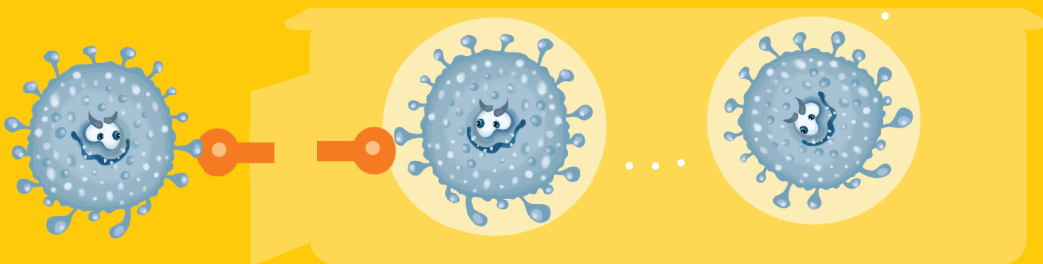
WHAT IS A VIRUS AND HOW DOES IT WORK?

What is a virus?

Viruses are very tiny particles that are capable of causing disease, in much the same manner as computer viruses can damage a computer. If the virus were as big as a coin, you would be as big as the whole country of Slovenia. Even though the virus is so small and cannot reproduce without a host cell, it is very cunning. Viruses are all around us and can infect all forms of life, from animals, plants to microorganisms. Most viruses are harmless to humans, but some cause diseases of varying severity.

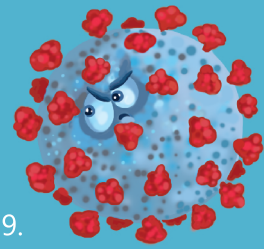
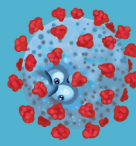
How does a virus work?

The virus – just like us – needs the house to live in. In fact, viruses like to live in the cells that build our body. The virus carries keys with it to connect to the lock of our cells and thus opens the door to enter the little house within our body. When it enters the cells, it tricks them into helping it build new viruses. New viruses then leave these cells and infect other cells in our body as well as other people. This is called a viral infection.



Viruses are not only harmful. We can even modify viruses so that they are incapable of causing disease; such viruses are used in medicine to teach the immune system how to recognise and treat cancer. This is a CAR T cell immunotherapy. Viruses can also repair our hereditary material and cure diseases. This is gene therapy. And finally, we can also use harmless modified viruses to make vaccines to fight dangerous viruses.

CORONAVIRUS



What is a coronavirus?

Coronaviruses are a group of viruses. One of the representatives of this group is SARS-CoV-2, which causes a disease called COVID-19.

SARS-CoV-2 is an abbreviation for Severe Acute Respiratory Syndrome Coronavirus 2.

What is COVID-19?

COVID-19 is a respiratory disease that is responsible for the COVID-19 pandemic. When we get sick, we may develop fever, cough, get tired, have trouble breathing, and lose smell and taste. Most people recover from the disease without any problems, but some people become seriously ill.

How do we get infected with the coronavirus?

When you have viruses in your body, they can be transmitted to other people even though you may not feel bad at all. The virus usually spreads through droplets caused by coughing, sneezing or even talking, and especially when singing or shouting. Such droplets do not travel very far, so it is good to maintain a distance of at least two meters from others who may be infected. However, if you are close enough to an infected person and inhale virus-containing droplets, you can become infected. Indoors, small droplets can remain suspended in the air over longer time periods. Viruses also like hanging around on objects that we often touch, such as toys, doorhandles, lifts, railings, equipment at playgrounds, etc. That is when they cling to our hands and if we touch our mouth, eyes, or nose, we can get infected. Two to even fourteen days may pass from the moment the virus enters our body to the time we start feeling ill. Doctors perform tests to tell us whether we are infected.



Why is SARS-CoV-2 a tough opponent for the immune system?

Each virus knows tricks to play on our immune system. The coronavirus knows many tricks how to fool our immune system so that it does not know how to behave and what to do to defeat it.

WHAT PEOPLE DO TO DEFEND AGAINST VIRUSES

Medicines

There are currently no effective drugs to cure COVID-19. Doctors therefore treat the symptoms of the disease. They are able to deal with them much more effectively than at the beginning of the pandemic, as they have already learned a lot about the disease. Researchers around the world are in search for new drugs to fight the coronavirus.

Vaccines

Vaccination is the best protection against getting sick.

The use of vaccines has eradicated some very severe diseases. Vaccines have saved more lives than any other medicine. Measles vaccine and many others offer protection for the rest of your life. Scientists have taken the virus very seriously and have developed several types of vaccines that protect us very well from the virus.

Scientists in Slovenia are also attempting to develop vaccines.

How the vaccine works

We recover from the disease when the immune system defeats harmful microorganisms. It is during this time, that the immune system learns and remembers how to fight such bad guys in the future. When such a harmful microorganism or the one similar enough invades our body, it can no longer cause the disease because the immune system stops it promptly. The vaccine contains 'inactivated' microorganisms or their parts that cannot cause the disease. The immune system understands the injection of the vaccine as an infection and prepares the immune system to defend the body. This is enough for our immune system to learn how to recognise the bad guy when it actually appears.

The best thing about it is that we do not even get sick when we get vaccinated!

We call this immunological memory.

When we get vaccinated, it stings us a little. Just like a small thorn. Later, our arm or head may hurt a bit, but this is only a sign that the vaccine is working. When we repeat the vaccination later, the virus can no longer harm us.



(Hint: See pages 3 and 4 to learn about how our immune system functions.)

LIFE DURING THE CORONAVIRUS PANDEMIC

(Hint: See page 6 to learn about how the coronavirus spreads from person to person.)

We need to make it difficult for the virus to infect us and others at every turn. Let us see what we can do for our health and the health of others!

1. It is wise to keep a safe distance and stay at least 2 meters apart from other people. This makes it very difficult for the virus to transmit.
2. The mask limits the possibility of infecting other people by coughing, sneezing, or talking, as virus-containing droplets are more difficult to pass through the mask. Wearing a mask also decreases the chance of the virus entering your body.
3. Even if we touch an infected area and thus transmit the virus to our hands, we will not get infected if we destroy the virus by washing and/or disinfecting our hands. We have to wash our hands with soap for at least 20 seconds, which is long enough to sing the song "Happy birthday" twice. Before we touch our face, eat or when we stop playing, we have to wash or disinfect our hands.
4. Because virus can float around in tiny droplets from the throat during breathing or talking, you should ventilate the rooms for a couple of minutes at least once per hour. Open the window and let those droplets fly away out of the room.
5. If the virus spreads extensively, it is safest to stay at home. This is sometimes difficult because we miss companionship. When you are staying at home, it is an opportunity to learn a lot of new things and spend more time with your family. This is also the time when your imagination can take you wherever you want.



All these measures are crucial to protect our health and the health of the individuals belonging to vulnerable groups, such as elderly people and persons of poor health. These measures provide researchers and doctors with time to learn more about the virus, to prepare for it even better and to search for effective treatment and vaccines. This will prevent many people from getting sick.

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