

Q & A for Everyone Who Wants to Know More About the Coronavirus (children's edition)

This document is edited with the information as of April 2, 2020.

How do you name a virus?

There are many reasons for the names. The novel coronavirus we have now is named after the appearance of the surface. It is covered with shapes like a crown, or “corona” in ancient Greek. In the past, viruses were sometimes named after places where they started to spread. For example, Spanish flu was named this way since it was thought to have spread from Spain. But, if you name a virus after a place, people may think that everyone in the place has the disease, even though that is not true. That is why viruses are not named after a place anymore.

How do you get infected with the virus?

Our body is made up of very many cells, which are like small rooms. When we are born, our bodies start with a single cell. As it divides and multiplies, the cells start to carry out the functions of our body. Viruses multiply in animals and people. When a virus is introduced into cells of the body, it takes over the mechanisms of the cells, working and multiplying, and makes copies of the virus. When animals and people cough or sneeze, the multiplied virus is carried out from the body by the spray and splash of droplets. After that, they are carried by water droplets in the air. Then, another person inhales those droplets. As a result, the virus sticks to the mucous membranes of the person who inhaled it. The mucous membranes are the red and moist parts in the mouth and nose. The inhaled droplets stick to the mouth, nose, or even the back of the lungs depending on how big they are.

The size of the droplets, carried in spray by coughing or sneezing, works well to enable the virus to stick to the nose and throat. When someone with the virus multiplying in their body coughs or sneezes, it can spread easily to other people who are closeby.

Column : Why is it easy for the virus to enter from the mouth and nose, but not the skin?

Looking at the inside of the mouth and nose, it is different from the skin such as the palm of the hand. It's red and moist compared to the skin. This is called a mucous membrane. It's red because the blood vessels are close to the surface of the mucous membrane. One of the reasons why the virus is likely to enter through the mucous membrane is that the keratin – which is part of the skin's surface that dies and falls off - is not present in the mucous membrane. There are many other reasons. It may be because the blood vessels are close to the surface of the body. Or, it may be because it is wet and the water droplets containing the virus can easily stick there.

What happens to the body when it catches the virus?

If the virus sticks to the mucous membranes of the nose and throat, it will enter directly into cells or nearby blood vessels. As I explained at the beginning, after entering a human cell, the virus tricks the cell to make many copies of the virus. Our immune cells help protect our bodies like policemen or firefighters. So they come to find and attack cells that were tricked into making more of the virus, as well as bits and pieces of the virus that were copied and multiplied. They also clean up dead cells. During this time, when the immune cells fight to kill the virus, the immune cells and other cells send a signal saying, "Help me kill the virus!" These signaling molecules are sent throughout the body. This is why the human body shows various symptoms, such as coughing, sneezing, and inflammation – in particular fever and pain. However, if the fight is not strong or the “help signal” is weak, symptoms may not appear. This is called asymptomatic infection. Even so, the virus may be multiplying. This is a problem because people without symptoms don't know that the virus is multiplying in their bodies.

How does the virus die? Should I wash my hands with soap?

Isn't just water enough?

Viruses are not living creatures. So-called “germs”, which refer to microbes and bacteria, are living creatures. The difference is whether or not they multiply by themselves or by eating food. Viruses do not do either. So, they don't die. However, viruses enter cells of living things such as humans and animals and make more virus. We want to stop this function.

Generally, virus particles consist of containers and its contents. The surface of the container walls – called membranes - can dissolve in water, but the middle part of the walls can only dissolve in oil. This happens to have the same structure as that of the cell membranes in our bodies. The only content inside the container are genes, which are like blueprints that give instructions on how to make a copy of your body. So, if the container breaks, the virus cannot work or enter the human cells, and as a result, it won't multiply.

[How to wash]

The way to break the container of the virus is to dissolve the part, which only dissolves in oil, in water by using soap. To do this, soak the oily soap in water or use strong alcohol. Make sure you lather the soap well. Water alone cannot break the virus container, so the virus remains active.

Why aren't closed spaces good?

Water droplets that got sprayed into the air from coughing or sneezing carry tons of the virus. The water droplets float 1-2 meters away from the person who coughed or sneezed, and travels slowly in the air. That's why people who have the virus multiplying in their body easily infect people nearby by coughing or sneezing. Also, if you close the windows and don't ventilate the room, a lot of water droplets filled with virus particles will remain in the air of the room. Then, people inside the room will inhale them.

Why is it harder to infect people who are one to two meters away?

Water droplets from coughing and sneezing generally shoot out one to two meters. That's why it is important to stay one to two meters away from others.

Of course, the size of the water droplets coming from coughing and sneezing varies. Smaller particles will fly further away and will also stay in the air for longer. But they also have fewer viruses in them because smaller droplets have a smaller volume.

Column : Even if people are in the same place, can some people get infected while others don't?

People in the same space and time might all inhale the virus in the same way, but not everyone will get infected.

The number of cells that the virus gets into depends on the immunity of the person who inhales it. Immunity is a body function to protect the body.

Can touching something that an infected person has touched infect others?

By coughing or sneezing, water droplets that contain lots of the virus may get on the palm of the person's hands. If he or she touches or holds an object, the virus may stick to it. Pencils, scissors, and so on. Although it depends on the material, the virus may remain active from a few minutes to more than a few hours after infected hands touch an object. If another person touches the infected object with his or her hands, the remaining virus may stick to the hands. The person may touch his or her nose, eyes, and mouth with their hands and get infected.



Simply touching an infected object with your hands won't get you infected. But if you touch your face with virus-infected hands, the virus could stick to your membrane – and then you'll be at risk of infection.

Of course, in this way, the amount of virus is lower than inhaling the spray from coughing and sneezing and is assumed to be less dangerous. But it's better to be careful.

Why doesn't all the virus in the body come out when you cough or sneeze?

Once a cell is tricked by the virus, the cell keeps making copies of the virus until the immune cells stops it. During that time, even if you cough or sneeze and force the virus out, new virus particles are made in your body. Therefore, you cannot release all the virus particles in your body just by coughing or sneezing.

I was told to spread my arms and keep a little distance from my friends. But if we spread our arms, won't we get infected?

If your friend's hands have water droplets with the virus, you may get the droplets by touching the friend's hands. If you then touch your face with your hands, you may get infected. So, don't touch each other when you spread your arms.

Column: How fast do the water droplets in a sneeze travel?

It is assumed to be 100 to 300 kilometers per hour. It is as fast as the Shinkansen.

The virus is so small. Why doesn't it come out of the mask cloth when people cough?

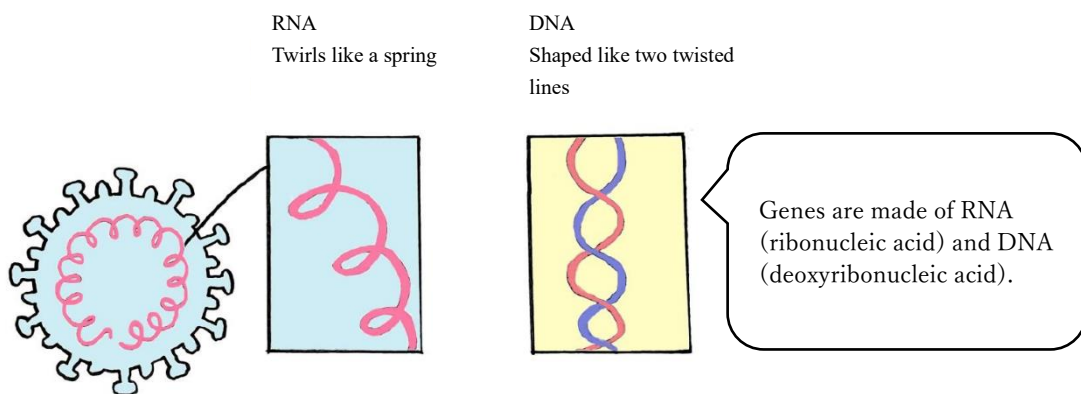
When the virus gets out in the air, it is in the water droplets of a cough and sneeze. If you were wearing the mask correctly, you can prevent water droplets containing the virus from flying into the air far away.

Column: Why do cells take in the bad virus?

The surface of a cell works to receive and take in substances and molecules with information or nutrition when they come. The virus uses this mechanism of cells to get to the inside of the cells.

Column: How does the virus let cells make copies of the virus?

When the container of the virus opens in a human cell, genes, a kind of blueprint for making copies of the virus, come out. Actually, the virus's blueprint works in the same way that human cells work to make materials by multiplying. That's how the virus takes over the whole human cell system and multiplies more and more.



Why does it take so long to make a medicine for it?

First, researchers have to find out what kind of substances can stop the virus from multiplying. In order to prevent the virus from multiplying, it is necessary to prevent the virus from entering human cells or to prevent them from making copies of the virus.

The drugs that make it impossible to make copies of the virus are made very similar to the materials needed for the virus to enter the cells and multiply, so the virus mistakenly takes this as the material. Then, the virus will not increase any more.

Researchers must study and find them. Next, after finding substances that work, they have to see if it really works for many people. Not only that, they need to make sure that the substance doesn't have a side effect that can hurt people's health. In particular, the system that the virus uses to multiply is the same as the system human cells use to make their parts, namely proteins. So, researchers have to make sure the substance only stops the virus from multiplying. This also takes a long time.

If I get infected with the virus, will I get better?

Usually, people will recover. For example, influenza is also caused by a virus, but people can recover. Some people are infected with the novel coronavirus and have no symptoms. Some people recover from the symptoms as if they had a common cold. But the problem we are having right now is that some people who have been infected with the novel coronavirus have difficulty breathing, or more specifically, have difficulty taking in the oxygen that they inhaled and sending it to the lungs, to the bloodstream, and to the entire body.

If a person cannot breathe and get oxygen into the body, the body will stop working and he or she will die. For now, the only way to fix the root cause of the breathing problem is to use machines to give the person lots of oxygen while the body's immune system tries to fight the virus.

Column: How often do new coronaviruses die?

A Lancet article published on March 30, 2020 showed that 1 out of every 1500 people infected, or 0.066% of infected people, have died. If it's an influenza virus, it is calculated to be about 1 in 10,000 people, or 0.01%, so it seems to be a little more than that. In addition, a calculation showed that about 1 to 2 in 100 people, or 1.5%, have died from the novel coronavirus among those who were tested positive.

If I get infected with the virus, how do I recover from it?

Cells that have been infected with a virus produce a lot of viruses and usually die later. The body's immune cells clean this up. At that time, the immune cells "learn" and become able to detect the virus. More specifically, the number of immune cells that make antibodies that attach themselves to the virus increases, and the immune cells become able to produce more antibodies. With more antibodies attached to viruses, it becomes easier for immune cells to find and attack them.

In this way, both the virus and the infected cells are reduced in the body and the person will recover. It is believed that people who are infected with the novel coronavirus recover in the same way. But unfortunately, in some cases, people with breathing problems may die if they become unable to supply their bodies with enough oxygen before the immune system drives the virus out of the body.

Do any drugs help immune cells fight the virus?

For germs (microbes and bacteria), because germs are living creatures, there is medicine to kill them (called antibiotics). But there are not many effective medicines for viruses. But there are not many effective medicines for viruses. One reason is that it is difficult to stop the multiplying virus because the human cells are multiplying the virus. In the case of ordinary viruses, the body's immune system is enough to cure the disease after some time, so medicines are rarely needed.

Medicines are available for a handful of viruses that the immune system alone can't fight easily. A few examples include influenza, herpesviruses that cause chicken pox, hepatitis B and C viruses, and HIV viruses that cause AIDS. For the novel coronavirus, however, there aren't any available yet. This is because the virus from this pandemic was only the seventh type of coronavirus to be discovered, and until now, experts thought that people recovered naturally from coronavirus infections.

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coronavirus, please read this booklet.

Let's Consider the Novel Coronavirus!

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