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Corona virus COVID 19

The virus has been named SARS-CoV-2, an abbreviation of Severe Acute Respiratory Syndrome Corona virus 2, while the disease is now called COVID-19.

What is the corona virus

The corona virus is a large family of enveloped single-stranded RNA viruses known to cause diseases from common cold to more severe diseases such as Middle Eastern Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The new corona virus (CoV) is a new strain of corona virus that has not previously been identified in humans.

In comparison with influenza and pneumonia

It is difficult to compare a whole new disease, such as Covid-19, with seasonal flu.
In summary, we can say from what is known today that they are similar in that both can cause a very serious illness in a proportion of those who fall ill.
By contrast, Covid-19 will hit significantly more people in a population where it is spreading, as in China today. The rapid and wide spread of infection is due to the fact that no one in the population has been able to develop an immunity to this new version of the virus. Why you will see more sick people and more people in need of medical attention.
On the other hand, the seasonal flu, which recurs every year, has been circulating in society for a long time. This is why protection against different types of influenza viruses has been built up in the population.

In comparison with pneumonia
Approximately 1% of the adult population in Sweden is affected by pneumonia annually, and between 10-15% of the affected die as a result of the disease.
If we turn this into figures about 99,000 people (calculated on a population over 15 years of age) suffer from pneumonia during one year, of which 9,900 to 14,850 die as a result of the disease.
Approximately 4 million people around the world die each year as a result of pneumonia.

Risk groups

We don't know enough about which groups are particularly susceptible to a severe infection of the new corona virus, and to what extent these individuals are exposed.
What has been reported in a Chinese study is that elderly people, and especially those with cardiovascular diseases, diabetes, chronic lung disease and high blood pressure are over represented among the severe cases. The study also shows that, after all, is only a very small proportion of these groups suffer from severe infection.

How does the virus infect?

Currently we know that the corona virus is spread through contact between people or through coughs and sneezing, so called drip-infection.

Preventive measures in a public environment

The infection spreads in close contact between people, there is no evidence today of infection through objects.
It is not yet clear how long the virus can survive outside the body, but preliminary information indicates that it can survive for a limited time and only under specific conditions. Common disinfectants can be used to kill the virus so that it cannot infect humans.

Infection risk

The Swedish Public Health Authority monitors the events continuously and assesses that the risks are now very high for import cases, i.e. people having been infected abroad but discovered in Sweden. And the risk of general spread of infection in Sweden is also assessed as very high.

The Swedish Public Health Authority makes regular risk assessments every week. New assessments are made based on analysis of recent developments in the outside world and data mainly from the World Health Organization, WHO, and the European Center for Disease Prevention and Control, ECDC.

How do I protect myself?

A common preventive measure against respiratory tract infections is to avoid touching the face or eyes as well as avoiding close contact with sick people.
Wash your hands frequently with soap and warm water, before meals, food handling and after bathroom visits. An alcohol handwash can be an option when you don't have the possibility to wash in water.
By coughing and sneezing in the fold of your arm, or in a paper tissue, you prevent the infection spreading in your environment and from contaminating your hands. Stay home when you are sick to avoid infecting people on the bus, your work or where you are close to others.

Face masks

Regular faceguards do not help against infection, the protection must keep a rating FFP3 to do any good. But as individual protection this is not an adequate help as the eyes are also susceptible to drip infection.

Protective gloves

Protects the hands from the virus, make sure to take them off by pulling them inside out and throwing them away immediately after use.

Symptoms

Respiratory symptoms, fever and cough. Most people do not get seriously ill, but a number of cases with more severe symptoms have been reported, as well as deaths.
Anyone having recently been in a country where the spread of infection is ongoing and who now has a cough and fever should contact 1177 Vårdguiden (Swedish medical/health guide) by phone and inform about the symptoms and travel history.

Incubation period

The corona virus' incubation period is 2-14 days.

How to test and response times

In the Stockholm area there is now the possibility of self-testing at home, which is when a nurse comes to your home and takes samples, it is decided on an individual basis whether home tests can be done or if the samples need to be taken at a hospital. According to the medical information service tests results can be ready in as early as two hours, but can also take up to 10-12 hours depending on the workload in the hospital's laboratory.

Links to follow

Nationally
Public Health Authority, Swedish official site on the infection situation:
https://www.folkhalsomyndigheten.se/

Vårdguiden:
https://www.1177.se/Stockholm/aktuellt/aktuellt-i-stockholms-lan/om-det-nya-coronaviruset/

The Government's travel recommendations:
https://www.regeringen.se/uds-reseinformation/

Internationally
European Center for Disease Prevention and Control:
https://www.ecdc.europa.eu/en

Official international site for the world situation, infected/deceased/recovered:
https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6

World Health Organization:
https://www.who.int/

Sources

Public Health Agency, Health Care Guide, Ministry of Foreign Affairs, European Infection Protection Agency, John Hopkins, WHO and Illustrated Science

In-depth information on the Corona virus COVID 19

Source; Illustrated Science

How dangerous is the corona virus?

The Common flu virus is the cause of approximately 650,000 worldwide deaths every year. Since December 2019, the corona virus has cost almost 3,000 people their lives.

Thus, the virus is not a big killer, but if you are over 60 and have existing health problems, there is every reason to take precautions.

The largest study of the corona virus to date, carried out by the Chinese center for disease control and prevention, showed an average mortality rate of 2.3% among those infected.

The number covers the large variation between different age groups:

Age 10–39 : 0.2% mortality
Age 40–49 : 0.4% mortality
Age 50–59 : 1.3% mortality
Age 60–69 : 3.6% mortality
Age 70–79 : 8% mortality
Age 80+ : 14.8% mortality

Eighty percent of those affected by the disease show mild symptoms of the virus, and only in the worst cases – primarily among the elderly and people with, e.g., high blood pressure and diabetes – there is a risk of developing pneumonia and organ failure, which can lead to death.
To make the corona seriously dangerous for many, it requires mutating into a more infectious and deadly version.

Can the disease be treated?

If the symptoms are limited to cough, fever and fatigue, the virus is treated as a common cold.
If the infected person gets pneumonia, hospitalization may be necessary.
The pneumonia the virus can cause is viral, not bacterial, why it cannot be treated with antibiotics.
The American John Hopkins University estimates that approximately 36,000 infected have recovered from the disease.

What are the symptoms?

Normally, the disease starts with fever followed by a dry cough.
The infected person can experience pronounced fatigue, muscle pain, headache and respiratory problems – just like during a severe flu. In severe cases the disease can also develop into pneumonia and organ failure.

According to the World Health Organization the symptoms are distributed as follows:
80% experience mild symptoms
14% experience severe symptoms
5% experience critical symptoms

It takes an average of 5 days from the time of infection to get sick – so called incubation period – but it can potentially take 14 days.

Allan Randrup Thomsen, professor of virology the the University of Copenhagen estimates that if you get very sick, it usually happens after approximately one week's illness.

How should I protect myself from infection?

The corona virus has been found to be about twice as contagious as the regular flu virus.
Airborne saliva particles can be transmitted from person to person by, e.g., coughing and sneezing, but can actually travel up to three meters through the air during regular conversations.

This is why many wear face masks in the worst affected areas in Asia.

Virus particles attack the respiratory tract

Virus particles from an infected person can stay in the air and they are infectious before the outbreak of the disease in the body.

1. **Departure**
   The virus particle leaves the body in a large group to increase the risk of infection.
2. **Transport**
   The particles travel in saliva droplets, which can fly more than one meter.
3. **Arrival**
   The virus arrives in the respiratory tract of a new victim, where it proliferates in the mucosal cells. The risk of disease increases with the number of particles.

The virus can also be spread through indirect contact via saliva or snot on the hands, and WHO recommends that we use the following precautions:

- Wash your hands frequently and use disinfectant hand alcohol.
- Avoid touching eyes, nose and mouth as virus particles are easily transmitted to vulnerable mucous membranes.
- Cover your mouth and nose when sneezing.
- Keep at least one meter's distance form people who sneeze, cough or have a fever.
- Stay at home if you feel unwell.
- Contact your doctor by phone if you suspect that you have symptoms of the corona virus.

New research shows that the corona virus' two cousins – MERS and SARS – can stay alive on surfaces such as metal, glass and plastic for up to nine days.

The researchers expect the same to be the case with the corona virus, but fortunately the virus particles can be killed with a little ordinary hand sanitation alcohol.

What happens now?

WHO has declared that the corona virus is an international health crisis - their highest alert.
If the virus spreads beyond expectations and among people in local areas across large parts of the world, it will be described as a real pandemic.

During a global pandemic, travel restrictions will not have the same effect as today - because the infection is still spreading locally - however, priority may be given to measures such as trying to limit large public collections, increasing the proportion of home-working employees, and expanding the opportunities of different countries to offer quarantine.

But there is hope for spring!

Several experts - including the leader of the US National Center for Disease Control, Dr. Nancy Messonier - hopes that the corona virus - like many other flu and cold viruses - will subside during the spring and summer months.

Firstly, people are not as close to each other during the warm part of the year as in winter, and in addition, virus particles do not survive nearly as long on surfaces in warm environments.

Researchers at the London School of Hygiene and Tropical Medicine estimate that the corona virus will culminate around March 1, while other researchers, such as at Hokkaido University in Japan, place the time somewhere between March and May.

How the corona virus becomes a true killer

The new coronavirus is spreading and the number of infected is increasing by several hundred day after day. The virus is, however, far from as deadly as SARS, for example, but it can change with just one or a couple mutations.

A mutated coronavirus named SARS-CoV-2 is currently attracting worldwide attention.
Every day, the number of infected people increases, while more and more countries report their first cases of the disease.
Recently, the World Health Organization WHO has also declared that the situation is an international health crisis.
They fear now that that the virus will mutate further. And that is not all an unrealistic scenario.

A virus with high mutation rate

The corona virus is a so-called RNA virus, which is characterized by being unstable and having a high mutation rate.
The virus has also already mutated once, when it jumped from animal to human, and once again when it began infecting humans.

Scientists all over the world therefore fear that the virus will mutate again, and that the mutations will strengthen properties such as infectiousness and mortality. This is when the corona virus can become dangerous for real.

Mutation type # 1 - Genetic variation

Antigenic activity is characterized by small natural mutations in the virus which over time develop into a new variation and confuse the immune system. For example, antigenic operation is the reason why many people can get the flu several times during the same season.

Small mutations occur in the virus

A viral gene is less altered.

The mutations create a new variant

Therefore, it accumulates more and more mutations over time and may at some point develop into a new variant of the original virus.

Mutation type # 2 - Genetic offset

Antigenic change is another type of mutation where two or more viruses are combined and form a new type of virus. The genetic change is therefore the reason for new diseases that our immune system does not recognize and can protect us from. The pandemic with the swine flu H1N1 in 2009, for example, arose as a result of a genetic change with viruses from pigs, humans and birds.

Viruses attack cells

Two or more viruses attack a cell.

The virus' RNA is copied

Inside the cell's core, the virus' RNA is copied.

A new virus occurs

This creates a new virus with properties from the original viruses.

Killer virus kills every tenth infected

In order for a virus to develop into a killer, it must first and foremost be infectious and spread quickly. For this to be possible, certain conditions must be met;

- The virus must be able to spread through the air
- The virus must be able to be transmitted over long distances
- The virus should be so aggressive that even a few virus particles can infect a person
- The virus should spread rapidly. And then the host should spread the infection while the person in question has no symptoms yet, so that contact with others continues, rather than the host isolating himself.

If you compare the terms with the corona virus, several of them can already be checked off. For example, it has been shown that the virus is airborne, as it is infected by small drops from sneezing and coughing.

In addition, there are many indications that the corona virus can infect without symptoms. According to several health authorities, it appears that infected can be symptom-free for up to 14 days and possibly carry the infection on during that period.

However, it has not been established how far the virus can travel. For example, given the relatively large size of the virus, several researchers do not believe that it can be airborne for a very long time at a time.

It is also unclear how aggressive the corona virus is. However, researchers from Imperial Collage London in the United Kingdom have made calculations showing that each infected person on average infects 2.5 people. And in that case, the corona virus is more contagious than, for example, SARS.

If the corona virus mutates in one direction, so that it meets all the conditions, the first part of the horror scenario is already reality. However, the virus must also increase its mortality if it is to become a true killer virus.

Right now, mortality is "only" at about two percent, which is relatively low. It can be compared to the mortality rate for SARS at ten percent, and about 20 percent for the Spanish disease in 1918.

Simulations show pandemic within six months

Last year, the American Research Institute, the Institute for Disease Modeling, made a model that showed how a mutated influenza virus could spread to the whole world in just six months.

In the simulation, the fictional virus meets all the conditions for rapid infection and also has a high mortality rate.

Vaccine against the coronavirus - why does it take so long?

More and more people are infected by the new corona virus, and the need for a vaccine is therefore great. However, the official report is that a vaccine will take several more months - but why does it take so long to develop a vaccine? And how far have we reached?

A vaccine is the best tool we have for diseases. That is why researchers all over the world are working at full speed to develop a vaccine against the new corona virus.

According to the World Health Organization, WHO, a vaccine will take a year and a half, giving the virus a relatively large time span to continue to create chaos.

The timespan may sound disappointing, but vaccine development is a complicated process and it usually takes three to five years to develop a complete vaccine.

Thus, the effort to develop a vaccine against the new corona virus is already in an exceptionally high gear, and many obstacles have already been removed.

Surveyed and reproduced in less than a month

Before a vaccine can develop, the genetic information of the virus, its so-called RNA, must be mapped and in early 2020, Chinese authorities reported that they had the entire RNA sequence of the corona virus in place.

It became the starting point for growing the virus in a laboratory, and just a few weeks later, researchers from Doherty University in Australia succeeded in that task.

From there, work on understanding the virus could begin - a task that is currently underway on several institutes around the world.

This is how a vaccine works

A vaccine prepares our immune system against a virus or bacterium.

First immune reaction

Vaccine consists of dead or living parts of a virus or bacterium. The immune system responds by building up antibodies that fight the disease, as well as memory cells that will remember it for the next time.

The second immune reaction

When the body strikes the same virus or bacterium again, the immune system immediately recognizes it and produces the antibodies that fight them.

Animal models to provide answers

In order to become wiser on the corona virus, it will first be necessary to grow it in sufficient quantity, in order to be able to test the virus in different ways. Thereafter, researchers will develop a biological model, a so-called Animal Model, which can reveal how the virus behaves in the body - from infection to outbreak.

Some selected animals are used, which have physiological similarities to humans, for example pigs and mice. This process can be complex and elaborate, but researchers have the advantage that the new corona virus shares 80-90 percent of its genetic information with SARS.

Therefore, it is quite possible that the animal models used to research SARS can also be used to explore the new corona virus.
With the results of the animal model, a vaccine can begin to take shape. Once a potential vaccine has been developed, it must undergo animal testing, in which the researchers ensure that the vaccine does what it should and causes damage by, for example, breaking down living tissue.

Last week, researchers at Imperial College in England confirmed that they have started testing their vaccine on mice. Other institutions also report that they are soon at the same milestone.

If the vaccine undergoes animal testing without problems, it passes to clinical trials in humans. These trials are divided into several phases, each of which can take up to several months to complete.
If the vaccine passes the clinical trials without problems, it is forwarded to the pharmaceutical authorities for final approval.

The Swedish Medicines Agency puts the pedal to the metal

In Europe, the European Medicines Agency (EMA) evaluates and approves new drugs and vaccines.

It usually takes up to 210 days to get a drug approved at EMA, but in emergency situations the process can be accelerated to about 70 days, because a special emergency procedure is applied. The vaccine company then sends in data for evaluation instead of sending it all when it is ready.

In early February, EMA activated the emergency procedure against the new corona virus. The procedure has previously been used for the swine flu H1N1, and it was also applied when ebola began in 2014.

When drug authorities have approved a vaccine, attention is finally directed to the manufacturing of the vaccine. It is important to find a production model that allows efficient and cheap mass production, to accelerate global distribution.

Mutations can precipitate vaccines

The new coronavirus has already mutated, when it jumped from animal to human and then began to infect humans. Therefore, there is a great risk that the virus can mutate again, which can put the spanner in the works for vaccine development.

The mutation can cause the virus to branch out into different variations, just like the flu. It can also cause the virus' properties to be strengthened or weakened. Either way, mutation can quickly render a potential vaccine unusable, as the genetic information of the virus changes.

This is why the development of a vaccine is a fight against the clock at the same time, and researchers must constantly be ready to change tracks if the virus develops. However recent tests show that the new corona virus is relatively stable so far.

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