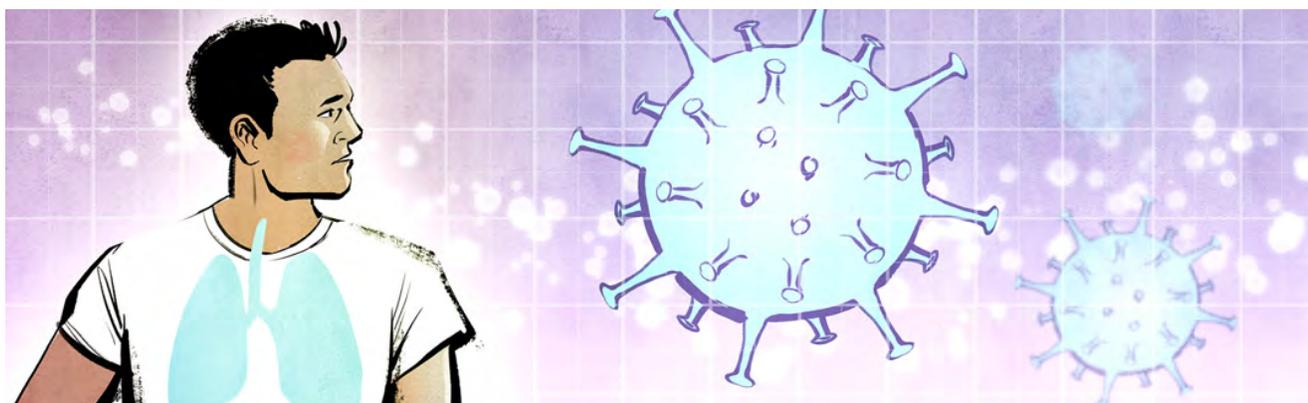




COVID-19 BACKGROUNDER

– WHAT DOES THE SCIENCE SAY?



This challenging **coronavirus** pandemic has turned our lives upside down. It's easy to get caught up in the fear, the rumours, and 'noise.' Instead, let's focus on the science.

ABOUT COVID-19

A virus is a microscopic piece of genetic material surrounded by a capsule made of protein. If you've had a cold, the flu, or chicken pox, you've had viruses. They can make you sick.

A virus cannot survive by itself. It needs to get inside a 'host.' Often the host is an animal. Sometimes, it is a human.

Once inside their host, some viruses are highly contagious. Others spread less easily.

COVID-19 is very infectious. It spreads through droplets that infected people cough out. The

virus may also remain for a time on surfaces after sick people cough into their hands, then touch those surfaces.

Symptoms may not appear for two to 14 days. The average **incubation period** is five days. Yet even without symptoms, infected people can infect others.

COVID-19 is a spherical capsule covered with spikes. Inside the host, it breaks into a healthy cell in the **respiratory tract**. It makes copies of itself, then leaves, killing the cell in the process.

Our immune system normally fights off invaders like viruses. While the battle rages, we have symptoms such as fever, a cough, and tiredness.

The good news is that about 80 percent of COVID-19 cases

are quite mild and patients recover. Serious cases usually involve pneumonia. It develops when the virus travels to the lower respiratory system and attacks the lungs. Patients may need a **ventilator** to help them breathe.

In Canada, seven percent of people infected with COVID-19 need to be hospitalized. Three percent need intensive care. One percent of those infected die. Usually these patients are older or have conditions that weaken their respiratory or immune systems.

FLATTENING THE CURVE

Without a COVID-19 vaccine, we can't stop the pandemic. So the strategy is to slow its spread. True, only a small fraction of those infected need hospital care. Yet so many people are getting

DEFINITIONS

CORONAVIRUS: a family of viruses that can infect animals and humans, and that causes the common cold and COVID-19

INCUBATION PERIOD: the period between infection and the appearance of symptoms of the disease

RESPIRATORY TRACT: the organs that are involved in breathing, including the nose, throat, larynx, trachea, bronchi, and lungs

VENTILATOR: a machine that pushes air in and out of someone's lungs when they cannot breathe on their own



the disease. If the virus spreads too quickly, that small fraction could still be large enough to paralyze Canada's health system.

On the other hand, if the spread is slower, seriously ill patients would occur over a longer time period. The health care system could manage COVID-19 patients better if the number was spread out.

Imagine a graph with a sharply rising line showing the increase of COVID-19 cases. By "flattening the curve" of this line, we would avoid overtaxing our hospitals. That's what our country is urgently trying to do.

PREVENTION IS KEY

The best way to avoid getting COVID-19 is to wash your hands with soap and water often – and don't touch your face.

A good hand wash takes at least 20 seconds, enough time to sing "Happy Birthday" twice. Scrub your palms, backs, between the fingers, the finger tips, and the thumbs. Using soap is best, but alcohol-based hand sanitizer works too.

The other way to slow the virus's spread? Get serious about social distancing. Stay two metres away from everyone except members of your household. That's about two arm lengths – further than the droplets from someone's

A HISTORY OF INFECTIOUS DISEASES

Nothing has killed more human beings than infectious disease. Only the last century has changed that, thanks to sanitation, along with medical advances like vaccines and antibiotics.

For example, the plague of Justinian struck in the 6th century and killed as many as 50 million people – about half the global population at the time. The Black Death of the 14th century may have killed up to 200 million people. Smallpox is thought to have killed as many as 300 million people in the 20th Century alone. When European colonists introduced smallpox and other infectious diseases to North America, Many indigenous populations were **decimated**.

In 1918, some 50 to 100 million people died in the so-called Spanish Flu pandemic. It infected one in every three people on the planet.

COVID-19 reminds us that infectious diseases haven't vanished. We had outbreaks of polio in the 1950s. Severe acute respiratory syndrome (SARS) in 2003. HIV (human immunodeficiency virus) is still **prevalent**. It has killed about 32 million people and infected 75 million.

Why are we seeing these new infectious diseases? For one, over the past 50 years, the global population has doubled. This means there are more human beings to get infected and in turn to infect others. We also have more livestock now, and viruses can leap from those animals to us. And we have a global economy, which enables new infectious diseases to spread around the world at the speed of a jet plane.

cough will travel. And stay home as much as possible.

As well, anyone with COVID-19 symptoms should self-isolate for two weeks. So should those who have come into contact with an infected person, or who have recently returned to Canada.

NO TIME TO REST

Meanwhile, scientists are hard at work. They are testing other anti-viral drugs to see if they can be used on COVID-19. They are injecting the sick with

blood plasma from recovered patients to see if it will boost their immunity. And dozens of companies are racing to create a vaccine.

Still, a vaccine is probably 18 months and a half away, so we must do all we can to stay healthy. The more people who get the virus, the more it will be passed on.

"If we act now... things will be better tomorrow," says Prime Minister Justin Trudeau. ★

DEFINITIONS

DECIMATE: to kill or destroy in very large numbers

PREVALENT: very common



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ON THE LINES

Answer the following in complete sentences:

1. Explain what a **virus** is.

2. Explain how a virus usually spreads from person to person.

3. How infectious is COVID-19? How long is the average incubation period for this coronavirus?

4. Can a virus survive by itself? Explain.

5. How does COVID-19 attack a human body? How does a person's immune system respond?

6. What percentage of people infected with COVID-19 experience mild symptoms?

7. Since no vaccine is available yet, how do health authorities plan to fight the pandemic?

8. List the three strategies health authorities are asking people to do to help 'flatten the curve'.



COVID-19 BACKGROUNDER

– WHAT DOES THE SCIENCE SAY?

Directions: Respond to the infographic below. What information conveyed in the infographic is new to you? What is interesting to you? What seems to be especially significant? Why? Overall, how does the information in this infographic enhance your understanding of how to prevent catching or spreading COVID-19? Explain.

How soap annihilates a virus

Viruses are a package of nucleic acid bundled inside a collection of lipids and proteins which can include a fat-based viral envelope – soap can destroy a virus from your hands before it can lead to infection

◀ Infection: Studies show that people on average touch their faces 23 times per hour, including 10 contacts with eyes, nose or mouth – infection points of coronavirus

Sars-CoV-2 virus
Protein spikes
Virus relies on spike to enter human cell and replicate

Soap molecule:
Can mix with both water and oils and fatty acids (lipids)

- Hydrophilic polar head binds with water
- Hydrophobic tail binds with grease and lipids

Virus genome
Protective lipid envelope

Destruction of virus takes at least 20 seconds

Hand sanitizers:
Vigorous hand-clean with alcohol-based sanitiser with alcohol concentration of at least 60% is good alternative

...breaking down fragile envelope. Viral particles are washed away by water

Soap molecules in water bind to lipid envelope...

Hand Sanitizer
Active ingredient
Ethyl alcohol 60%

Sources: American Journal of Infection Control, RNZ Picture: Getty Images © GRAPHIC NEWS



COVID-19 BACKGROUNDER

– WHAT DOES THE SCIENCE SAY?

Directions: Respond to the infographic below. What information conveyed in the infographic is new to you? What is interesting to you? What seems to be especially significant? Why? Overall, how does the information in this infographic enhance your understand the importance of ventilators in treating patients with COVID-19? Explain.

Global race to make ventilators

Inventors, academics, carmakers and aerospace firms are rushing to build hundreds of thousands of ventilators to help save the lives of people with Coronavirus-related breathing difficulties

MECHANICAL VENTILATOR

Ventilator unit: Pushes air into lungs, replicating normal breathing when disease causes lungs to fail. Patient must be heavily sedated

Humidifier: Matches air to body temperature and adds moisture

Oxygen flow to patient

Carbon dioxide flow from patient

Tube inserted into windpipe

Medication relaxes respiratory muscles so breathing can be fully regulated by machine

NON-INVASIVE VENTILATOR

Face mask covers nose and mouth

Continuous Positive Airway Pressure (CPAP) device delivers oxygen to lungs without need for ventilator

Mercedes F1 is offering engineering expertise to University College London to build up to 1,000 CPAP machines per day

Sources: AP, BBC, UCL Picture: UCL © GRAPHIC NEWS

