

Confronting COVID-19

**How the COVID-19
virus infects and kills**

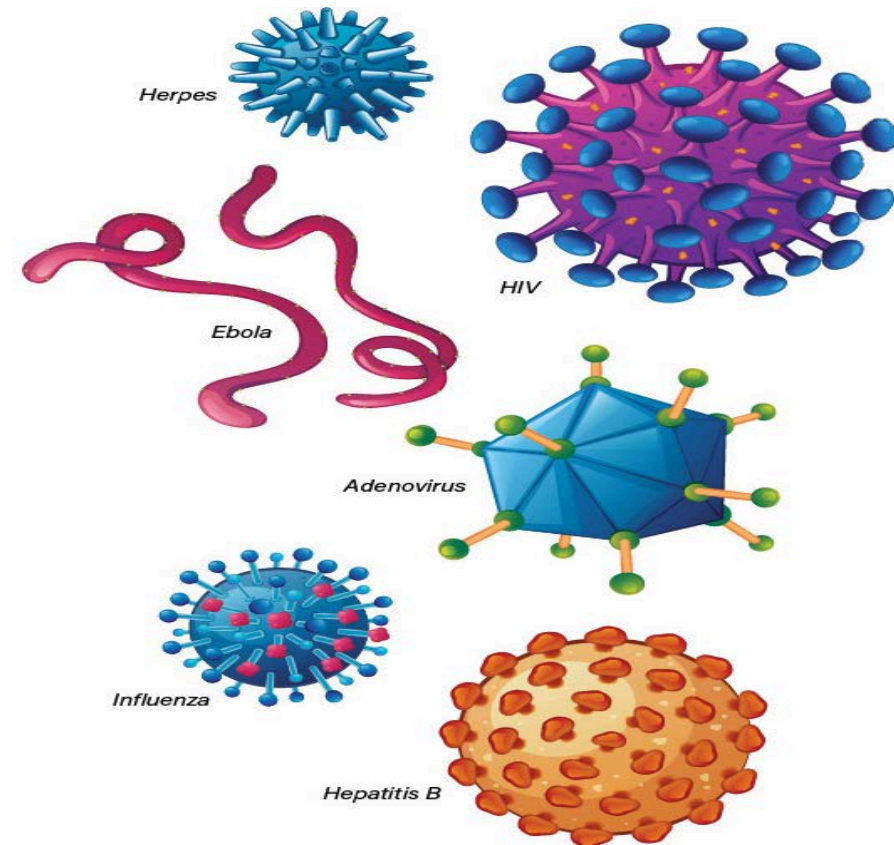
Thursday, May 28, 2020, 11:00 AM

Webinar objectives

- Physical and chemical characteristics of the COVID-19 virus
- Origins and emergence of the virus
- Routes of transmission of the virus
- COVID-19, the disease caused by infection with the virus
- Testing for the virus and for antibodies
- Vaccination against future infection
- Making your workplace safer from COVID-19.

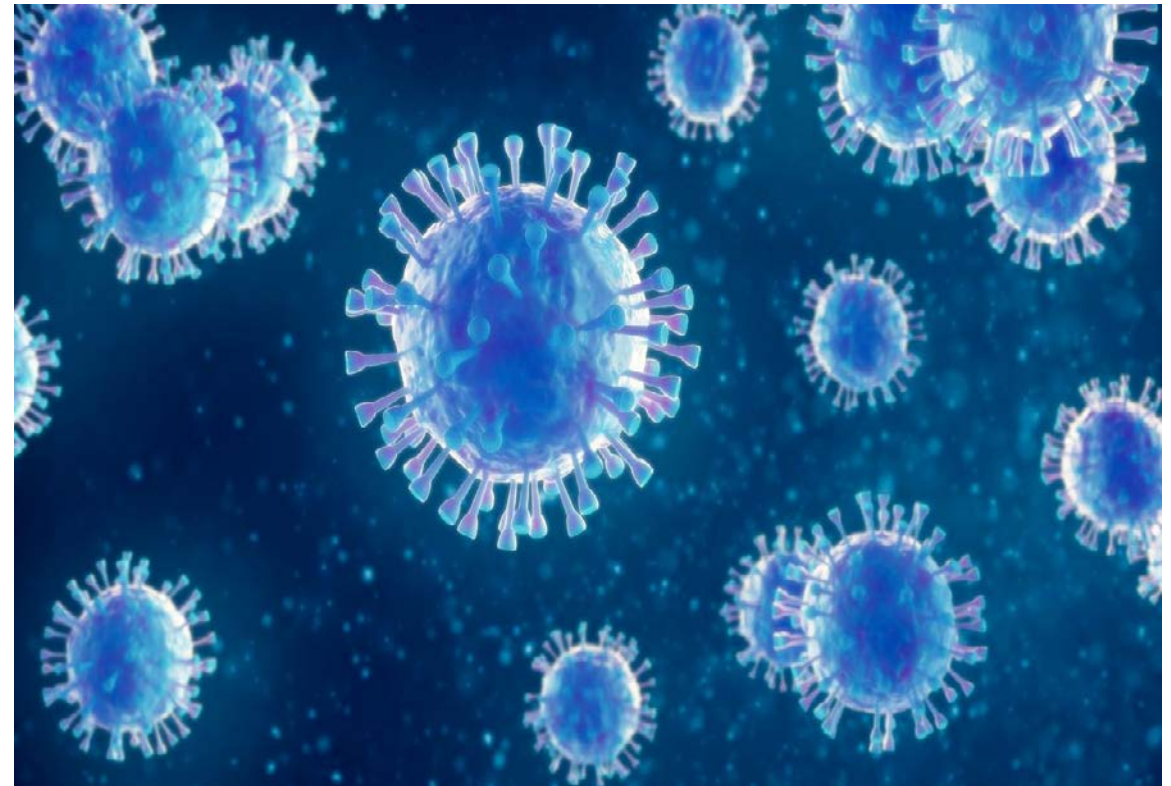
Viruses

- Viruses are biological hazards
- Require a living human cell to reproduce
- Many comprised of genetic material called RNA (ribonucleic acid) encased in an envelope
- Use RNA to replicate.



Coronaviruses

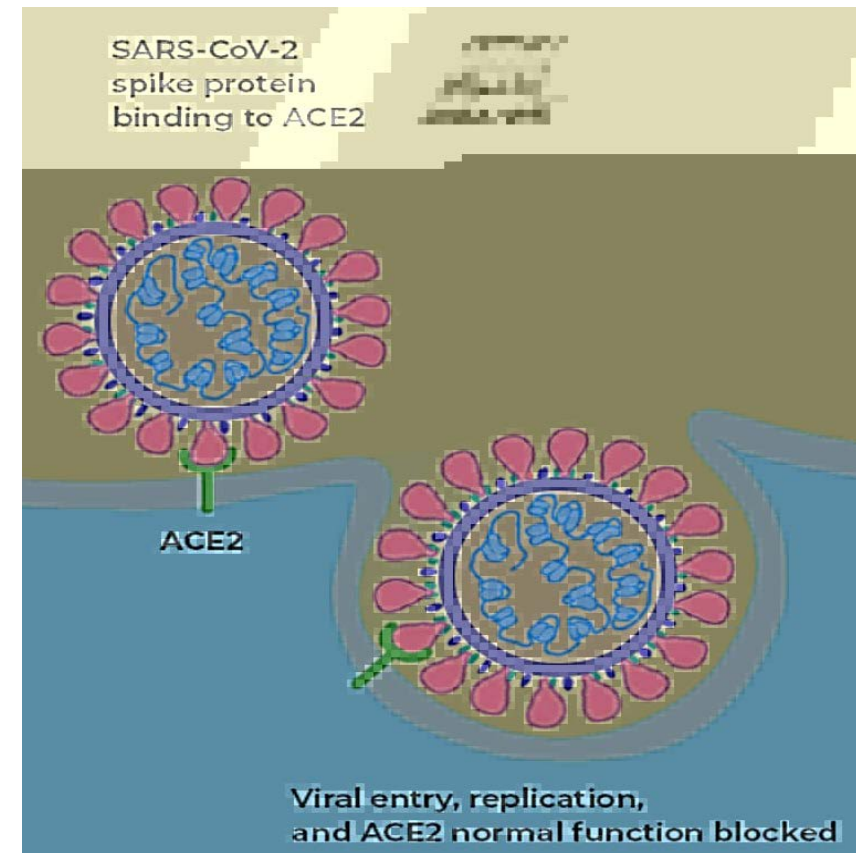
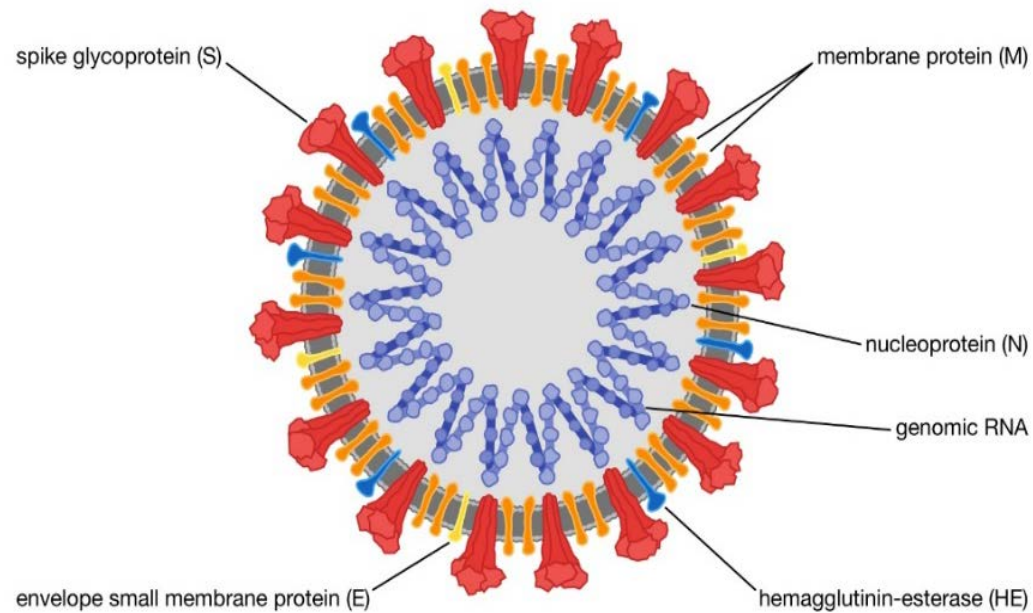
- A large group of viruses from family *Coronaviridae*
- One of largest viruses that replicates using RNA
- Round with club shaped spikes projecting from surface
- Known to cause respiratory infections from common cold to MERS and SARS.



Characteristics of the virus

- Spherical shape between 60 and 140 nanometres in diameter
- Spikes between 9 and 12 nanometres protrude from surface
- Spikes comprised of four different proteins
- Protein on S spike of particular importance
- S protein binds to ACE2 on human cells to gain entry and infect.

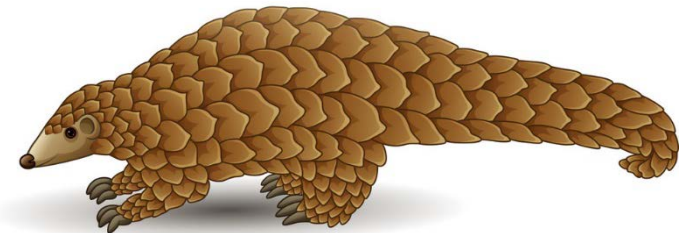
How the virus infects a cell



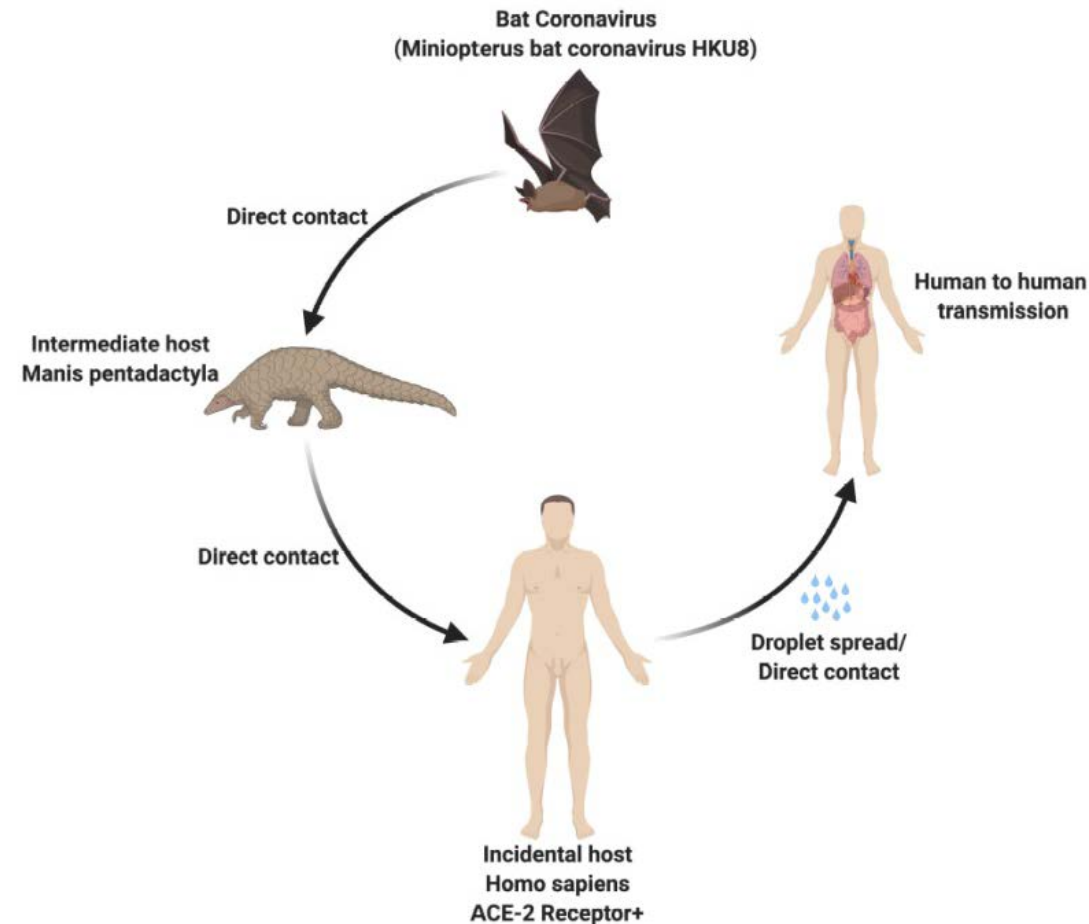


COVID-19 origins

- A virus that normally exists in animals but can infect and cause disease in humans (zoonotic)
- Exact origins are unknown but two possibilities:
 - virus jumped from animal to human directly with ability to transmit from human to human
 - virus jumped from animal to human and acquired features necessary to transmit from human to human.

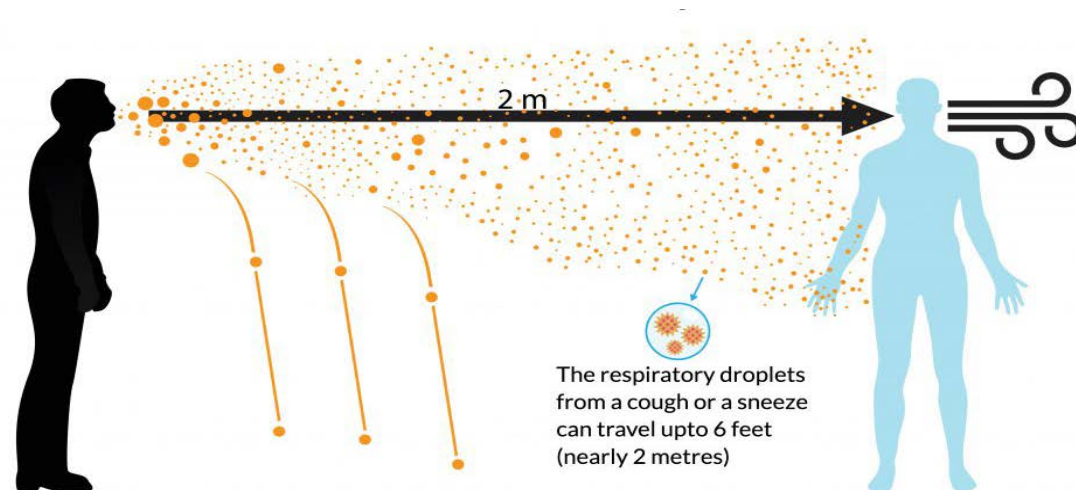


Original and intermediate hosts



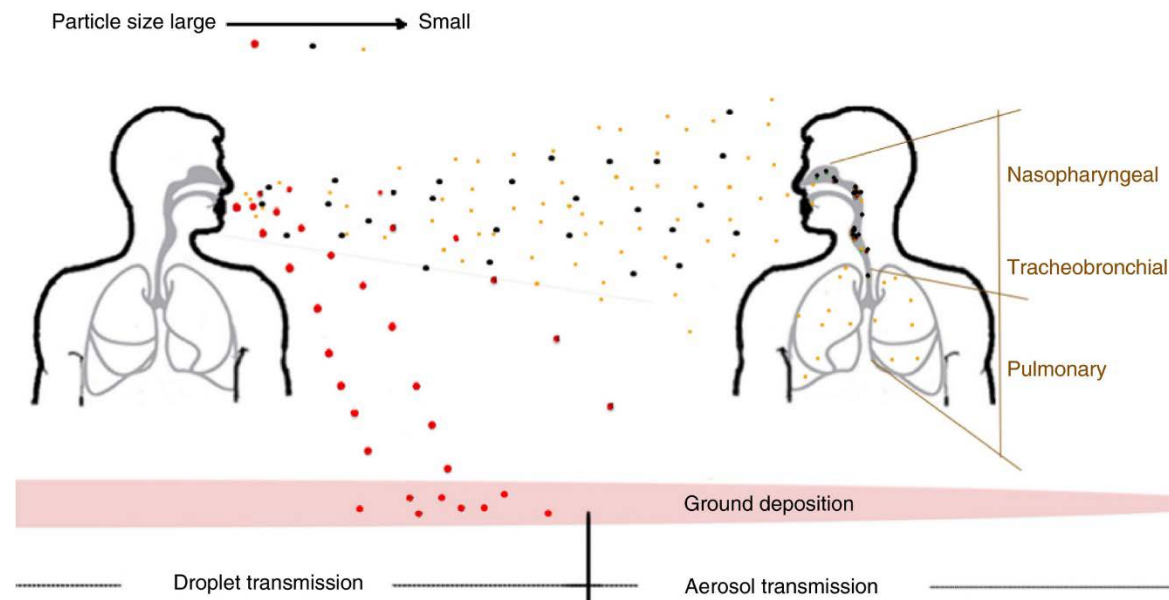
Transmission by respiratory droplets

- Respiratory droplets expelled by infected individual (coughing or sneezing)
- Most droplets are large (> 5 microns) and fall rapidly to ground
- Droplets smaller than 5 microns (droplet nuclei) may remain suspended in air



Transmission by aerosol

- Aerosols and small droplet nuclei also generated during medical procedures
- Droplets small enough to be inhaled deep into the lung



Transmission by contact

- Respiratory droplets that fall to a surface can be viable for days
- Touching contaminated surface and then eyes, nose or mouth



Asymptomatic and pre-symptomatic spread

- The Centres for Disease Control in Atlanta, Georgia estimates up to 25 percent of transmission may be from asymptomatic and pre-symptomatic individuals.
- Asymptomatic
 - infected with virus but not showing symptoms
- Pre-symptomatic
 - infected with and shedding virus but not showing symptoms

How infectious is the virus?

- Basic reproduction number (or R_0) is an estimate of how easily a virus spreads
- R_0 for SARS-CoV-2 is estimated at 2.2
- Means one person on average can infect 2.2 others
- By comparison, the R_0 of influenza is 1.3

Super-spreader events

- Large gatherings where a few transmit virus to many causing a cluster of disease
- Transmission risk higher when:
 - activity is indoors as opposed to outdoors
 - workplace temperatures are colder
 - work is noisy requiring workers to shout
 - work is strenuous causing heavy, deep or rapid breathing.

Situations with high risk of transmission

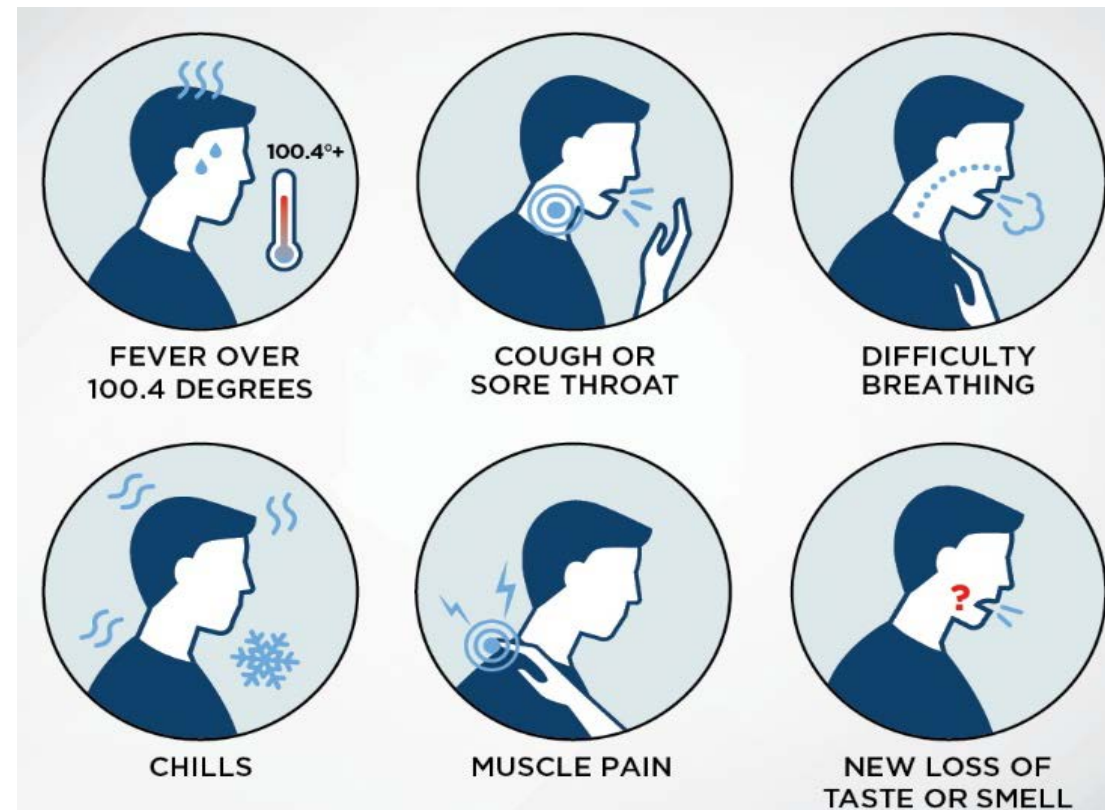


COVID-19 the disease

- Infection with SARS-CoV-2 causes COVID-19
- Time between exposure and disease ranges from 1-14 days
- Typical onset of symptoms between 5 and 6 days.



Symptoms of COVID-19



Recovery from COVID-19

- 80 percent of those infected recover at home over two to four weeks
- 1 in 5 become seriously ill and require hospitalization
- Those older and with underlying health conditions at greater risk.



Testing for the virus

- Viral test - to confirm presence of virus (or infection with disease)



Testing for antibodies

- Antibody test – to determine presence of antibodies (or immunity against re-infection)



COVID-19 vaccination?

- Vaccination can effectively help stop the spread of infection
- Several different vaccine types using virus or viral parts under study
- How long until we see one for COVID-19? Earliest estimates 12 to 18 months, likely longer though.



Reopening workplaces and returning to work

- Complete a hazard assessment for the virus
- Assessment done in consultation with worker health and safety representatives or joint health and safety committee
- Results of assessment will determine control measures



Hierarchy of controls

- At the source
 - Isolation (of infected), working remotely
- Along the path
 - MERV filters, increased ventilation, decreased recirculation, physical distancing, barriers, sanitation and disinfection of surfaces
- At the worker
 - personal protective equipment, hand hygiene.

WHSC training

Now offering virtual classroom, including:

- Hazards of COVID-19 (3 hour)
- GHS-WHMIS (2 hour)
- JHSC Certification I (3 days)
- JHSC Certification II General Stream (2 days)
- JHSC Refresher (1 day)

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