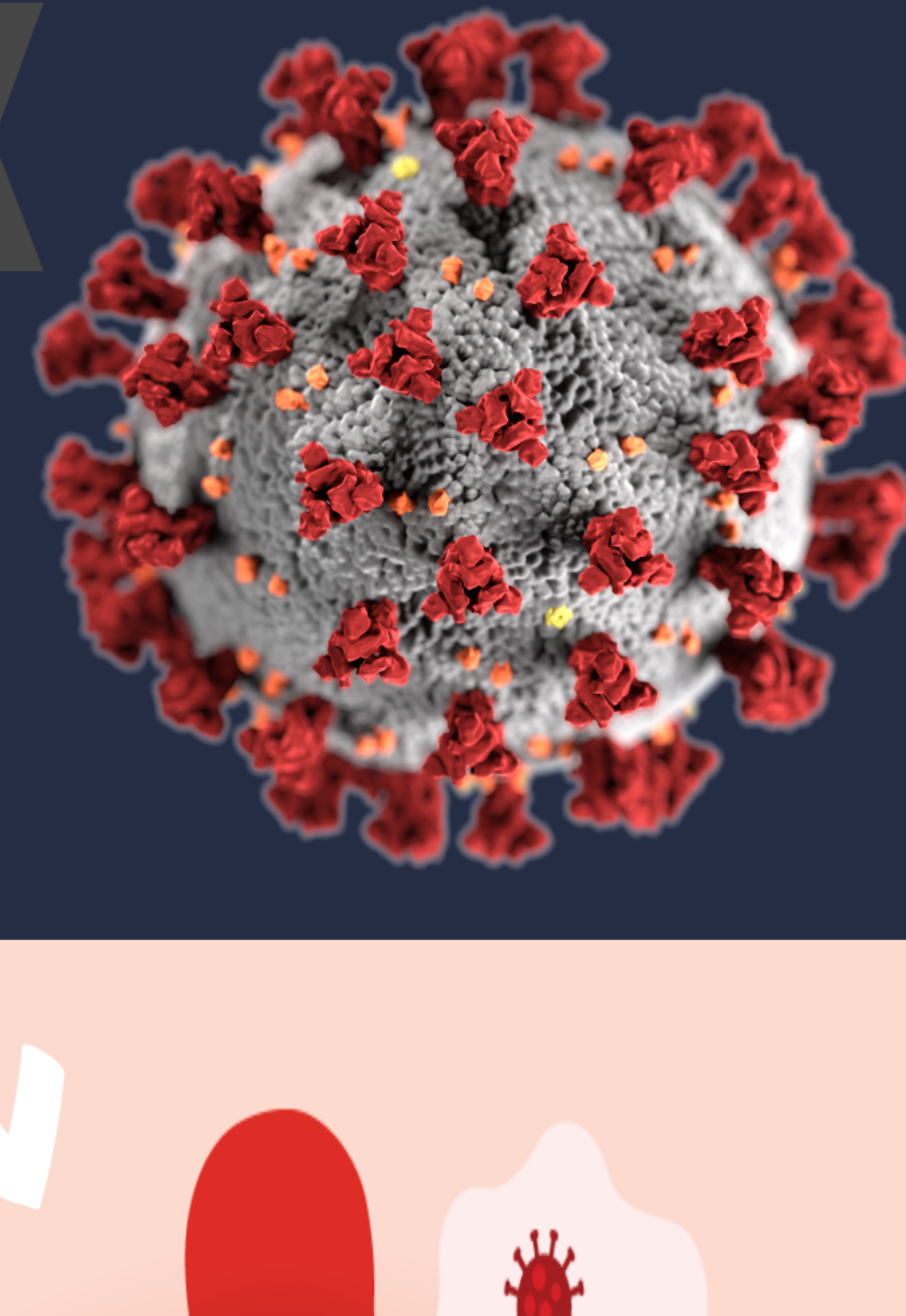


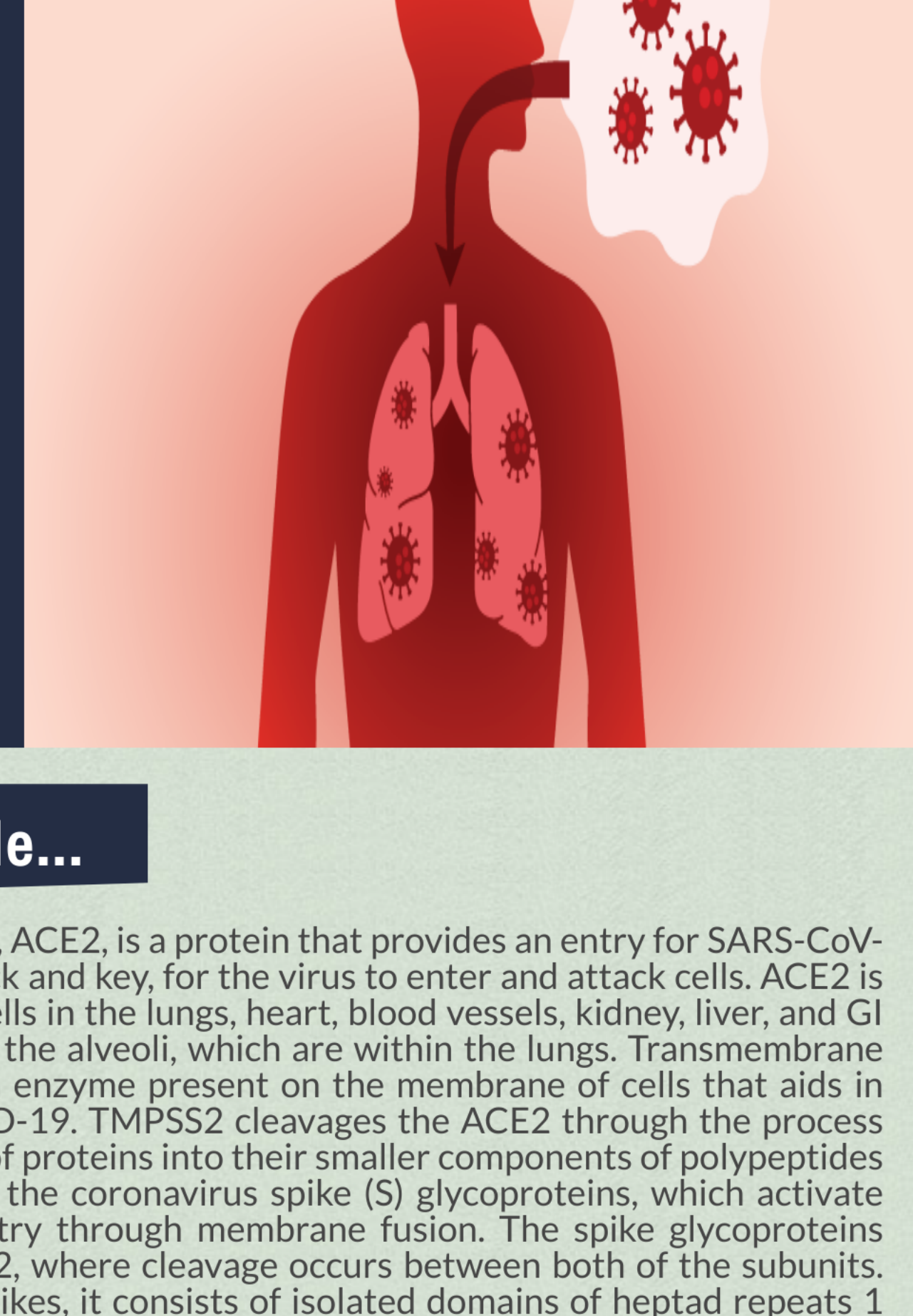
# STAYING SAFE & PREVENTING THE SPREAD

Understanding how Covid-19 spreads and how to keep yourself and others safe.



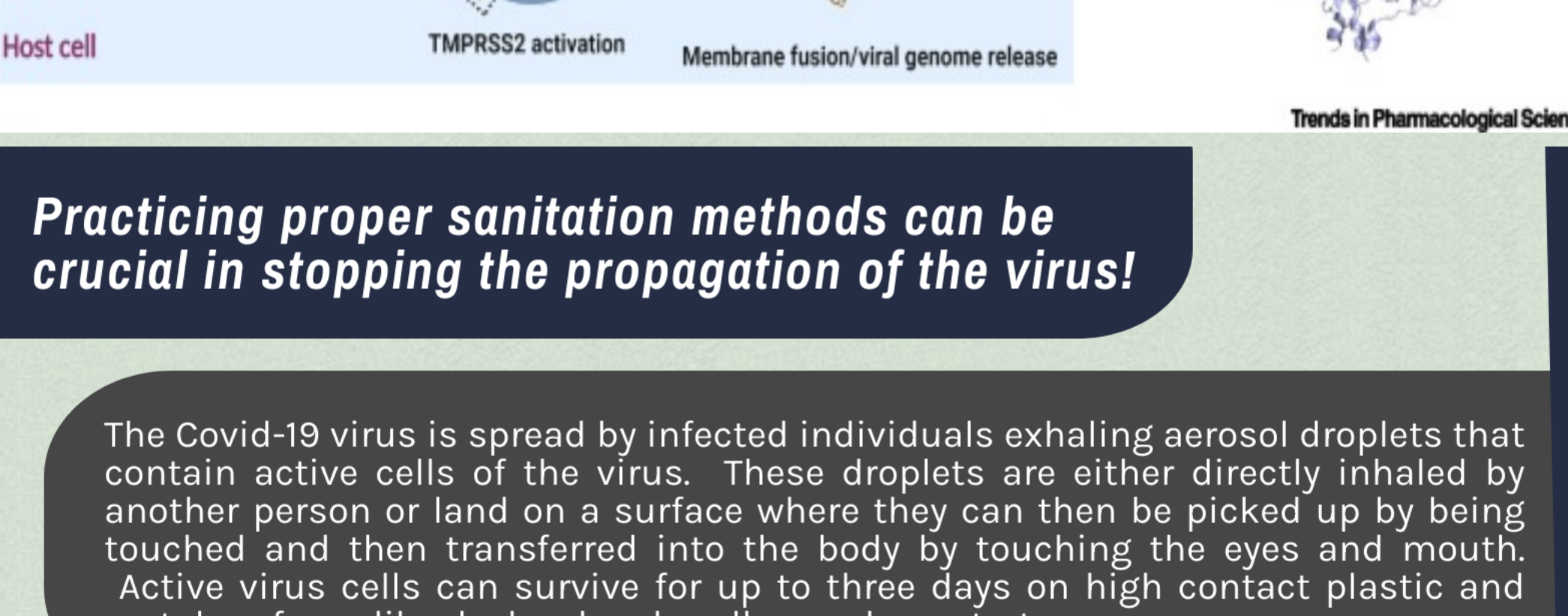
## How does it Enter my Body?

The lungs are the primary site of injury for SARS-CoV-2. It reaches the lungs through the airway of the nose and mouth. The upper and lower airways of the body are involved early in SARS-CoV-2 infection compared to other parts and systems of the body. Wearing a mask can reduce the chances of COVID-19 entering the airway of the nose and mouth.



## Looking on the Inside...

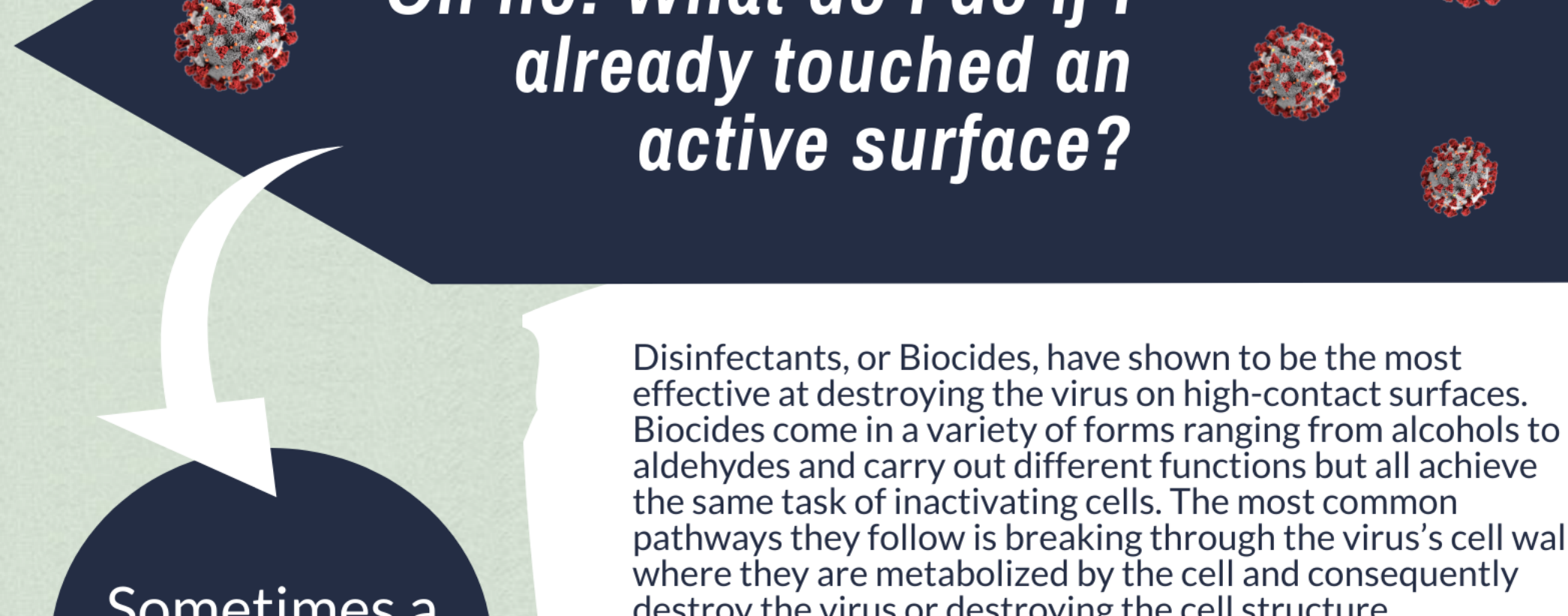
Angiotensin-converting enzyme 2, ACE2, is a protein that provides an entry for SARS-CoV-2 by acting like a receptor, or a lock and key, for the virus to enter and attack cells. ACE2 is present on the surface of many cells in the lungs, heart, blood vessels, kidney, liver, and GI tract. It is also present on cells in the alveoli, which are within the lungs. Transmembrane protease serine 2 (TMPSS2) is an enzyme present on the membrane of cells that aids in facilitating the infection of COVID-19. TMPSS2 cleaves the ACE2 through the process of proteolysis, or the breakdown of proteins into their smaller components of polypeptides or amino acids. It then cleaves the coronavirus spike (S) glycoproteins, which activate the glycoprotein for host cell entry through membrane fusion. The spike glycoproteins consist of two subunits, S1 and S2, where cleavage occurs between both of the subunits. After the virus is cleaved at its spikes, it consists of isolated domains of heptad repeats 1 and 2 (HR1 and HR2). These peptides then pull the virus into the cell membrane, enveloping it and engulfing it into the cell.



## Practicing proper sanitation methods can be crucial in stopping the propagation of the virus!

The Covid-19 virus is spread by infected individuals exhaling aerosol droplets that contain active cells of the virus. These droplets are either directly inhaled by another person or land on a surface where they can then be picked up by being touched and then transferred into the body by touching the eyes and mouth. Active virus cells can survive for up to three days on high contact plastic and metal surfaces like desks, door handles, and countertops.

## Virus Transmission:



## Oh no! What do I do if I already touched an active surface?

Sometimes a Picture is Better!

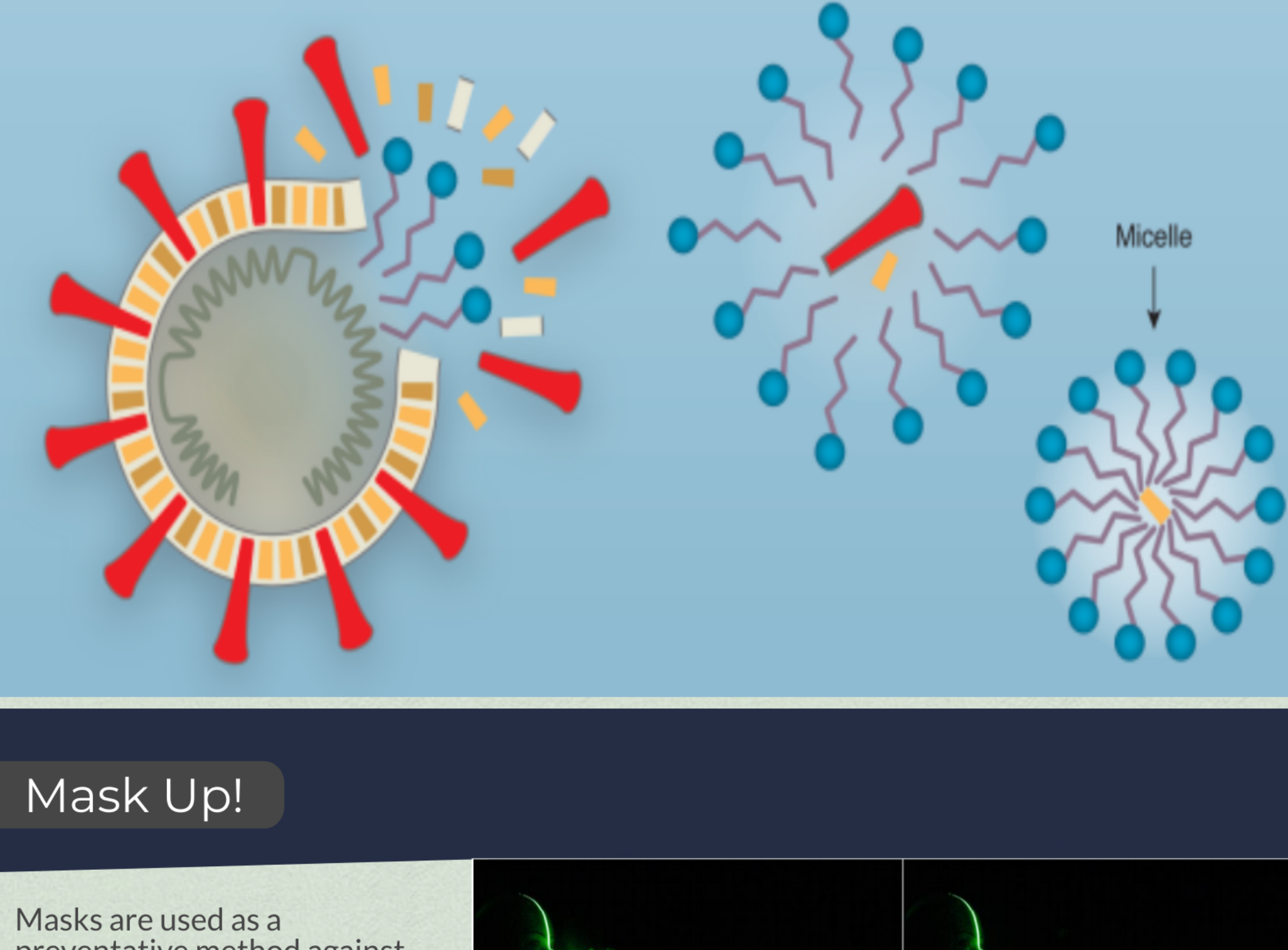
Disinfectants, or Biocides, have shown to be the most effective at destroying the virus on high-contact surfaces. Biocides come in a variety of forms ranging from alcohols to aldehydes and carry out different functions but all achieve the same task of inactivating cells. The most common pathways they follow is breaking through the virus's cell wall where they are metabolized by the cell and consequently destroy the virus or destroying the cell structure entirely. Other measures that can be taken are using hand sanitizers and washing your own hands. Wetting your hands and washing hands with soap and scrubbing for 20 seconds not only destroys the virus cells but removes the cells from your hands. Soap was found to destroy the cell by tearing apart the viral envelope when the two come in contact. If you can't wash your hands, a good runner-up is using hand sanitizer that is at least 60% alcohol. The mechanism by which alcohols in hand sanitizers destroy viruses is still being studied but believed to be either by disruption of the cell membrane or infiltration of alcohol into the cell which causes protein degradation, which results in cell death.

## How Soap Works

Washing with soap and water is an effective way to destroy and dislodge many microbes, including the new coronavirus.

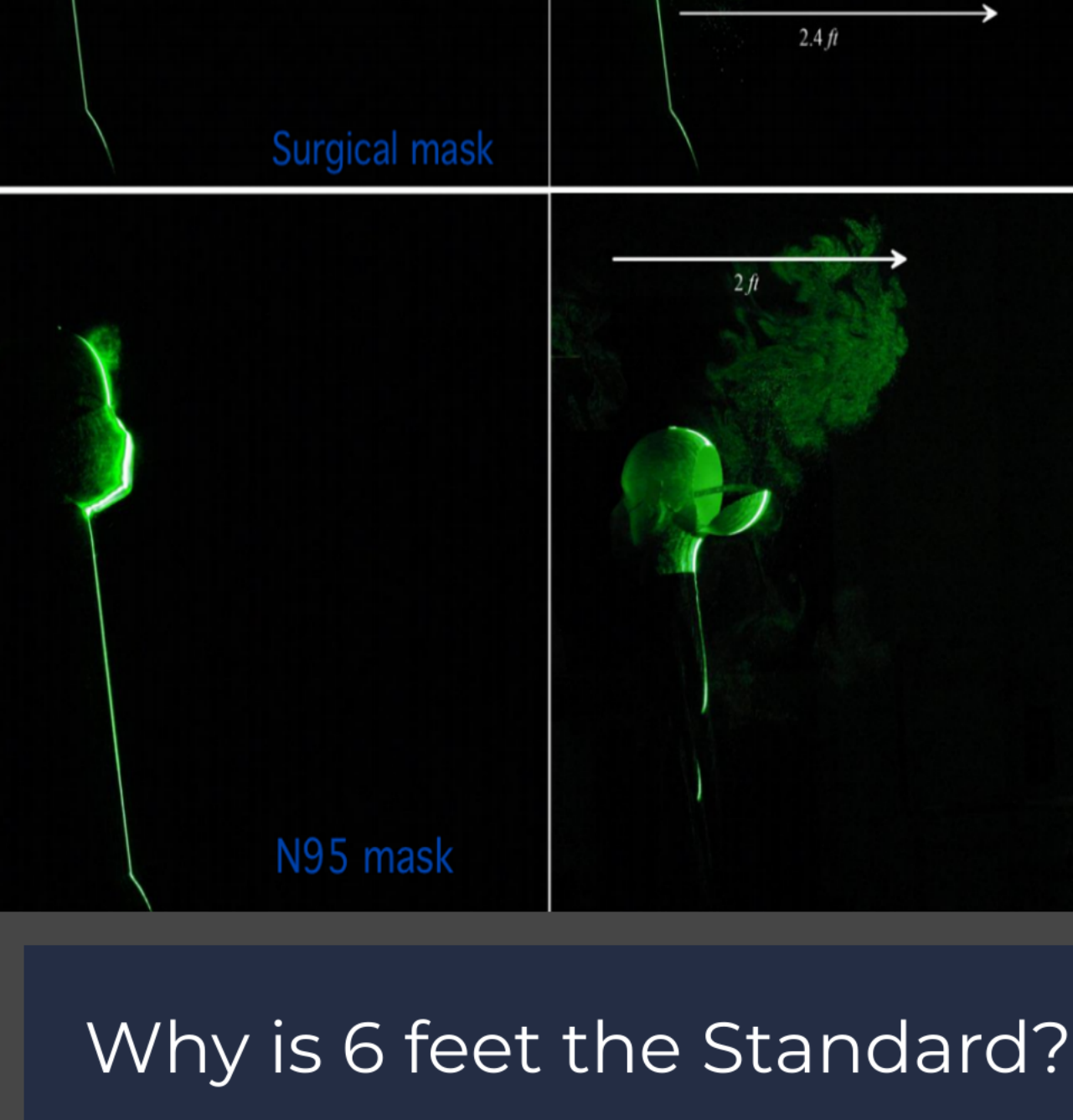
**THE CORONAVIRUS** has a membrane of oily lipid molecules, which is studded with proteins that help the virus infect cells.

**SOAP MOLECULES** have a hybrid structure, with a head that bonds to water and a tail that avoids it.



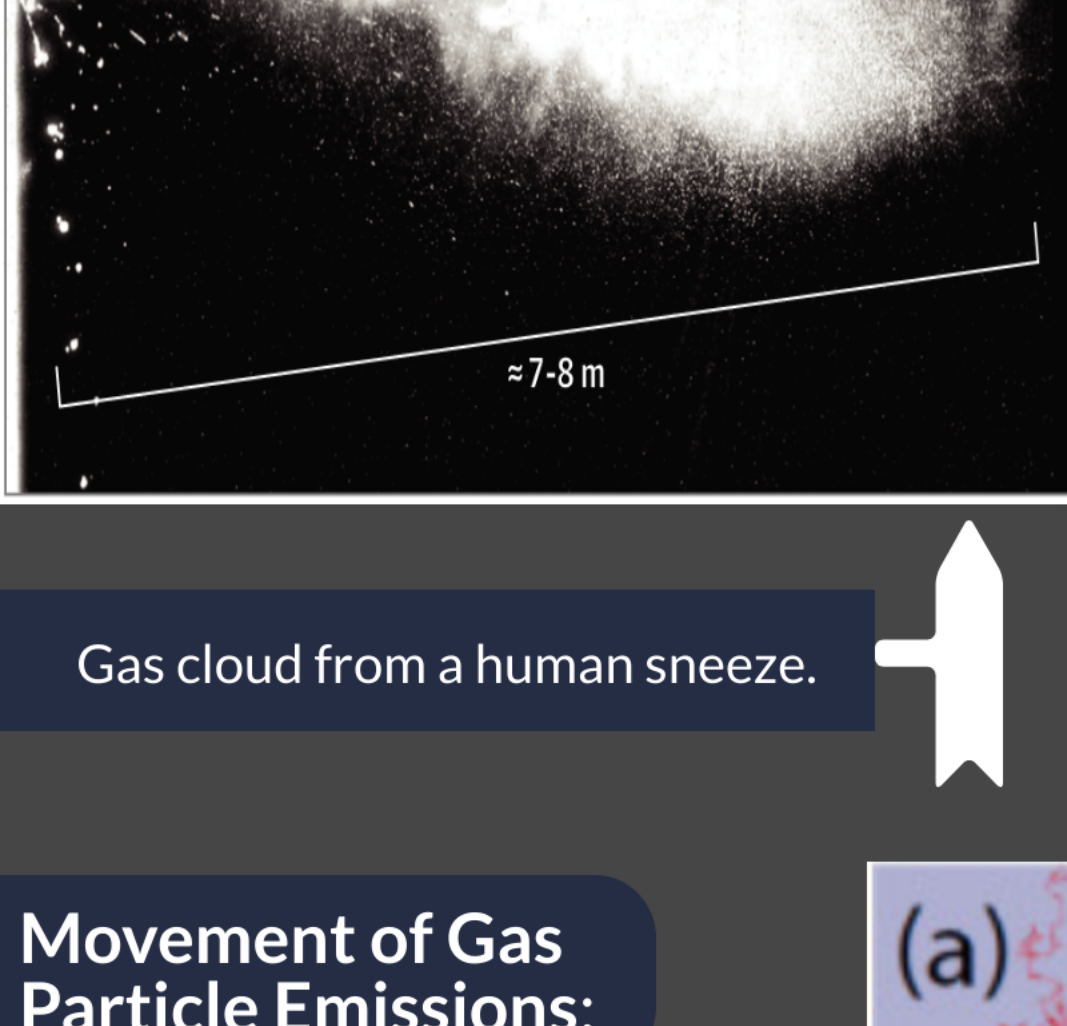
## Mask Up!

Masks are used as a preventative method against the transmission of infectious diseases. They control the spread of infection and protect the wearer. For a mask to be effective it needs to have the ability to withstand repeated emission of viral or infectious particles from sneezing or coughing. Surgical and N95 masks are examples of masks with high efficiency. Based on the type of mask an individual wears, they can be an effective tool against the spread SARS-CoV-2 virus.



Gas cloud emissions from a human sneeze with effective masks.

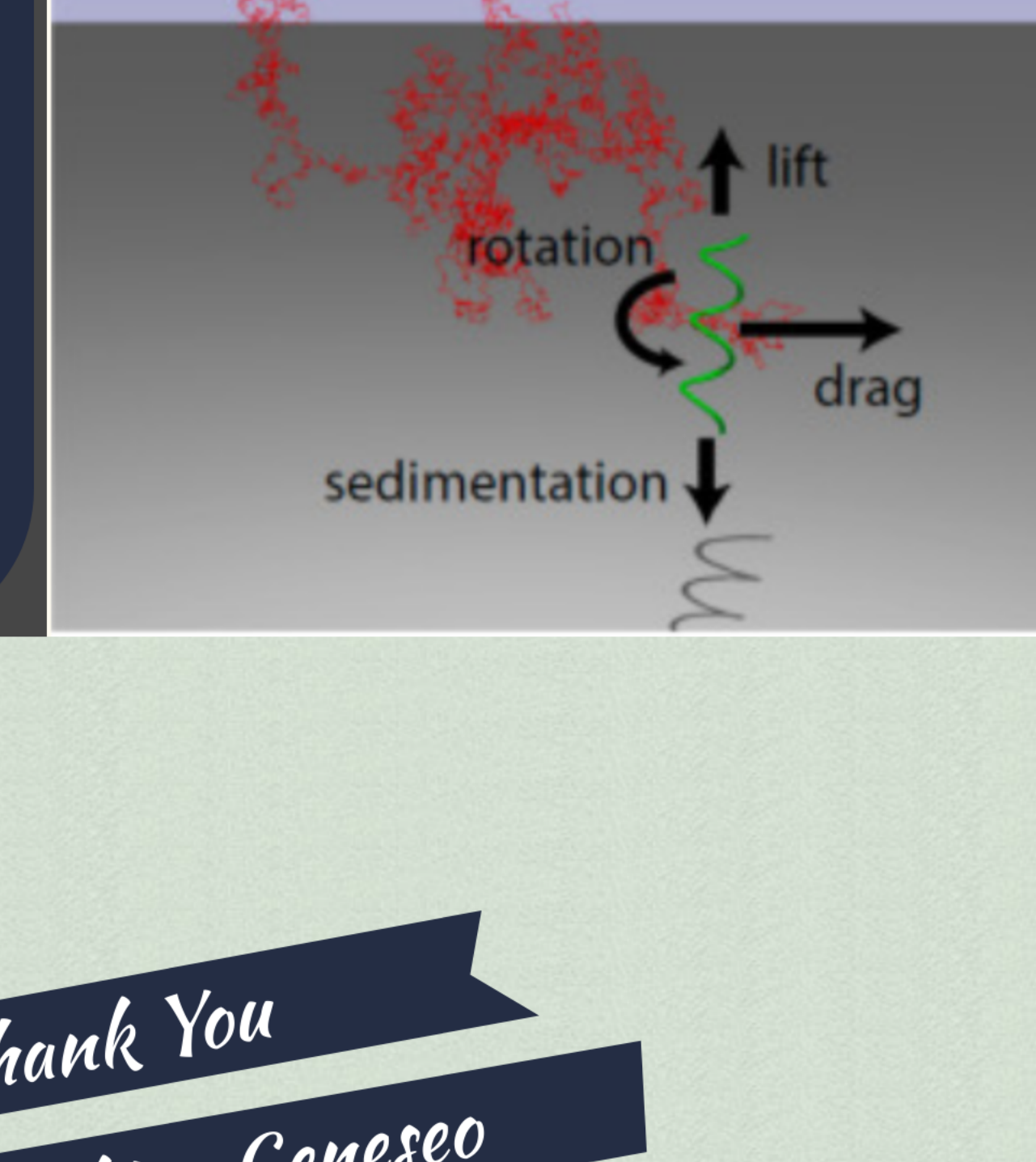
## Why is 6 feet the Standard?



Distancing 6 feet apart has become a standard guideline in preventing transmission of infectious diseases. The 2007 CDC Guide suggests that a distance of  $\leq 3$  feet is the minimum for many infectious agents but SARS-CoV-2 virus droplets could reach persons located 6 feet or more from their source. Data show that an individual can exhale at speeds up to 33 to 100 feet per second (10-30 m/s), creating a cloud of particles that can span approximately 23 to 27 feet (7-8 m).

## Movement of Gas Particles Emissions:

Gas particles are everywhere and move in ways that are hard for us to understand. Numerous forces act on gas particles which makes it difficult to calculate and predict their movement. They are exposed to Brownian, gravitational, viscous drag, and/or phoretic forces which govern the directionality, size, and speed of gas particles. Brownian motion is the random movement of particles due to collisions and interactions with other particles. During these interactions, particles experience phoretic forces where they can attach and be transported by other particles. While in motion gravity pulls particles down and drag acts in opposition to provide resistance. With all these forces to consider only approximations can be made about the movement of gas particles, therefore you can never really know where they may show up.



Thank You  
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 A Wonderful  
 Place!

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