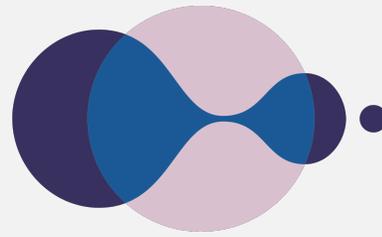


## **Integrated Health Engineers**

Wisdom from the past, Expertise for the future

MAKING MEDICALLY INFORMED BUSINESS  
DECISIONS DURING THE COVID-19  
PANDEMIC

[integratedhealthengineers.com](https://integratedhealthengineers.com)



## Integrated Health Engineers

Wisdom from the past, Expertise for the future

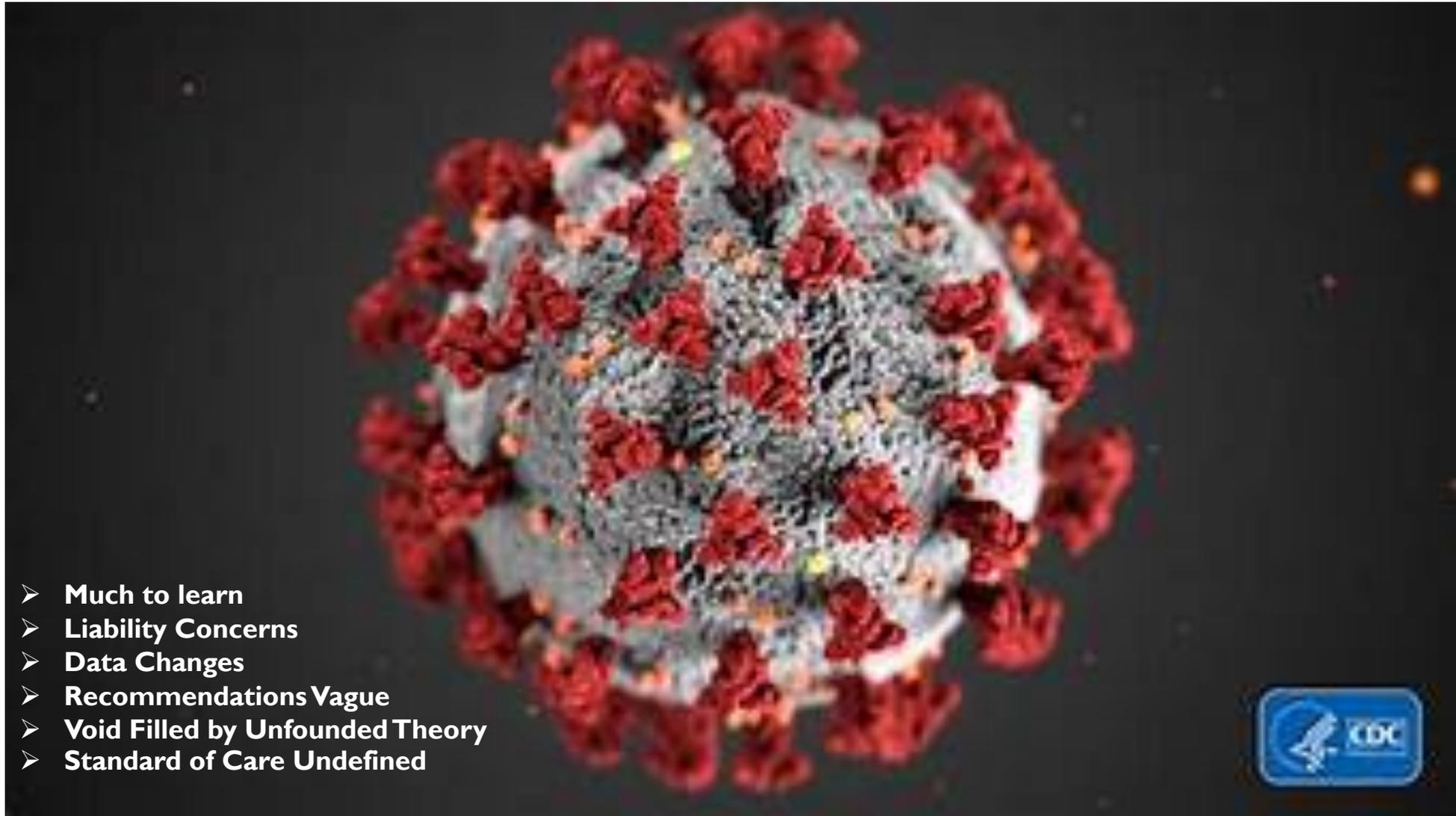
We are world-leading experts in infectious diseases, occupational health, engineering, operations management, lean processes and strategic planning.

We are your comprehensive COVID-19 business resiliency experts. We provide customized health, safety, engineering and management solutions across most industries to client-specific requirements. We do this so that you might reassure your employees, clients and suppliers that their health and safety is integral to your business ethos.

We also do this because we know that those businesses that can get open and stay open will become leaders in their respective fields as their competitors are forced to close for lack of planning or flawed execution.

## A WORD OF THANKS

- I would like to thank the Council for Dredging and Marine Construction Safety not only for the opportunity to speak with you, but for the proactive steps that you have taken to control the COVID-19 virus. Your actions are commendable and will no doubt reap business benefits for you for years to come.
- I made these slides to be medically informative but lighthearted. As a result, you may not find a great deal of detail within them, as I had intended to provide explanation as I went. Should you need any clarification or would like to speak further, feel free to reach out to me at : [ted.northrop@yahoo.com](mailto:ted.northrop@yahoo.com) or via my mobile phone at (972) 977-8715.

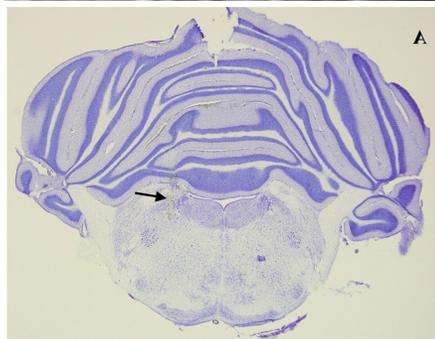


- **Much to learn**
- **Liability Concerns**
- **Data Changes**
- **Recommendations Vague**
- **Void Filled by Unfounded Theory**
- **Standard of Care Undefined**

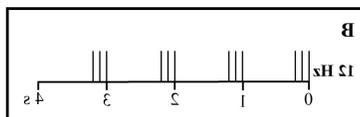
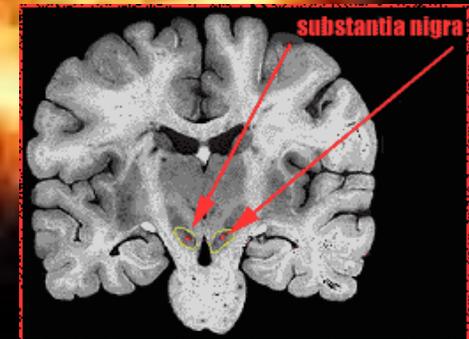


## **COVID-19: A Novel Coronavirus or We Don't Know What We Don't Know.**



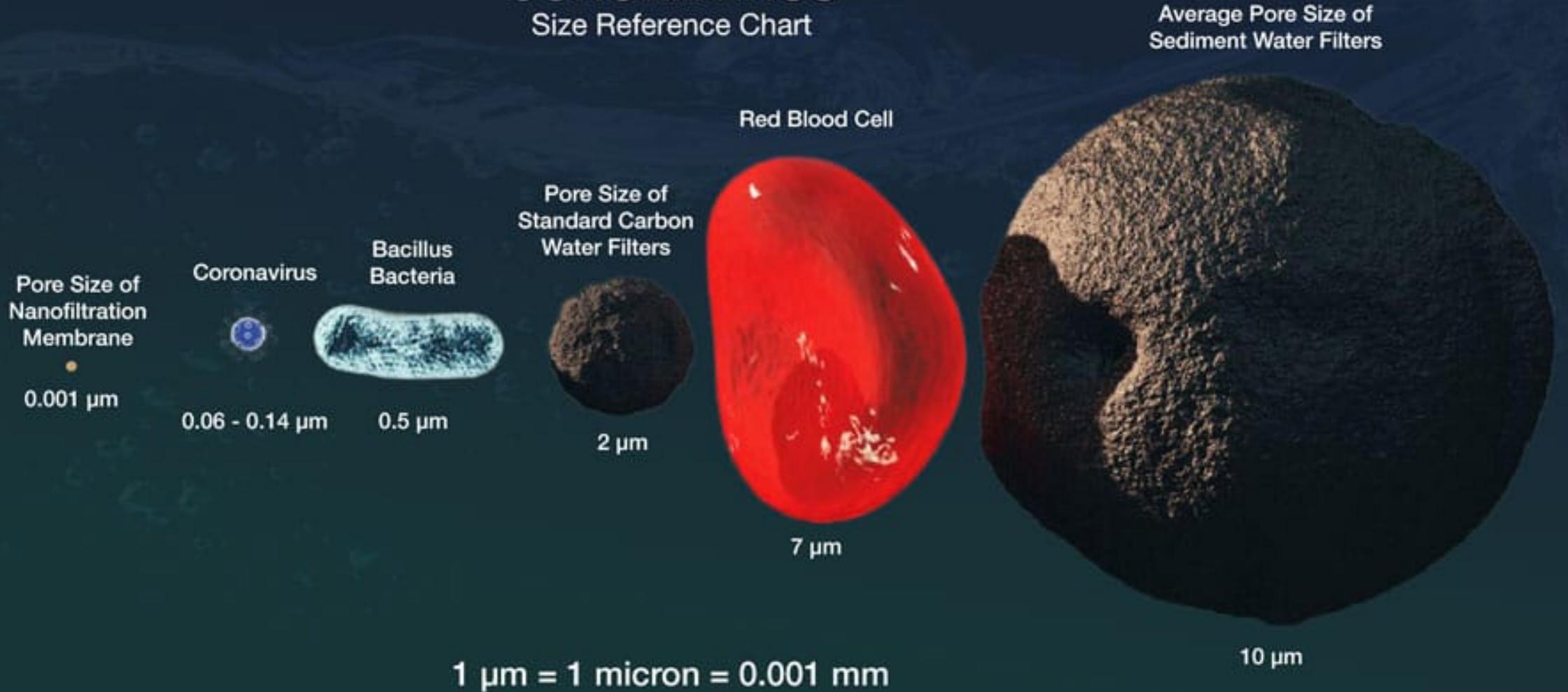


**COVID-19**  
CORONA VIRUS DISEASE 2019



# CORONAVIRUS

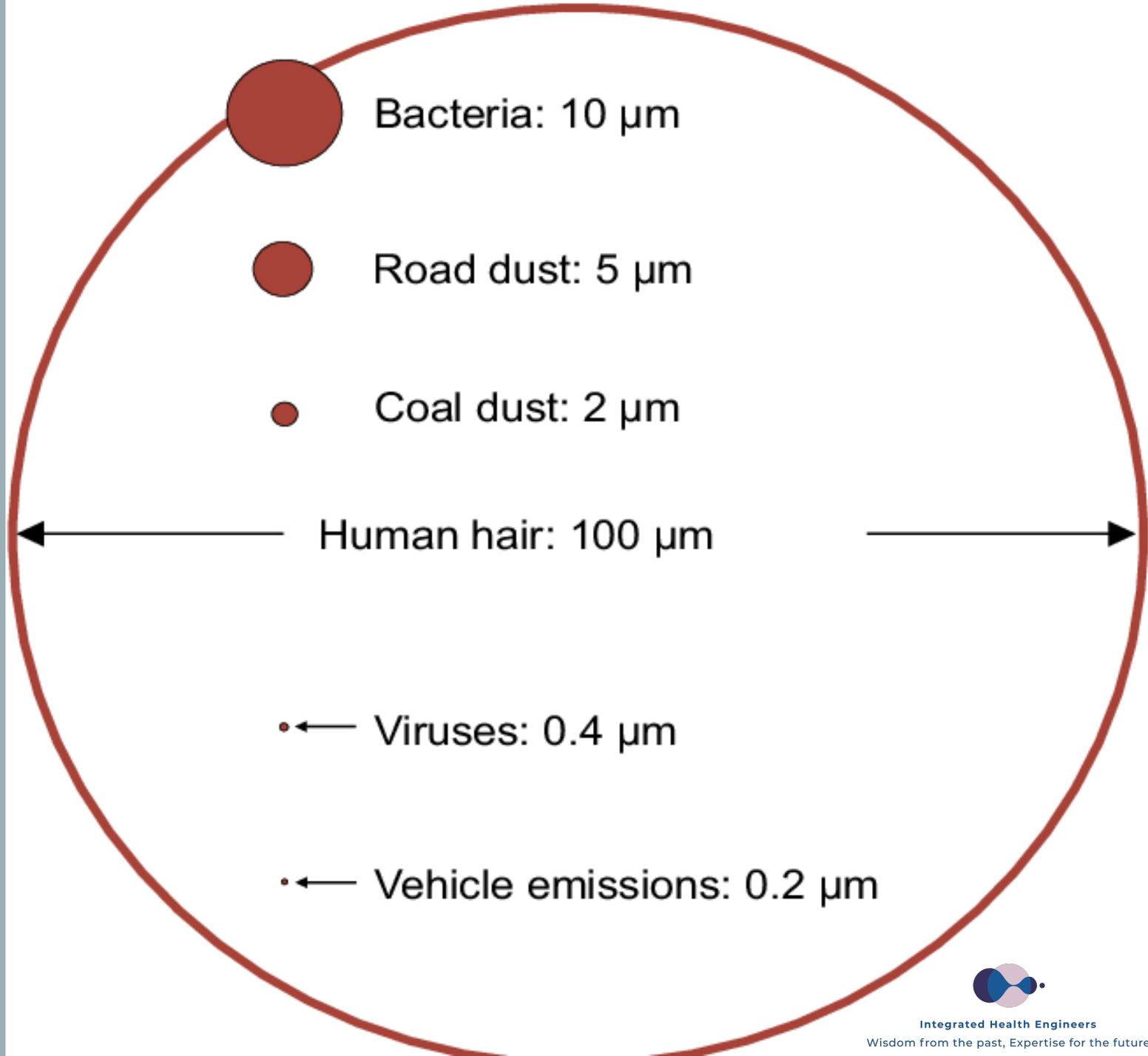
Size Reference Chart



**Pore Size N-95 Mask: 0.3 micrometers or 300 nanometers. However, Respiratory Droplets: 5 micrometers to 1000 micrometers (1 mm)**

COVID-19: 125  
NANOMETERS

POLLEN: 125  
MICROMETERS



**Respiratory Droplets or “Steam” in cold weather.**



**This is why we stay 6 feet away from one another.**



**Integrated Health Engineers**  
Wisdom from the past, Expertise for the future

- Incubation period (days from exposure to onset of illness ) @ 5 days but can range from 2-14 days
- Infectious period starts 2 days before symptoms develop. *If they develop at all.* But even if no symptoms arise **YOU ARE INFECTIOUS TO OTHERS.** *Full stop.*
- 97.5% of those who develop symptoms will do so within 11.5 days. **99% will develop symptoms within 14 days.** **Common sense must dictate return to work decision given variability in disease onset.**





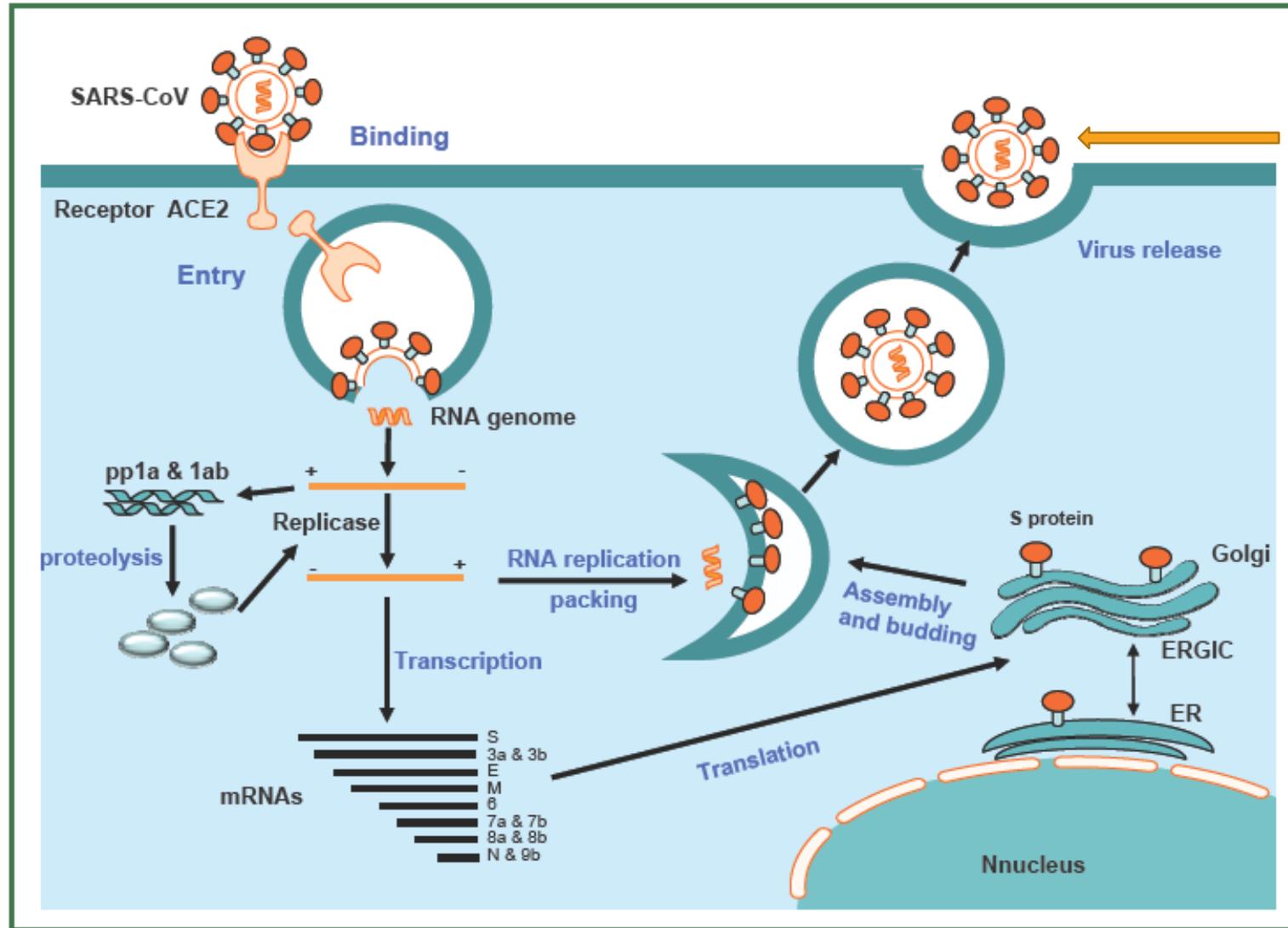
# NOT REPRODUCTION – REPLICATION OUTSIDE THE CONTROL OF THE SYSTEM

(Neo is a Virtual White Blood Cell.)



COVID-19: 30,000 Nucleotide base pairs.

Human Genome: 3.2 billion nucleotide base pairs

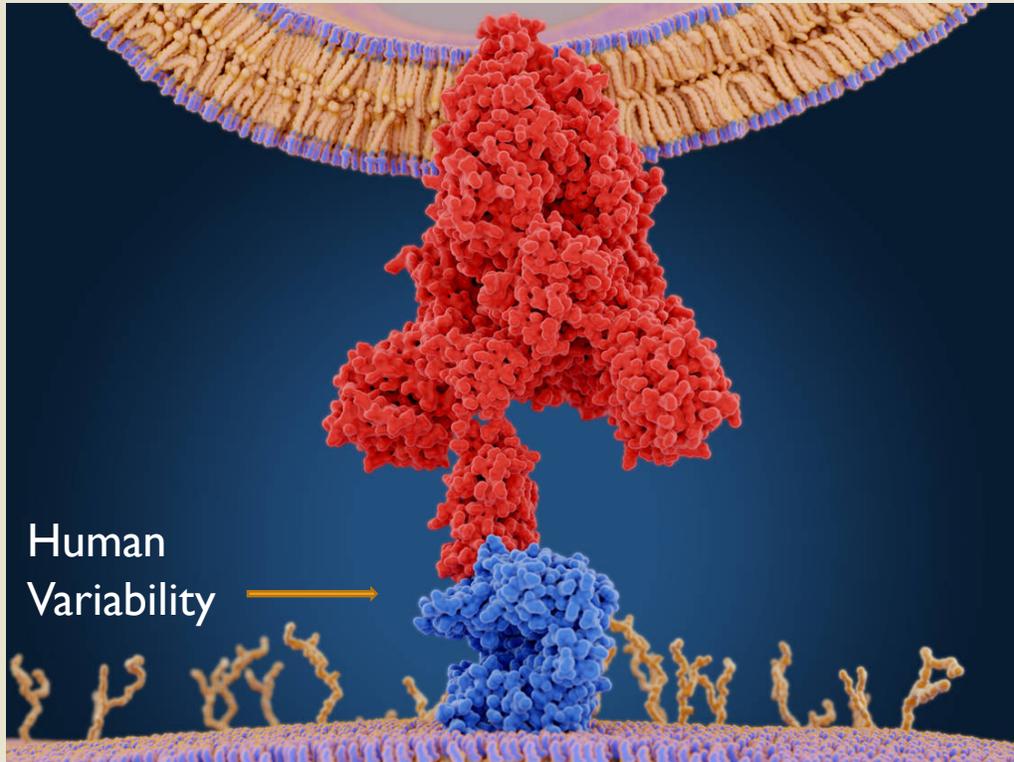


Efficiency Matters Here

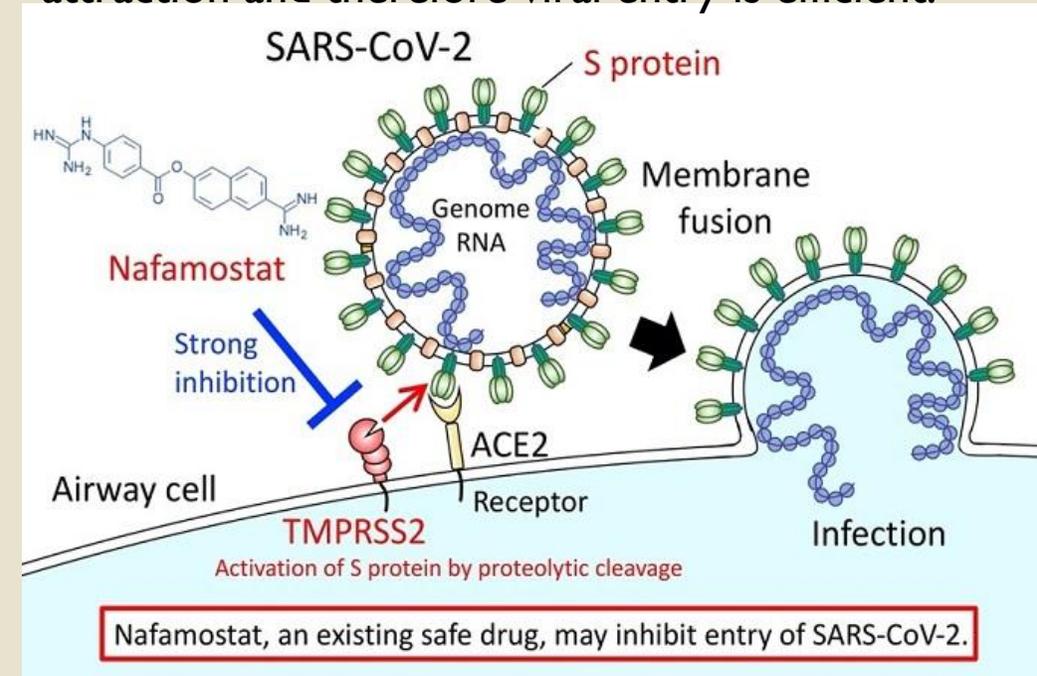
Viral RNA utilizing human enzymatic machinery – mistakes in translation (mutations) are common.

# How does COVID-19 infect us, and why are some people more susceptible (short answer: “efficiency”)?

## Magnetic Lock and Key



For humans the conformational lock and key is an unfortunately good fit with strong charge based attraction and therefore viral entry is efficient.



**Angiotensin-converting enzyme 2 (ACE2)**<sup>[5]</sup> is an [enzyme](#) attached to the [cell membranes](#) of cells in the lungs (ARDS), arteries (Thrombogenicity), heart (failure/arrhythmia), kidney, and intestines.<sup>[6][7]</sup> ACE2 lowers blood pressure by catalysing the [hydrolysis](#) of [angiotensin II](#) (a [vasoconstrictor peptide](#)) into [angiotensin \(1-7\)](#) (a [vasodilator](#)).

**Efficiency of viral entry into your cells weighed against your body’s ability to kill infected cells**

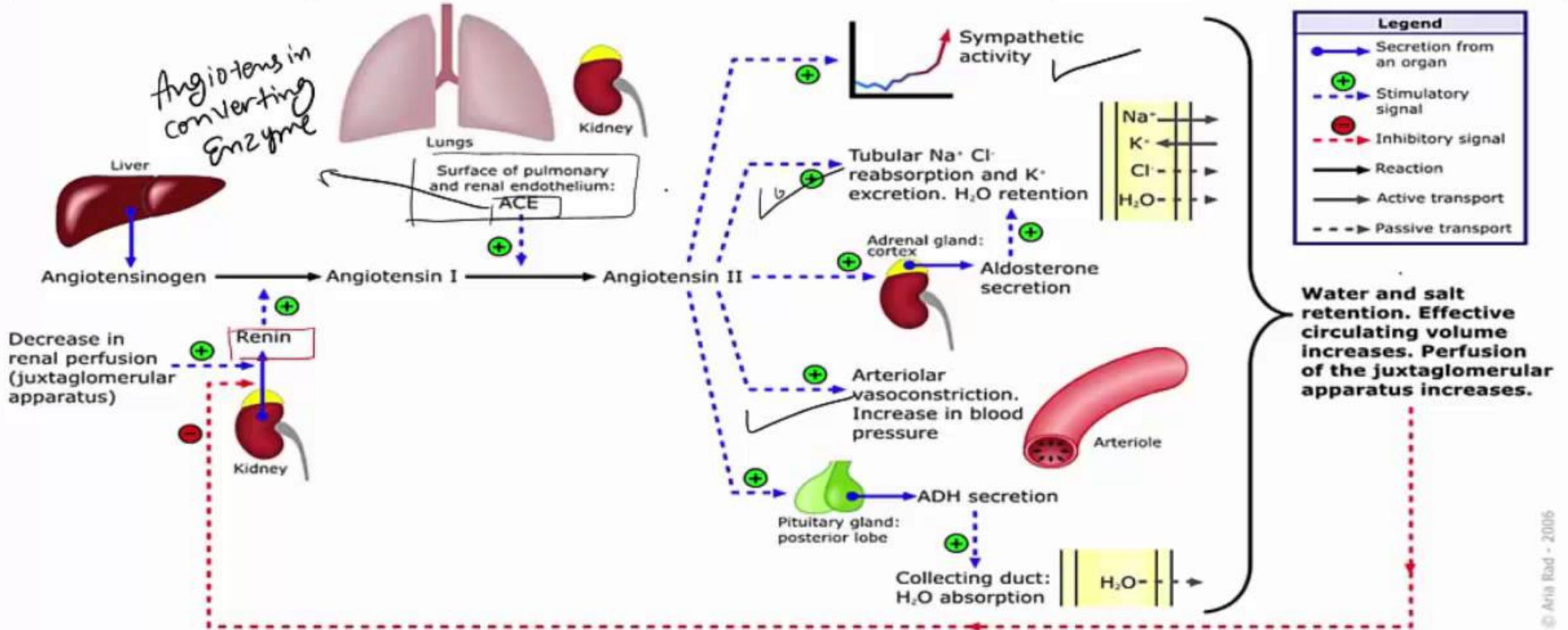




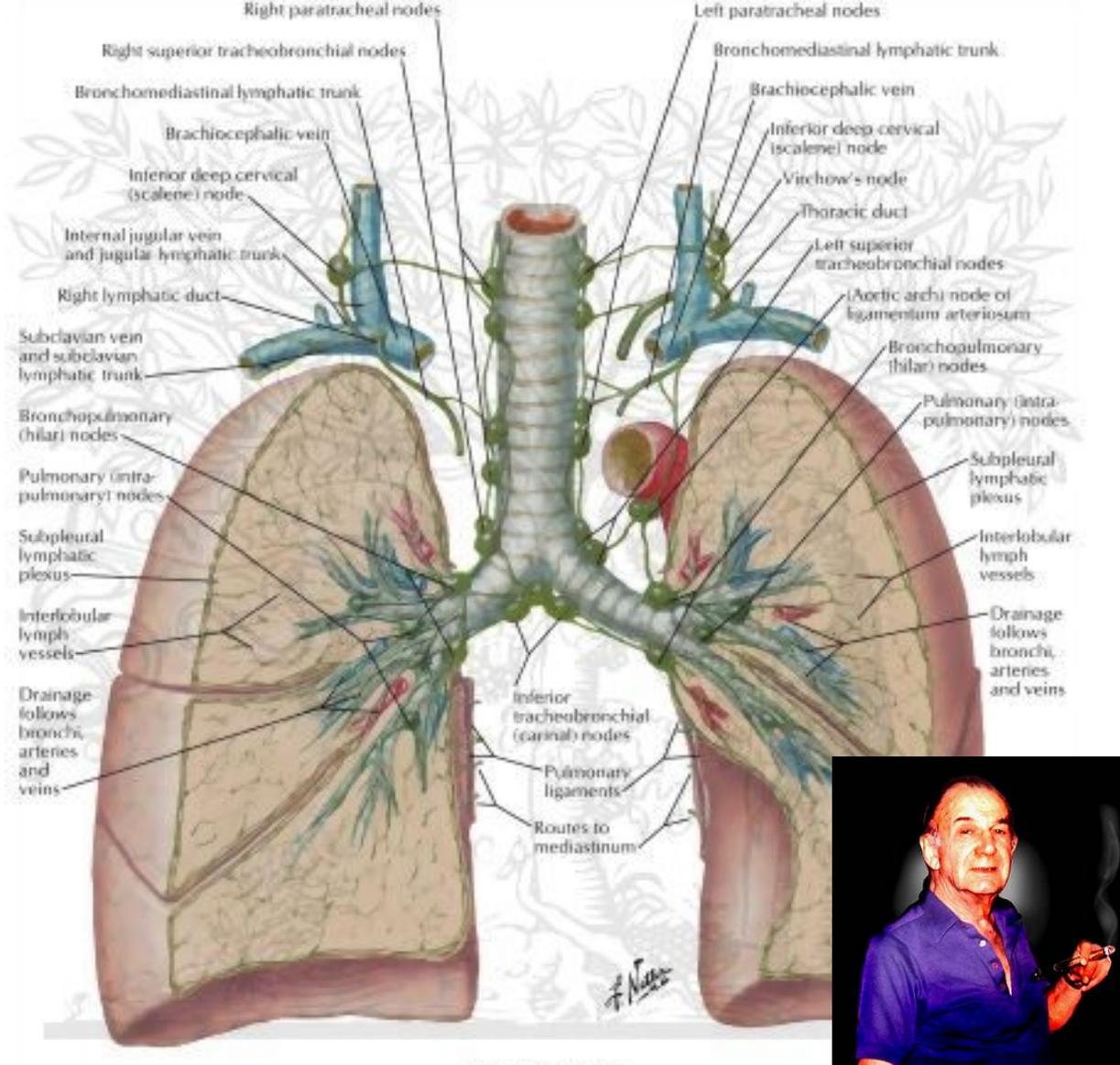
# Renin-Angiotensin-Aldosterone (RAA) System

Why do some people have more ACE2 Receptors?

## Renin-angiotensin-aldosterone system



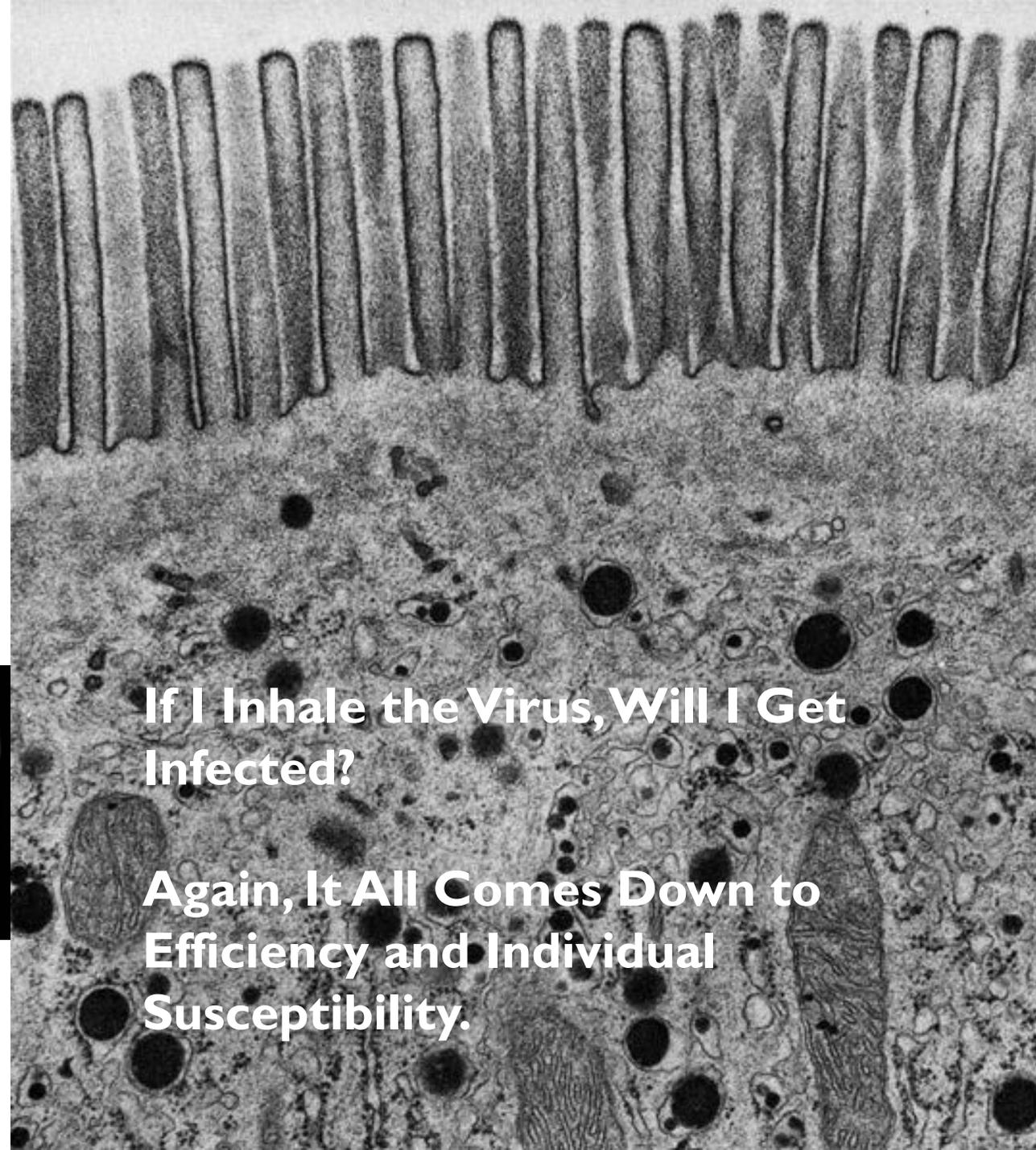
© Aris Rad - 2006



**Drainage routes**

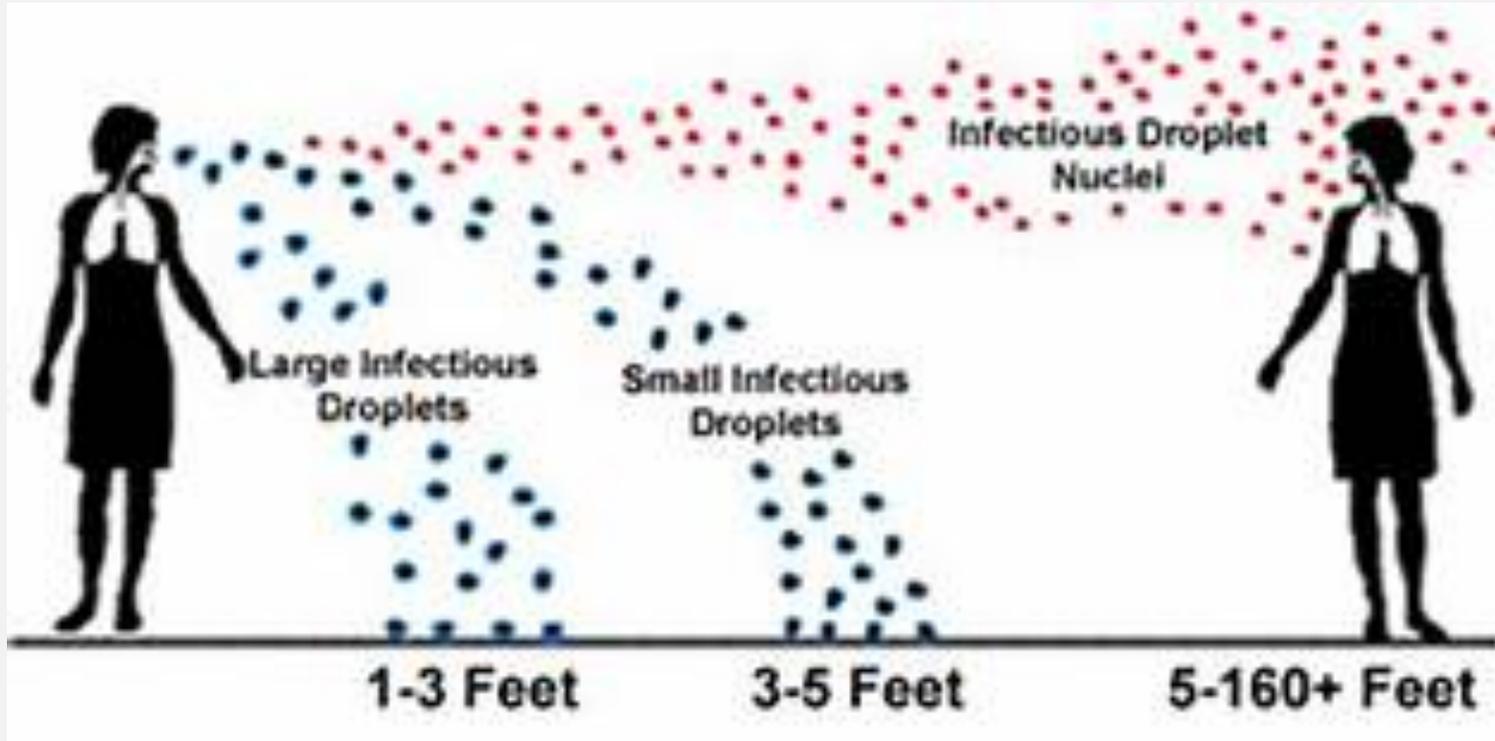
**Right lung:** All lobes drain to pulmonary and bronchopulmonary (hilar) nodes, then to inferior tracheobronchial (carinal) nodes, right superior tracheobronchial nodes, and right paratracheal nodes on way to brachiocephalic vein via bronchomediastinal lymphatic trunk and/or inferior deep cervical (scalene) node.

**Left lung:** Superior lobe drains to pulmonary and bronchopulmonary (hilar) nodes, inferior tracheobronchial (carinal) nodes, left superior tracheobronchial nodes, left paratracheal nodes and/or (aortic arch) node of ligamentum arteriosum, then to brachiocephalic vein via left bronchomediastinal trunk and thoracic duct. Left inferior lobe drains also to pulmonary and bronchopulmonary (hilar) nodes and to inferior tracheobronchial (carinal) nodes, but then mostly to right superior tracheobronchial nodes, where it follows same route as lymph from right lung.



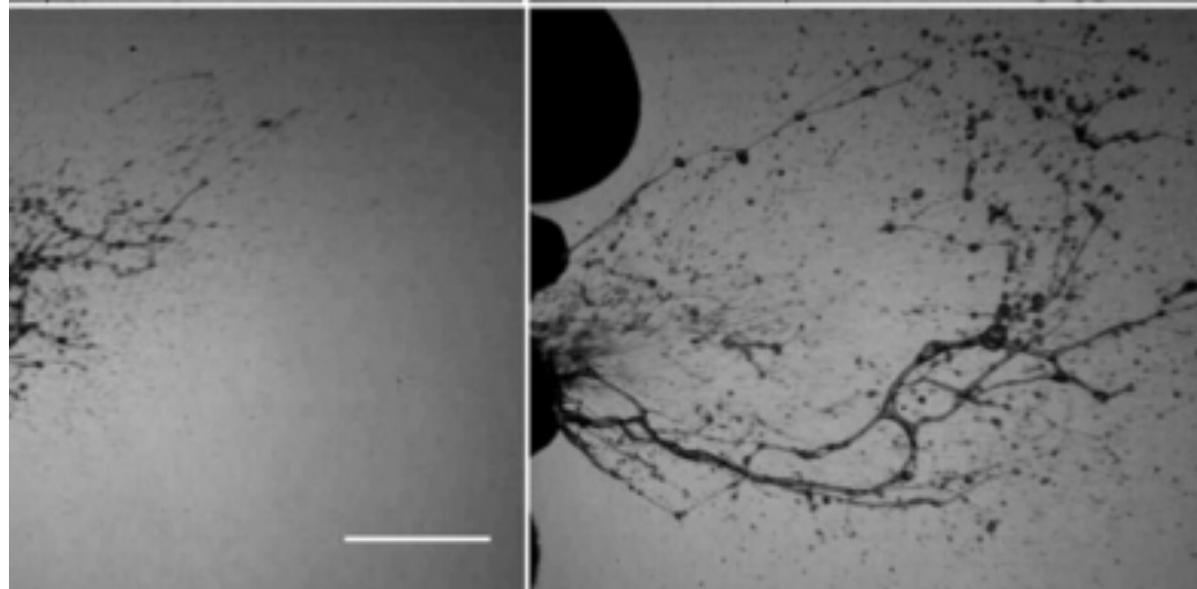
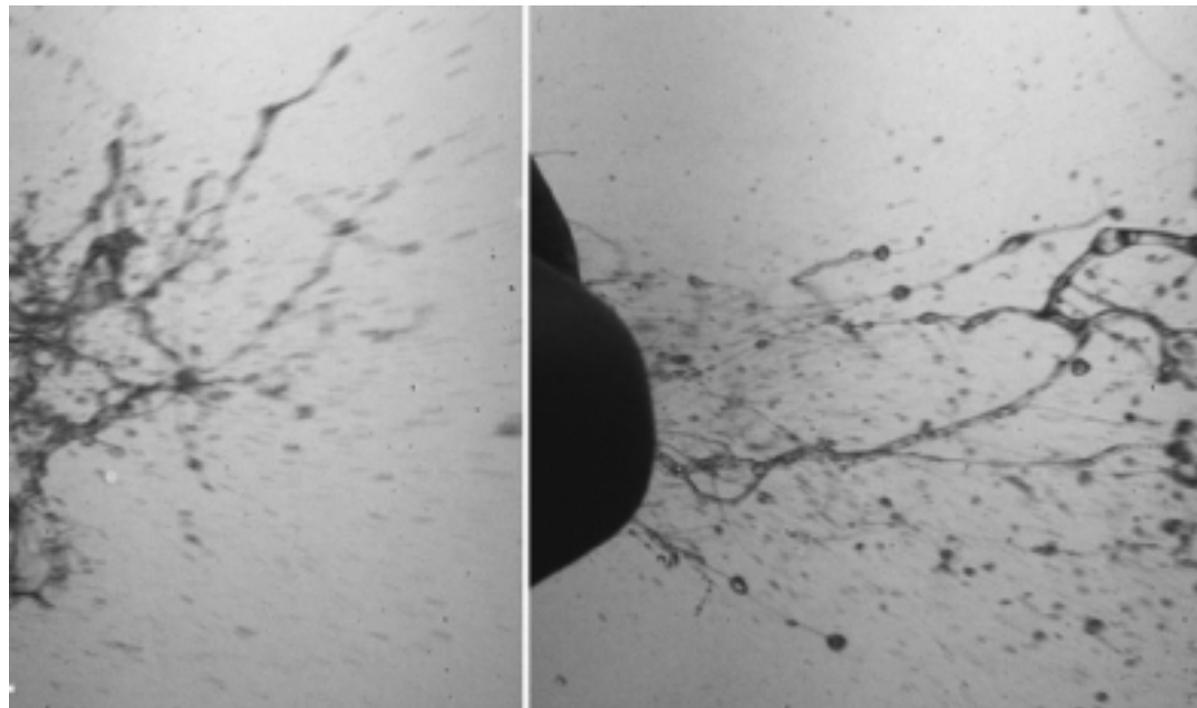
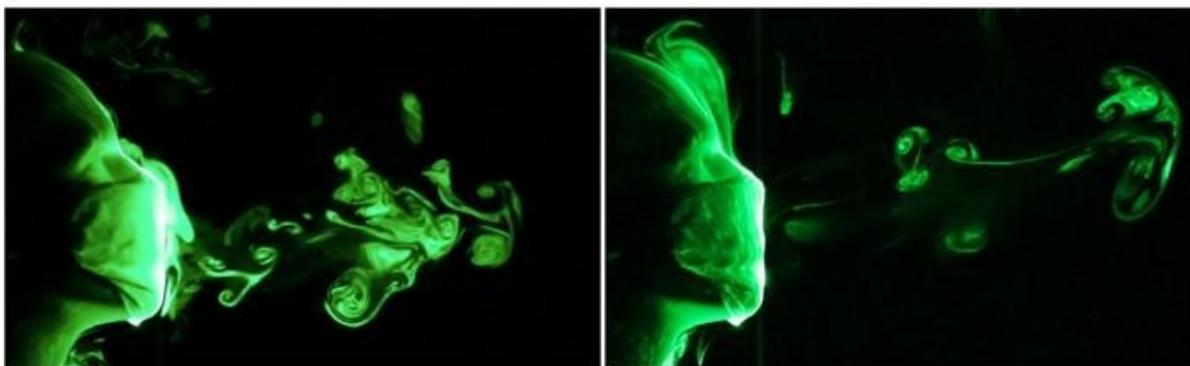
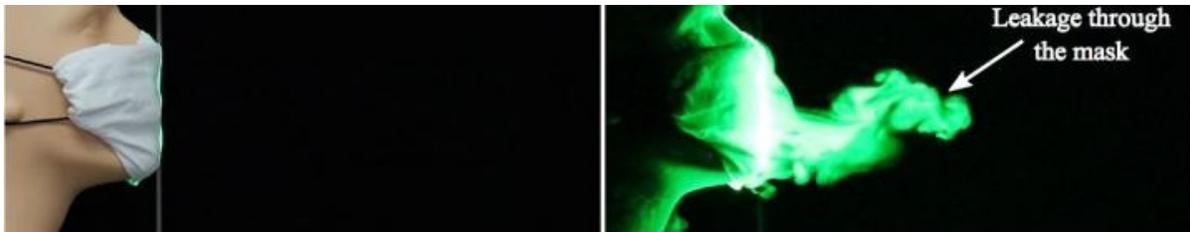
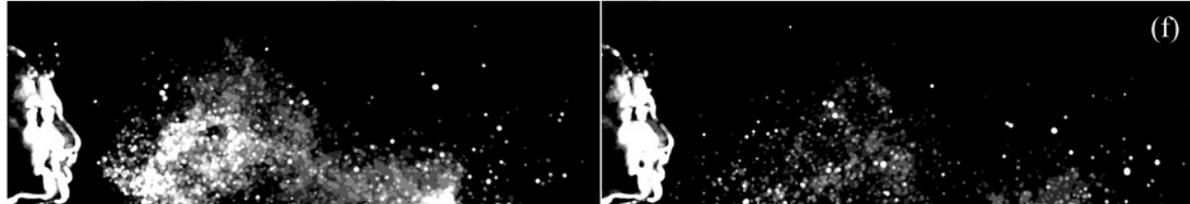
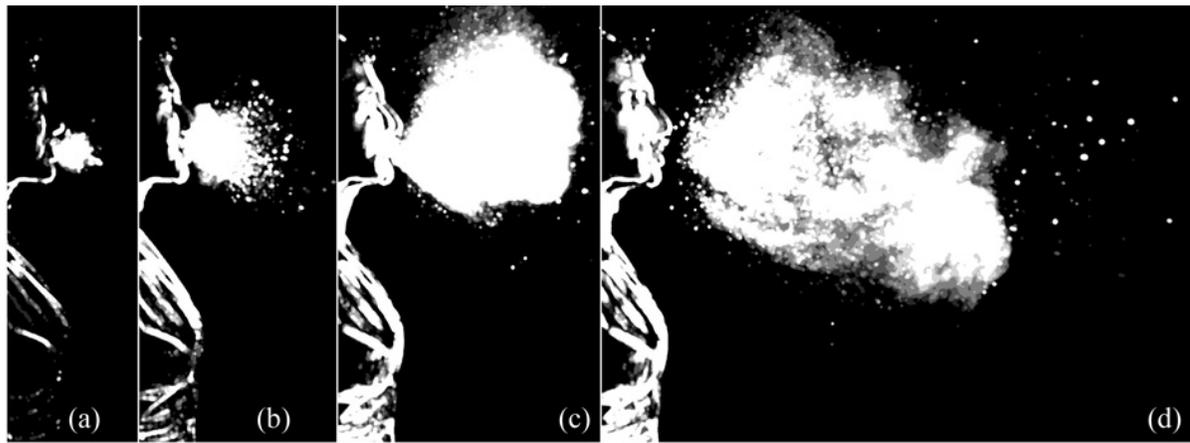
**If I Inhale the Virus, Will I Get Infected?**

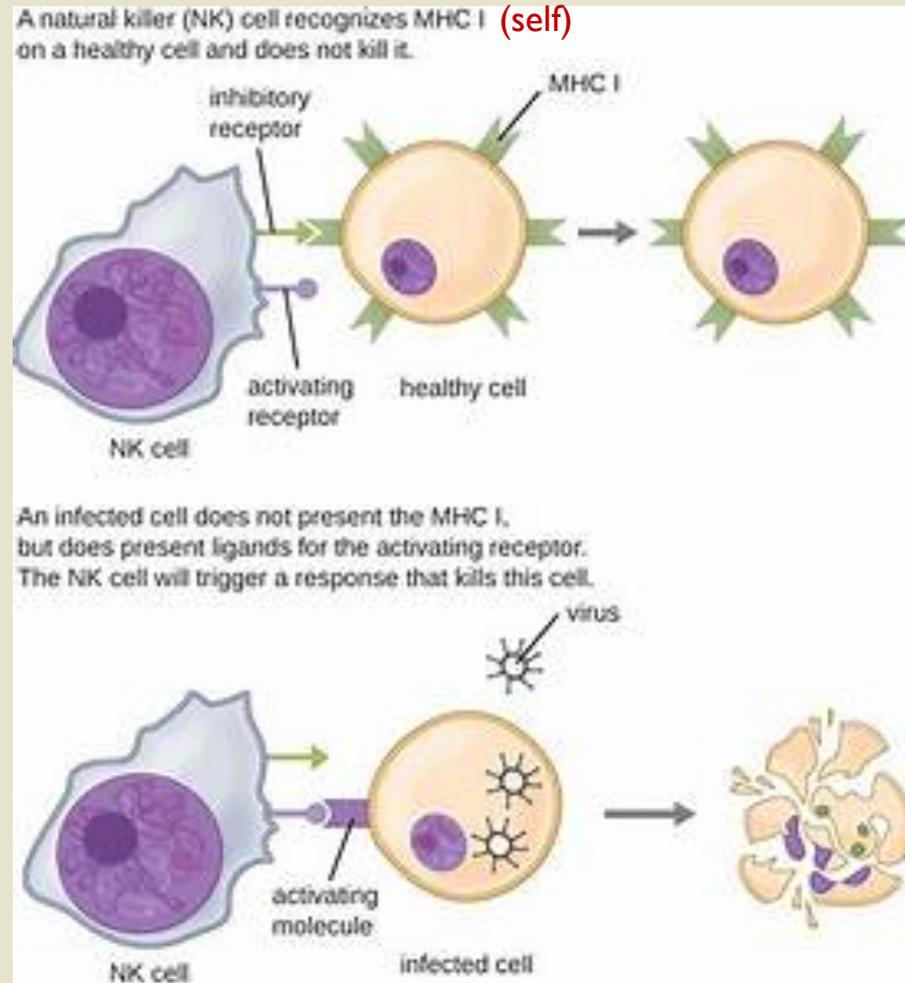
**Again, It All Comes Down to Efficiency and Individual Susceptibility.**



The “6 feet of distance” rule comes from studies of respiratory physiology, said Dr. William Schaffner, infectious disease expert at Vanderbilt University. “Without a cough or a sneeze, if we exhale, the distance 3 to 6 feet from each other is called the breathing zone.







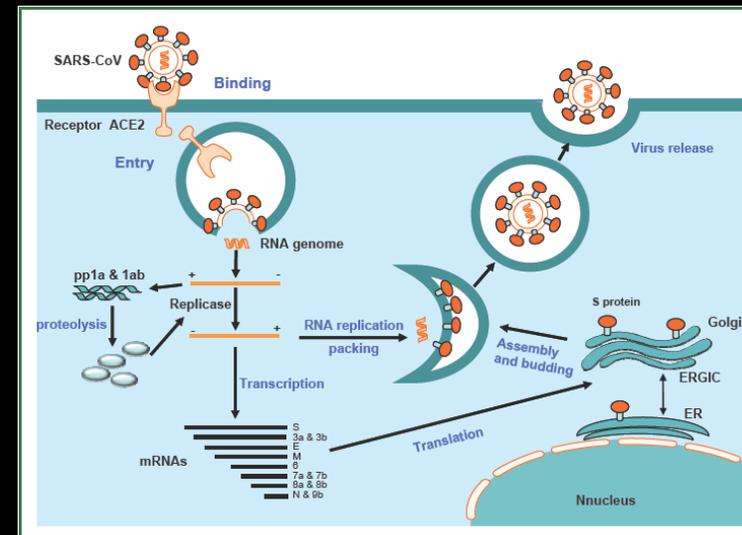
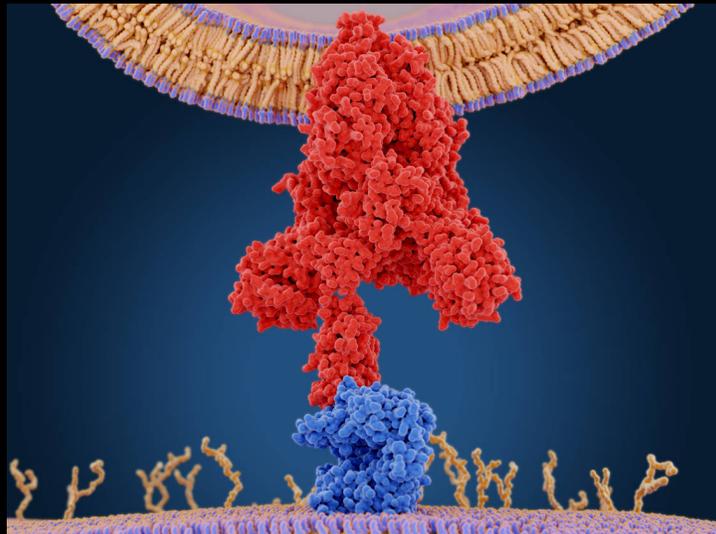
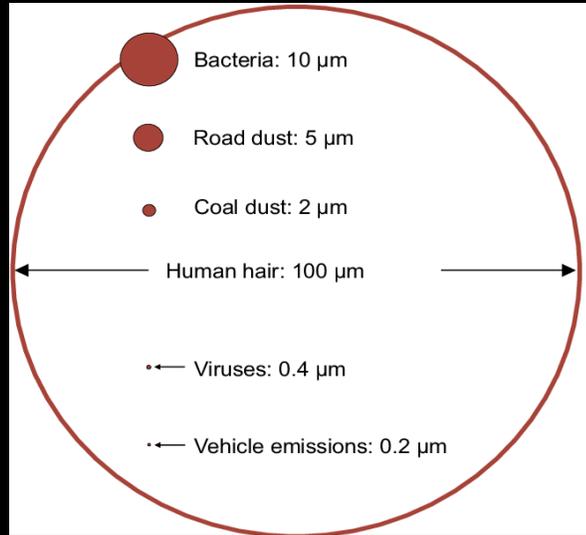
## How does my body fight off COVID-19?



## Self Destruct Sequence: AKA Apoptosis AKA Programmed Cell Death



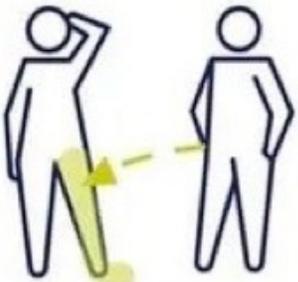
A tiny, environmentally robust particle capable of remaining airborne for an indeterminate time and distance.....



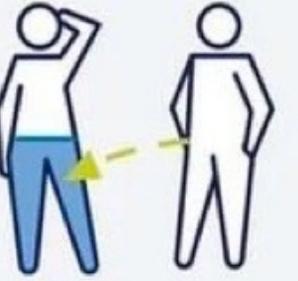
that enters our cells via ACE2 receptors and then replicates, eventually causing activation of our inflammatory response.

# 1000 Words on Masks:

**THE URINE TEST**



IF WE ALL RUN AROUND NAKED AND SOMEONE PEEES ON YOU, YOU GET WET RIGHT AWAY



IF YOU ARE WEARING PANTS, SOME PEE WILL GET THROUGH - BUT NOT AS MUCH, SO YOU ARE BETTER PROTECTED



IF THE GUY WHO PEEES ALSO IS WEARING PANTS, THE PEE STAYS WITH HIM AND YOU DO NOT GET WET.

## WHY YOU SHOULD WEAR FACEMASKS

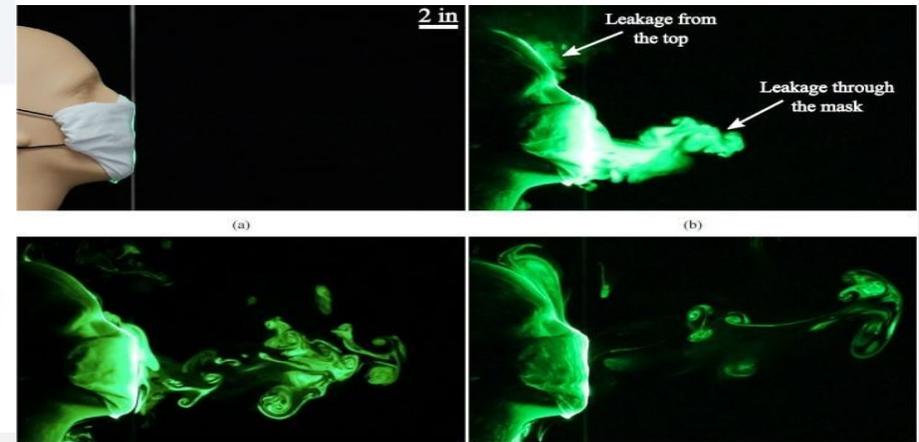
LET ME TRY AND MAKE IS SIMPLE FOR YOU...

### Truth or Fiction?

Seeking truth and exposing fiction since 1999

#### CDC on Homemade Cloth Face Coverings

[CDC recommends](#) wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies), especially in areas of significant community-based transmission.



**The smaller the pore size and the better the fit, the more effective the mask. Face shields augment but do not replace.**





Gloves are great if you use them properly.  
Gloves will get you infected if you don't.  
Proper handling?



# VIABILITY ON SURFACES

Air is 3 hours – imagine the infectious potential of a persistently airborne particle repeatedly circulating through your workspace that is infectious for 3 hrs.

**\*Dependent on presence of UVC which can defeat COVID-19 in 15 minutes.**

## How long the new coronavirus can live on surfaces

SURFACE	LIFESPAN OF COVID-19 VIRUS
 Paper and tissue paper**	3 hours
 Copper*	4 hours
 Cardboard*	24 hours ■
 Wood**	2 days ■■
 Cloth**	2 days ■■
 Stainless steel*	2–3 days ■■■
 Polypropylene plastic*	3 days ■■■■
 Glass**	4 days ■■■■
 Paper money**	4 days ■■■■
 Outside of surgical mask**	7 days ■■■■■■

\*At 69.8 to 73.4°F (21 to 23 °C) and 40% relative humidity \*\*At 71°F and 65% relative humidity

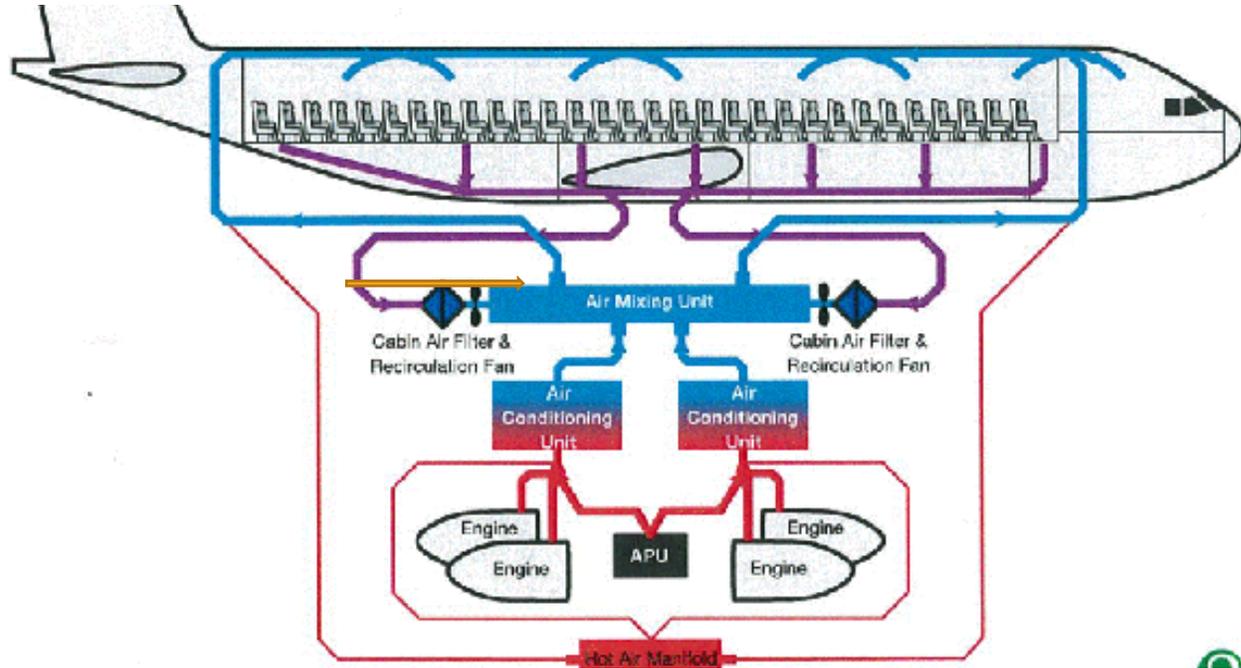
Source: New England Journal of Medicine\*; The Lancet Microbe\*\*

BUSINESS INSIDER

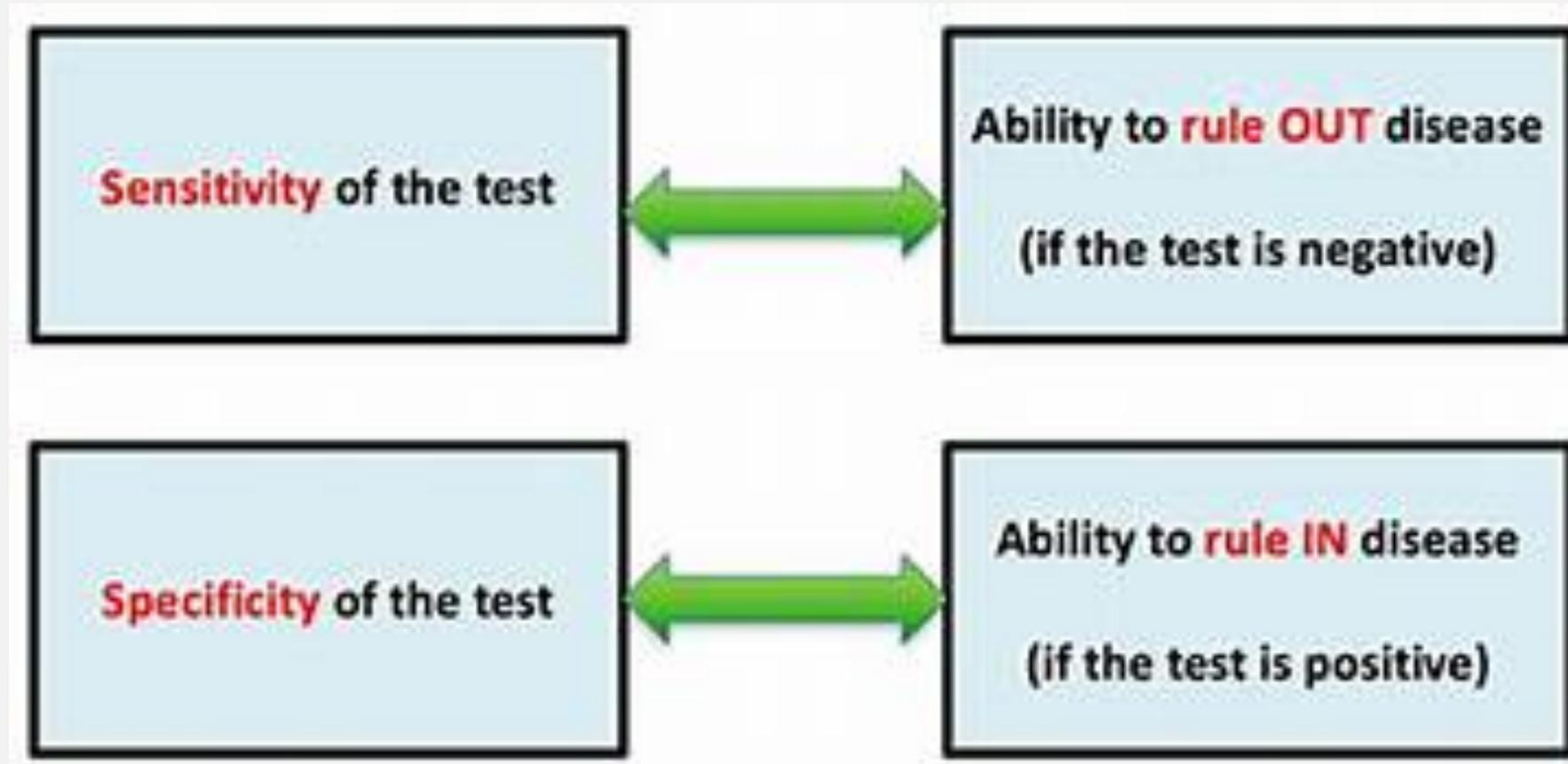
## WHAT ABOUT FLYING FOR BUSINESS?

- Not (necessarily) a closed circuit – unlike most AC systems.

- Your trip TO the airport is likely far more risky.

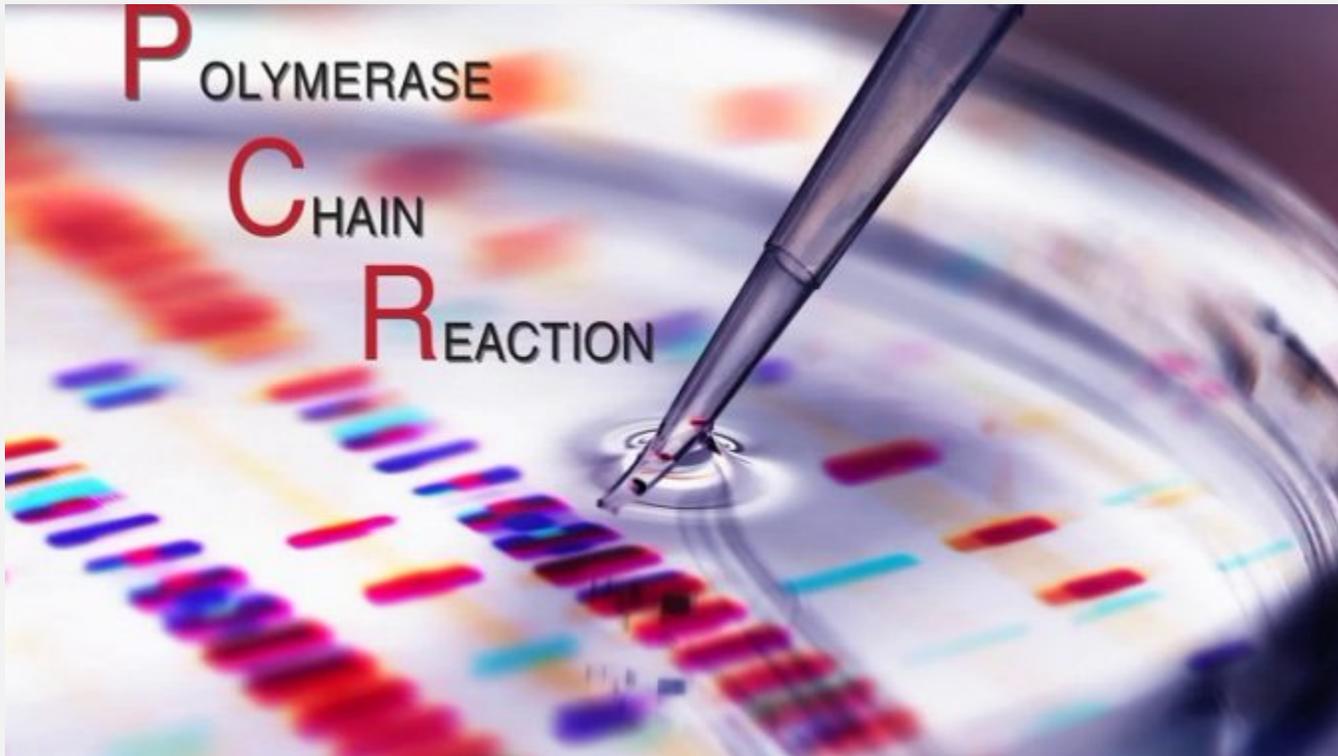


## Testing Modalities (Legalities Aside):



Send out vs. Point of Care (POC): Balance S/S vs Time to Make Clinical Decision. Until now, POC tests have proven both relatively insensitive and inaccurate (but not worthless in certain settings).





- Ultra Sensitive (technique dependent)
- Most Specific
- 2-3 Days Processing
- Expensive
- Reagent Shortages
- **Caveats**
- Caveats are why recommendations are so vague. A million cases all at once without pre-existing lab infrastructure.

## Diagnostic or PCR Test

**What it does:** Doctors use this test to diagnose people who are currently sick with COVID-19. This is the one we've been hearing so much about.

**How it works:** This test uses a sample of mucus typically taken from a person's nose or throat. The test may also work on saliva — that's under investigation. It looks for the genetic material of the coronavirus. The test uses a technology called PCR (polymerase chain reaction), which greatly amplifies the viral genetic material if it is present. That material is detectable when a person is actively infected.



- Specific AB Conferring Immunity Unknown
- 120+ “Quick to Market” Tests Available
- Fast
- Cheap

## What is an Antibody? Self vs. Non-Self (Autoimmune)

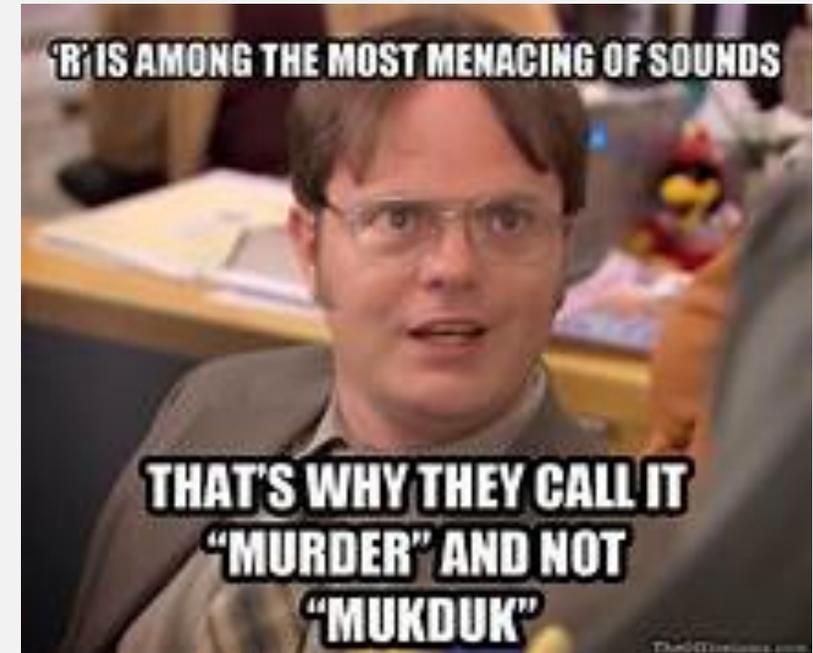
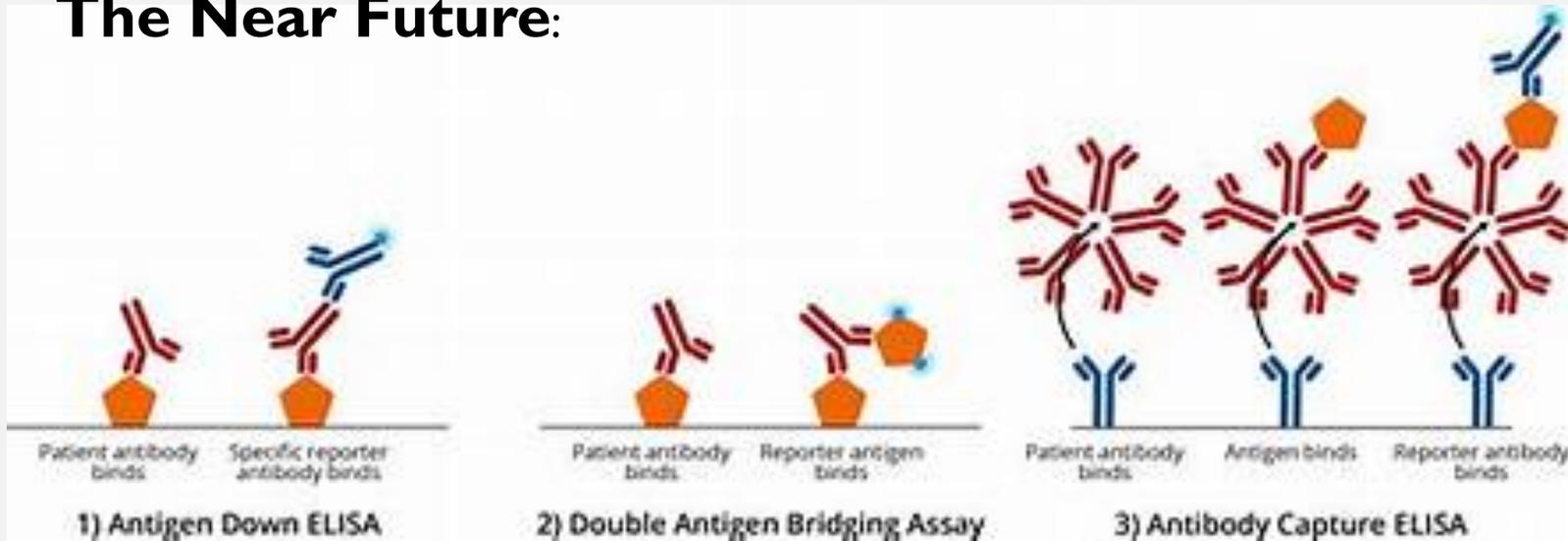


**What it does:** Antibody tests identify people who have previously been infected with the coronavirus. They do not show whether a person is currently infected. This is primarily a good way to track the spread of the coronavirus through a population.

**How it works:** This is a blood test. It looks for antibodies to the coronavirus. Your body produces antibodies in response to an infectious agent such as a virus. These antibodies generally arise after four days to more than a week after infection, so they are not used to diagnose current disease.

## Direct Detection of Troublemaker

### The Near Future:



## Antigen Test

**What it does:** This test identifies people who are currently infected with the coronavirus. It may be used as a quick test to detect active infections. Initially it will not be used to diagnose disease, but it may be used to screen people to identify those who need a more definitive test.

**How it works:** Antigen tests can identify virus in nose and throat secretions. It does this by looking for proteins from the virus (as opposed to the diagnostic test, which looks for genetic material). This is the same technology used in your doctor's office for rapid strep testing.

## When Should We Quarantine an Employee?

- **Arrives to Work Febrile/Symptomatic or Calls in Sick:** Quarantine IMMEDIATELY, test today and test in 5 days. If negative at 5 days and symptoms resolved, return to work. If negative at 5 days and persistently symptomatic, return to work 48 hours after last symptom clears. If positive, automatic 14-day quarantine (minimum or 7 days after resolution of fever/symptoms).
- **Exposed to Someone Who Tested Positive:** Quarantine IMMEDIATELY, test today (contact tracing) and test in 5 days.
- If negative at 5 days, return to work. If positive, automatic 14-day quarantine (min).
- **MUST trace every contact a proven infected patient had within company and treat them as an exposed individual.**

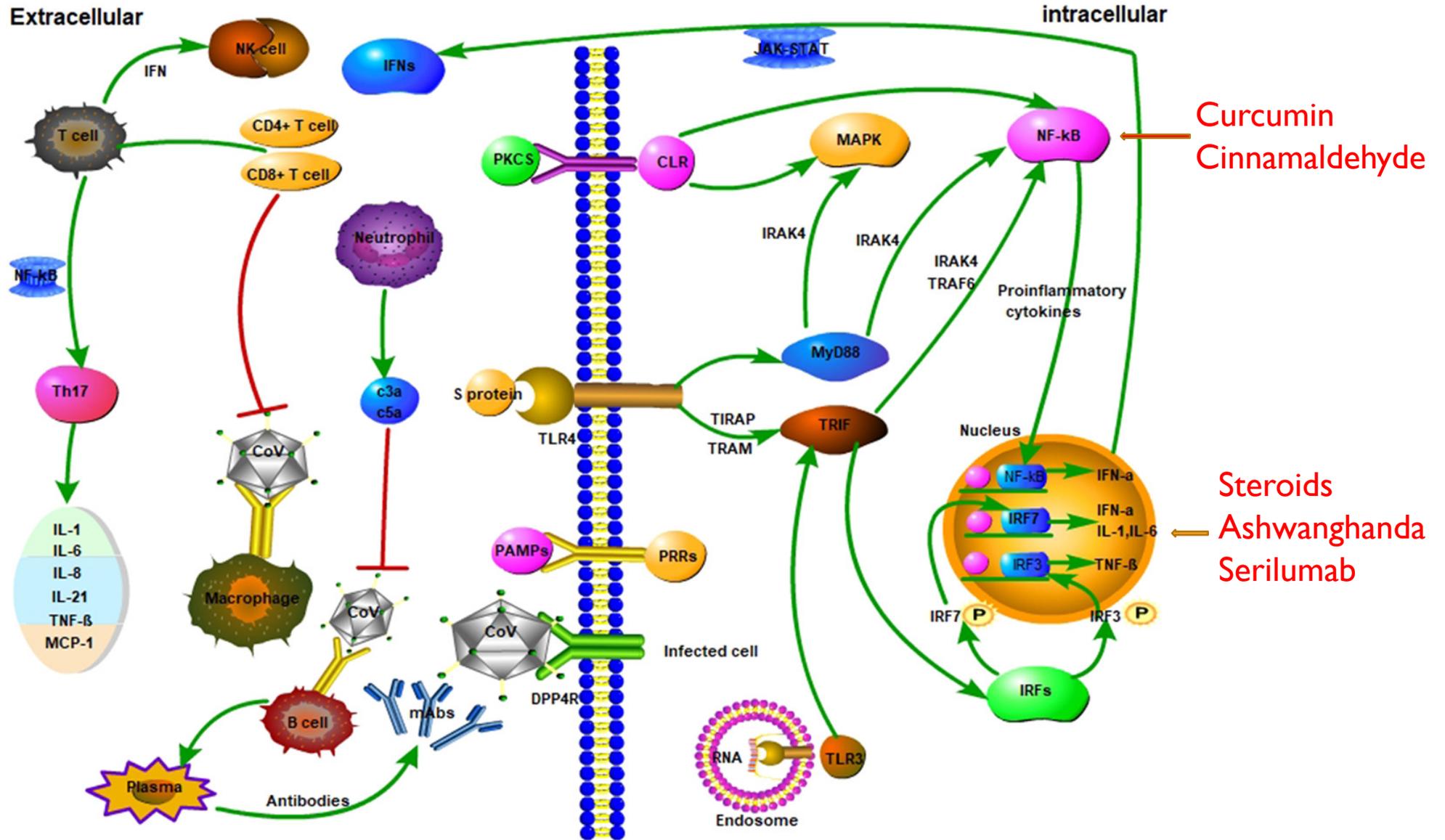


## So how do we use testing to put people back to work? Clinical Acumen and Common Sense

The decision to return to work for employees with suspected or confirmed COVID-19 should be made in the context of local circumstances. Options include a symptom-based (i.e., time-since-illness-onset and time-since-recovery strategy), time based, or a test-based strategy. ***Viral tests have detected viral RNA in some people's respiratory samples after they have recovered from COVID-19. Prolonged viral shedding has been demonstrated without direct correlation with replication competent virus.*** The determination of which strategy to use should be made in consultation with healthcare providers and public health professionals.

Under the Americans with Disabilities Act, employers are permitted to require a healthcare provider's note to verify that employees are healthy and able to return to work. However, as a practical matter, employers should be aware that healthcare provider offices and medical facilities may be extremely busy during periods of community transmission of SARS-CoV-2 and may not be able to provide such documentation in a timely manner. ***In such cases, employers should consider not requiring a healthcare provider's note for employees who are sick to validate their illness, qualify for sick leave, or to return to work.*** Most people with COVID-19 have mild illness, can recover at home without medical care, and can follow CDC recommendations to determine when to discontinue home isolation and return to work.

WBC :

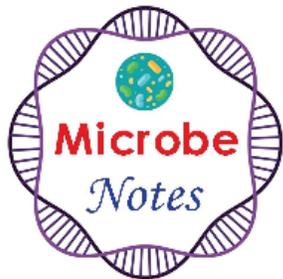


COVID doesn't kill you. Your inflammatory response to it kills you. Degree of induced inflammation defines course.

# How do these “natural” things compare to pharmaceuticals?

## Remdesivir

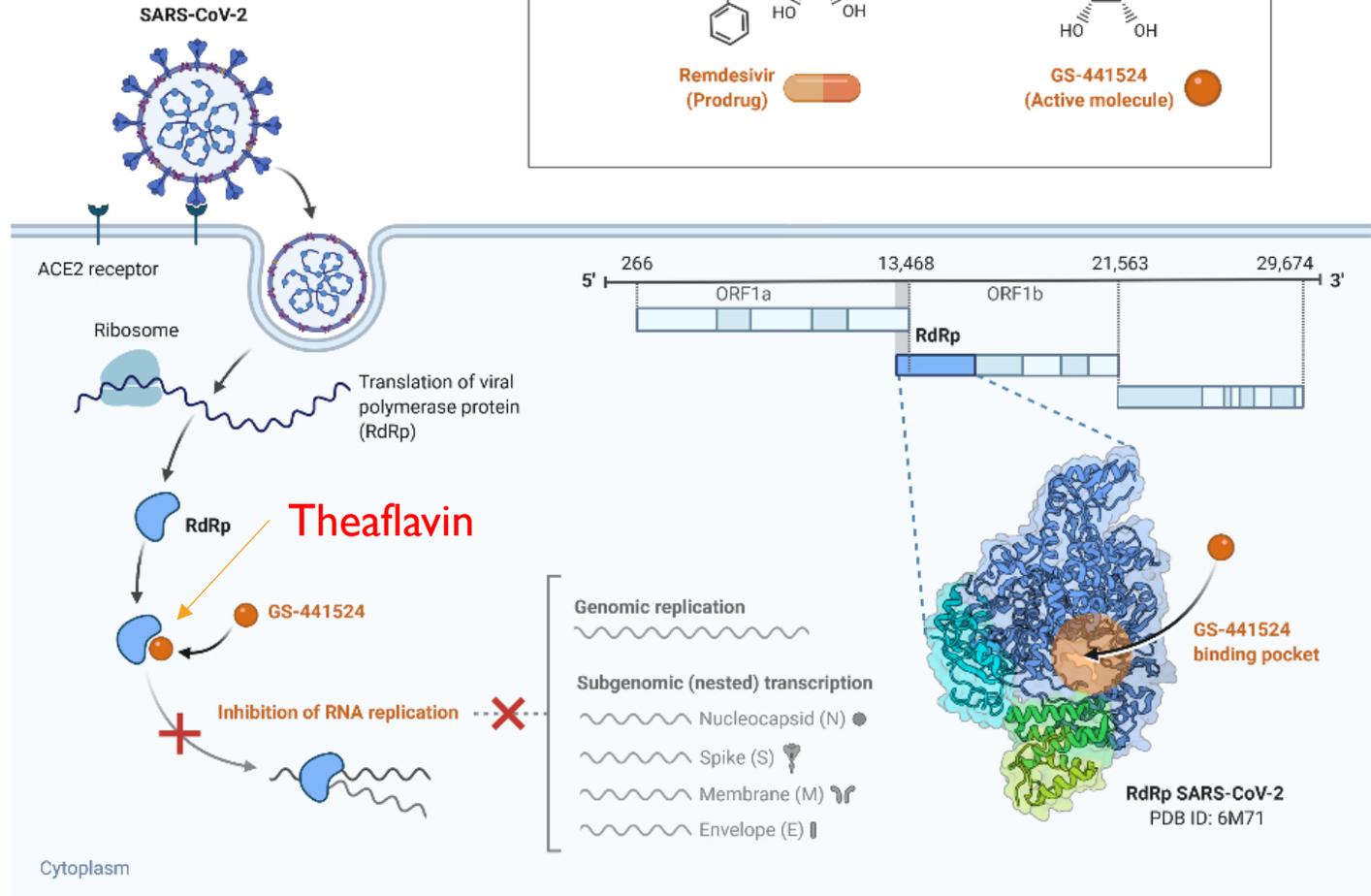
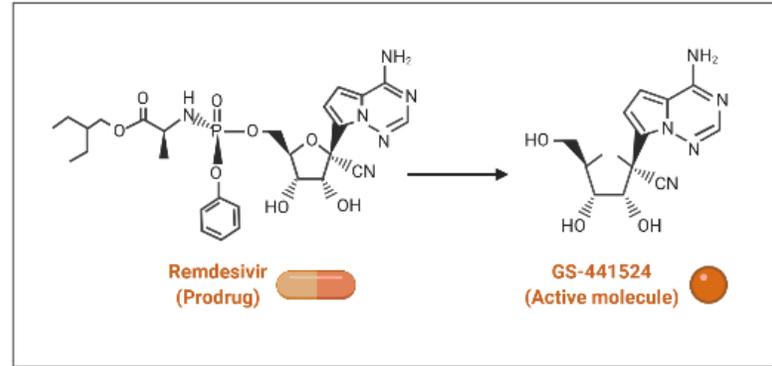
- Characteristics
- Mechanism of action
- Uses
- COVID-19 and Remdesivir



The  
Biology  
Notes

### Remdesivir

Potential repurposed drug candidate for COVID-19



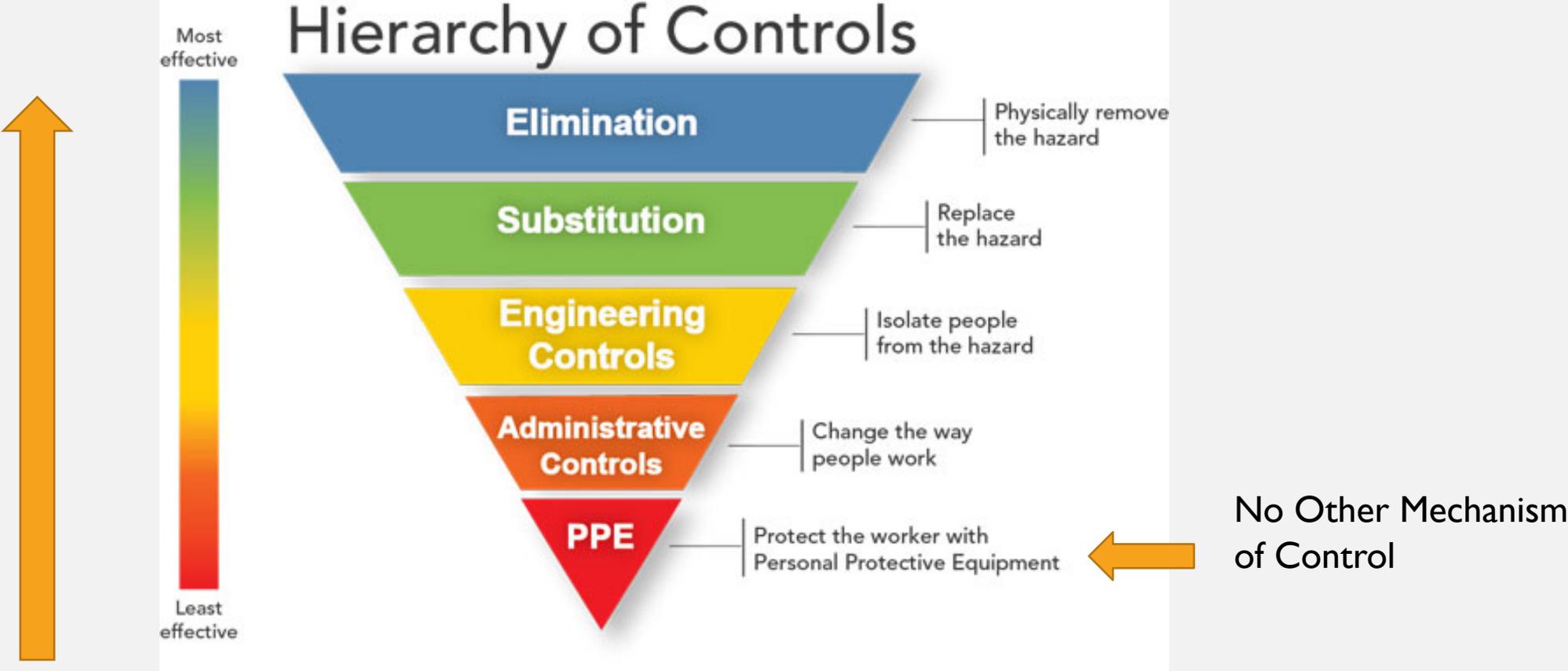
Congratulations -  
those smarty pants  
look good on you.



## WHAT YOU NOW KNOW:

- The Nature of Your Enemy: Origins, Physical Characteristics, Propensity to Travel
- How It Spreads
- How It Infects You
- What It Does Once Inside
- Why Some People Get Sick and Others Don't
- How and Why We Test for It
- What to Do with a Suspected Case
- When to Return to Work

# PREVENTING SPREAD: THE DEVIL IN THE DETAILS



*Integrated Health Engineers helps you find the chinks in your armor and move back up the hierarchy.*