

Jorge Mera, MD, FACP

Whitney Essex, APRN

COVID-19 Update

October 28, 2020



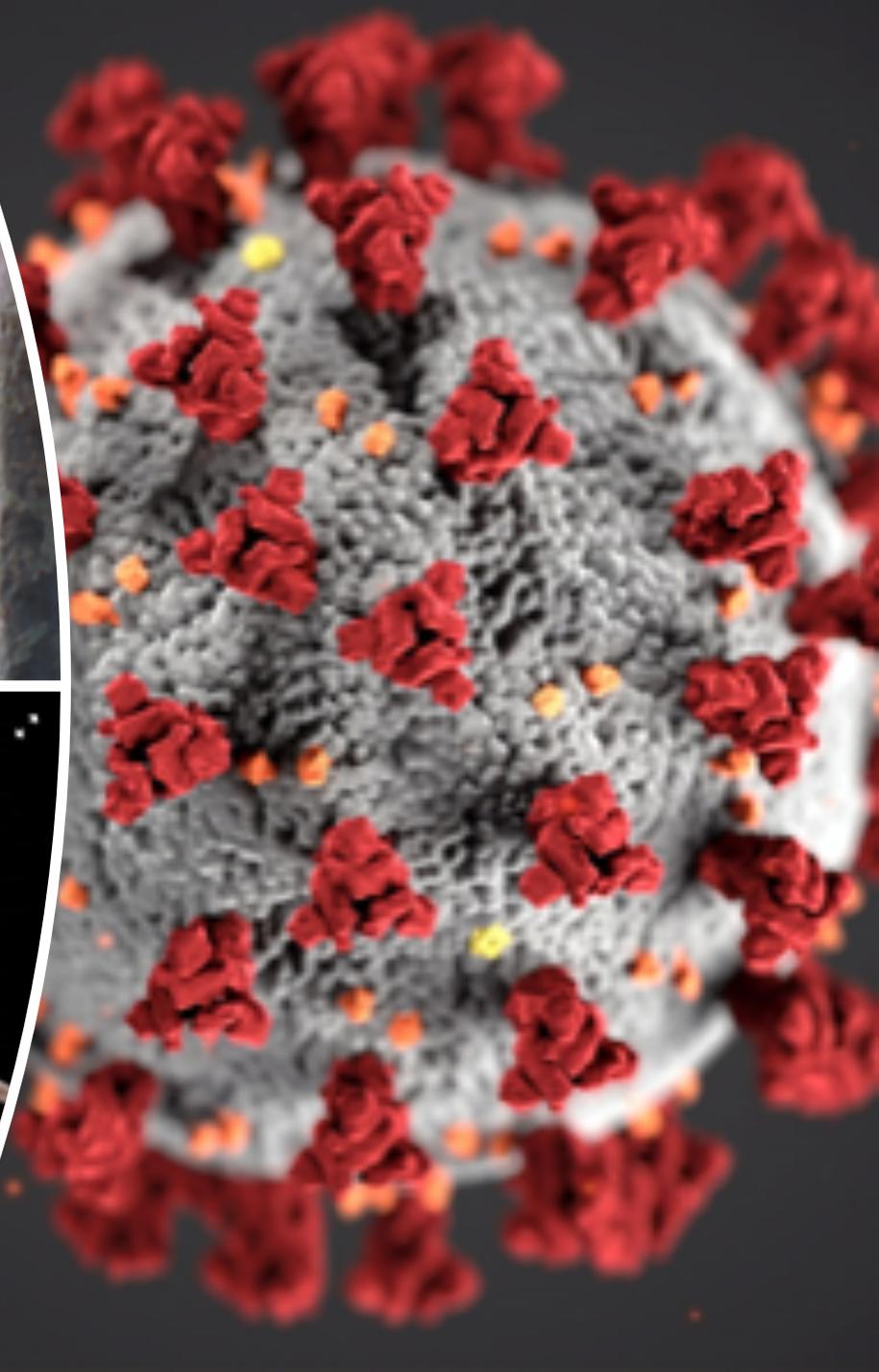
COVID-19

- The Virus

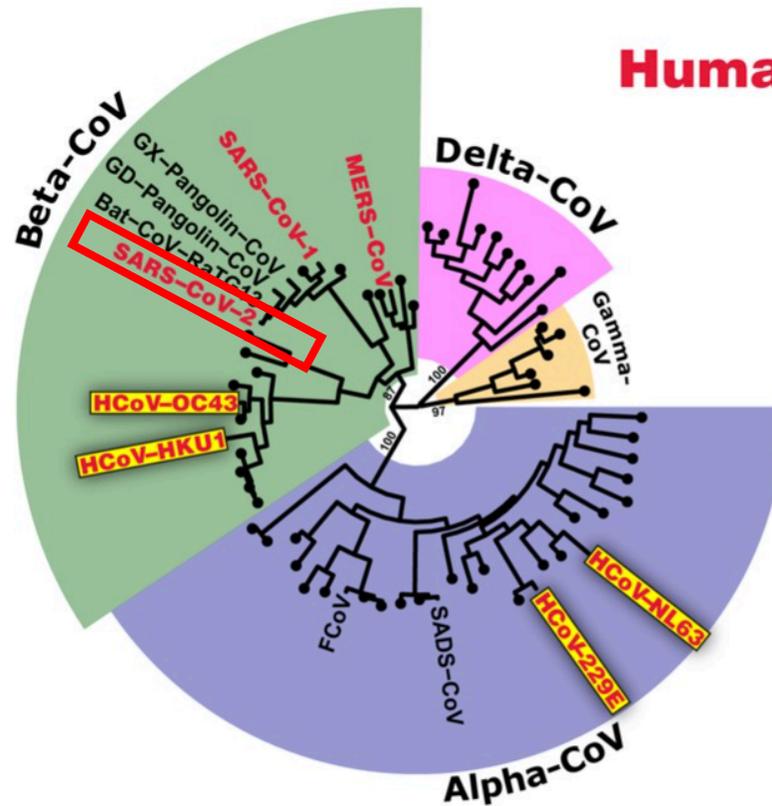
- SARS CoV-2
- Corona = "Crown"

- Prevention

- Social distancing
- Masks
- Handwashing



Human coronaviruses



Source: SM Gygli, PhD, NIAID. Based on 440 bp nucleotide sequences of RNA-dependent RNA polymerase.

➤ Virus

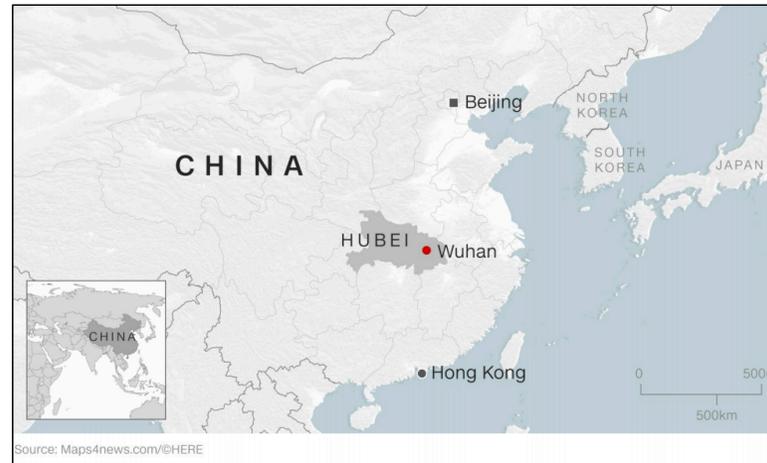
- RNA viruses with spike-like surface proteins
- SARS-CoV: **S**evere **A**cute **R**espiratory **S**yndrome **C**orona**V**irus (2003 outbreak)
- SARS-CoV2: **C**ause of present coronavirus **P**andemic

➤ Disease

- CoVID-19: **C**oronavirus disease from SARS-CoV2 discovered in 2019

SARS-CoV-2

2019 Novel Coronavirus



December 31, 2019

- Cluster of pneumonia cases of unknown etiology identified in Wuhan, China

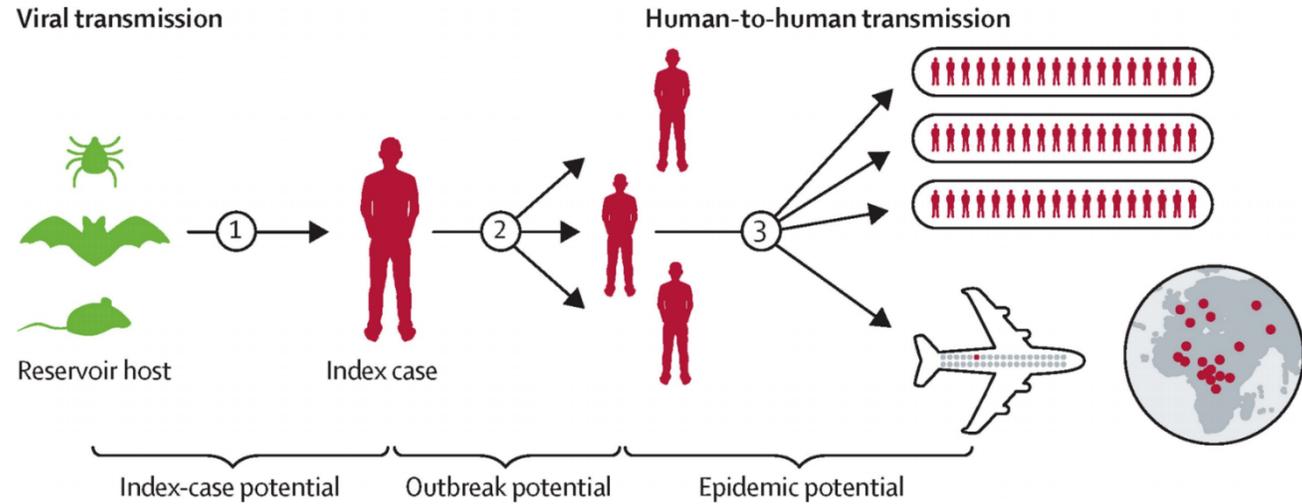
January 7, 2020

- Confirmed that the cluster was associated with a novel coronavirus, 2019-nCoV
- Previously referred to as 2019 novel coronavirus (2019-nCoV)
- Now Named: **COVID-19**
 - COVID-19 – names of the disease
 - SARS-CoV-2 → virus causing COVID-19

Sources: World Health Organization. Pneumonia of unknown cause-China. www.who.int/csr/don/05-january-2020-pneumonia-of-unknown-cause-china
World Health Organization. Novel coronavirus-China. www.who.int/csr/don/12-january-2020-novel-coronavirus-china

SARS-CoV-2

Travel Related Exportation of Cases

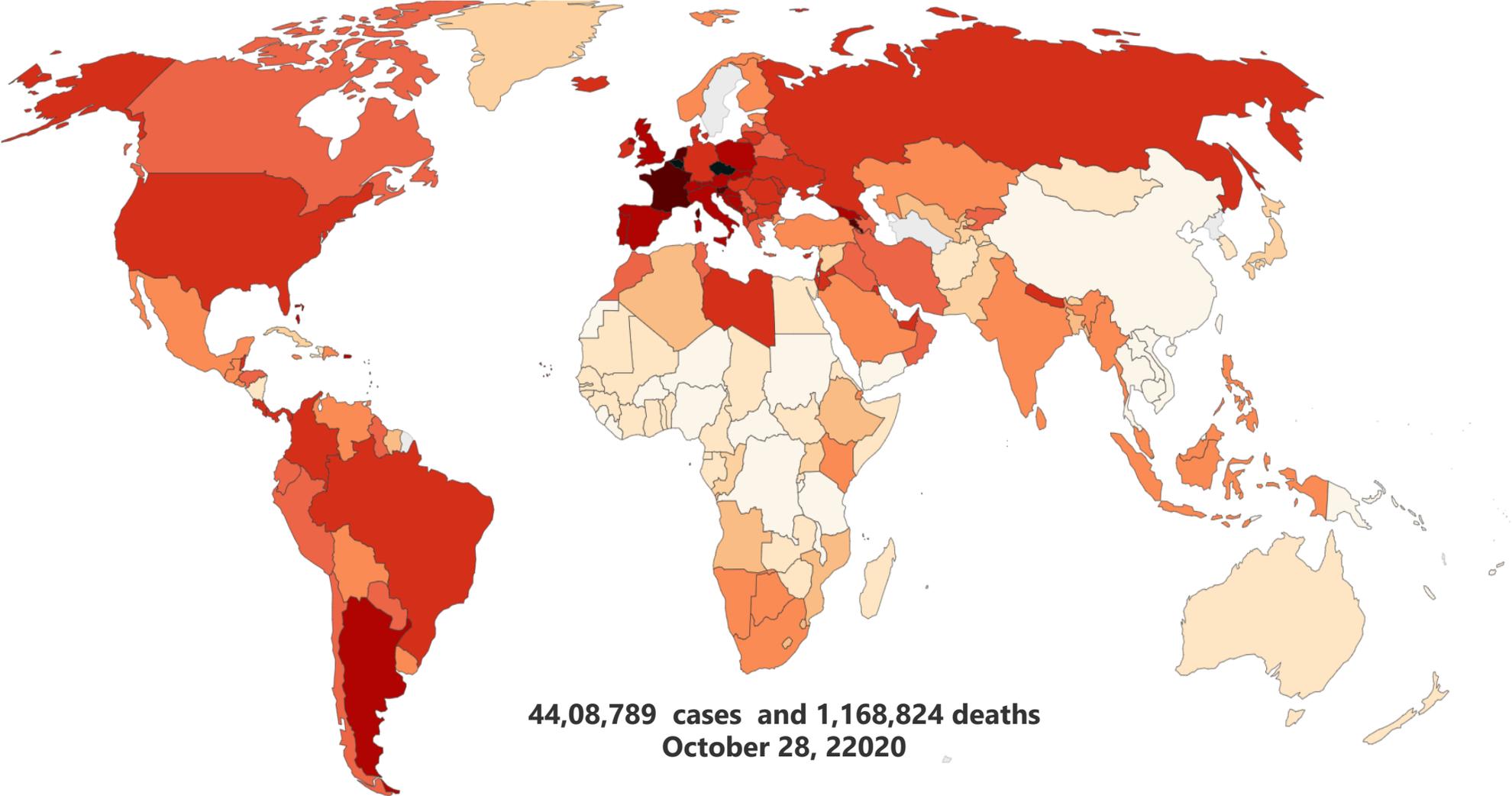


Source: The Lancet Published online October 11, 2017 *Lancet*. doi: [https://doi.org/10.1016/S0140-6736\(17\)32092-5](https://doi.org/10.1016/S0140-6736(17)32092-5)

Daily new confirmed COVID-19 cases per million people, Oct 26, 2020

Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.

World 



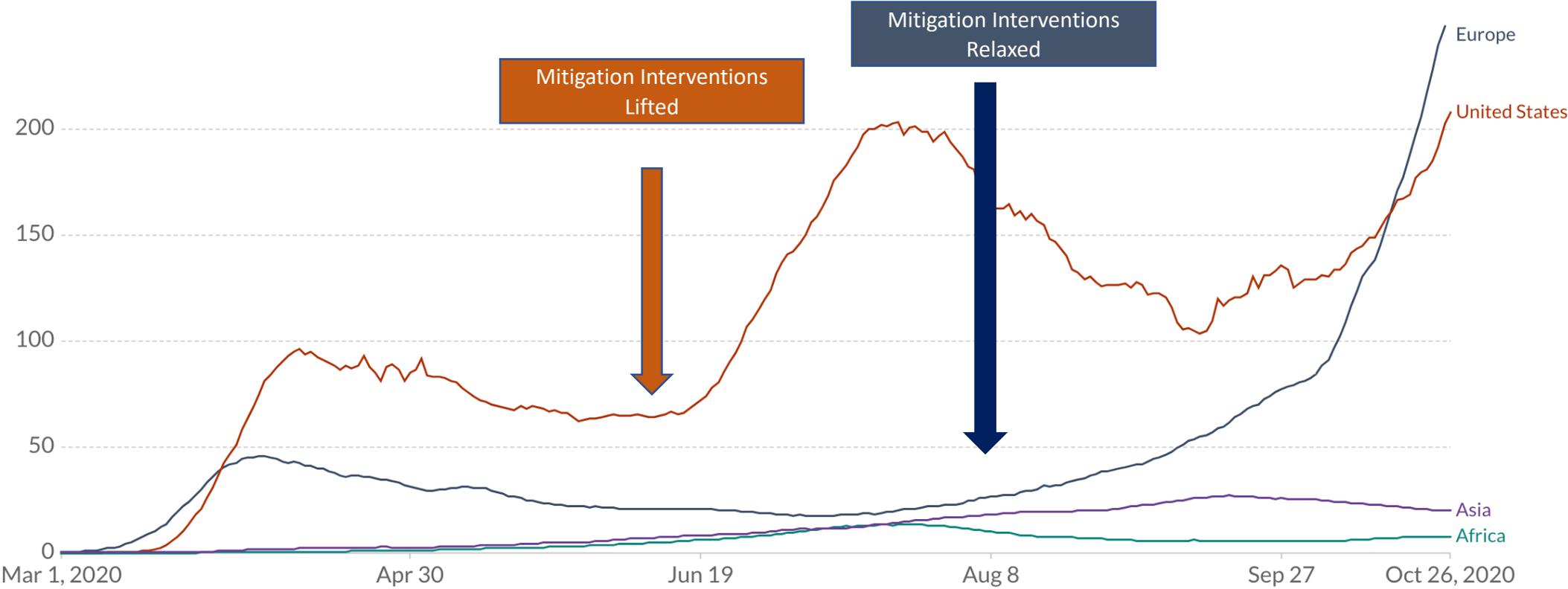
**44,08,789 cases and 1,168,824 deaths
October 28, 2020**



Daily new confirmed COVID-19 cases per million people

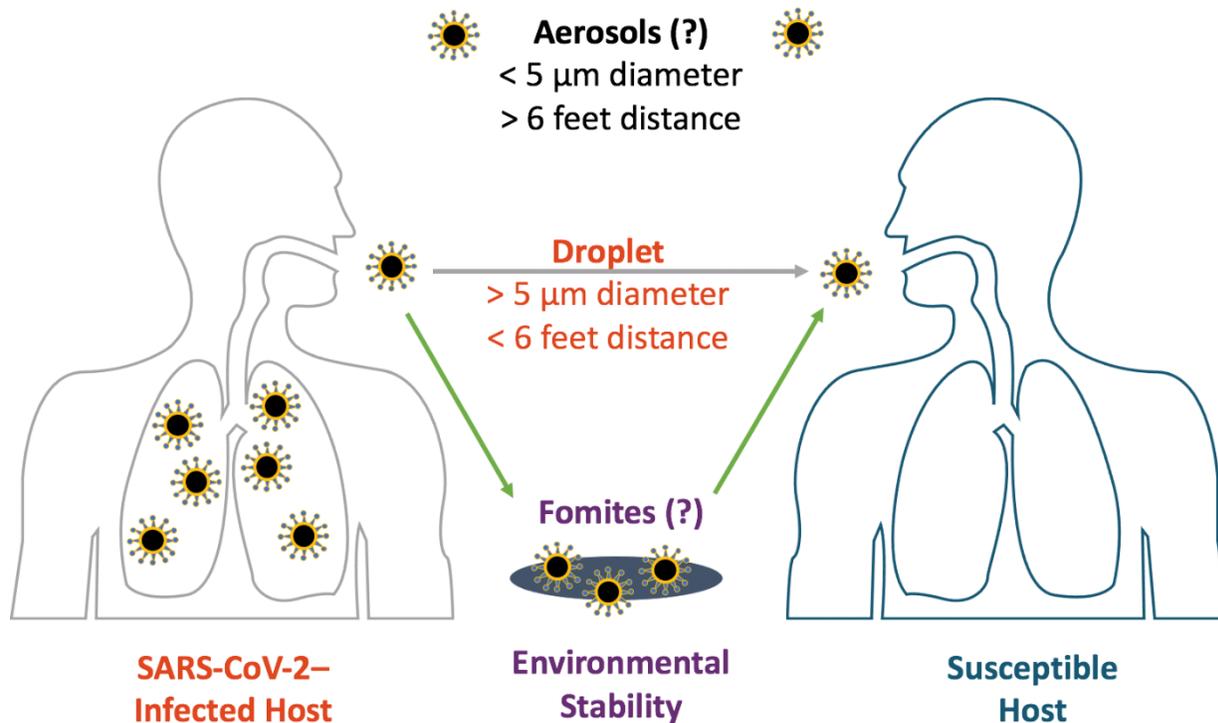
Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.

LINEAR LOG



Source: European CDC - Situation Update Worldwide - Last updated 26 October, 10:35 (London time)

How is SARS-CoV-2 Transmitted



- Mainly through exposure to respiratory droplets ($> 5 \mu\text{m}$) when close ($< 6\text{ft}$) to an infected person
- Sometimes through droplets or particles ($< 5\mu\text{m}$) that remain in the air (aerosols) over time and various distances ($> 6\text{ft}$ or $< 6\text{ft}$)
- Less commonly through contact with contaminated surfaces
- Virus found in stool, blood, semen and ocular secretions; role is unknown

How is SARS-CoV-2 Transmitted

Human sneeze or cough: 0.1 – 1000 microns

- Uncovered intense coughs: droplets may travel > 20 ft.

Silent shedders as main drivers

- Estimates up to 79%
- Infectious up to 6 days before symptoms

6 ft. social distancing may not protect if

- Particles generated are < 1.0 micron
- You are indoors with poor circulation



Epidemiology

Incubation Period

- 5.1 days from infection to symptoms [2-14-day range]

Why is it spreading faster than SARS

- High level early viral shedding from upper respiratory tract
- Asymptomatic transmission

Close Contact

- Within 6 feet, > 15 minutes cumulative and no protection

Isolation/Infectiousness

- 10 days for non-hospitalized
- 20 days for hospitalized or immunocompromised

Key Interventions to Prevent Acquiring and Transmitting SARS-CoV-2

Comparing different masks

N95 respirators

- Filters at least 95% of airborne particles if fitted and worn properly
- Medical grade masks are preferred
- Non-medical grade N95 masks OK during outbreak if medical alternatives unavailable



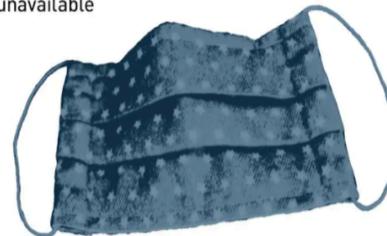
Surgical masks

- Normally worn in operating room to protect patients and medical staff against large droplets
- Looser fit, less protection than N95
- Doesn't protect against small airborne particles



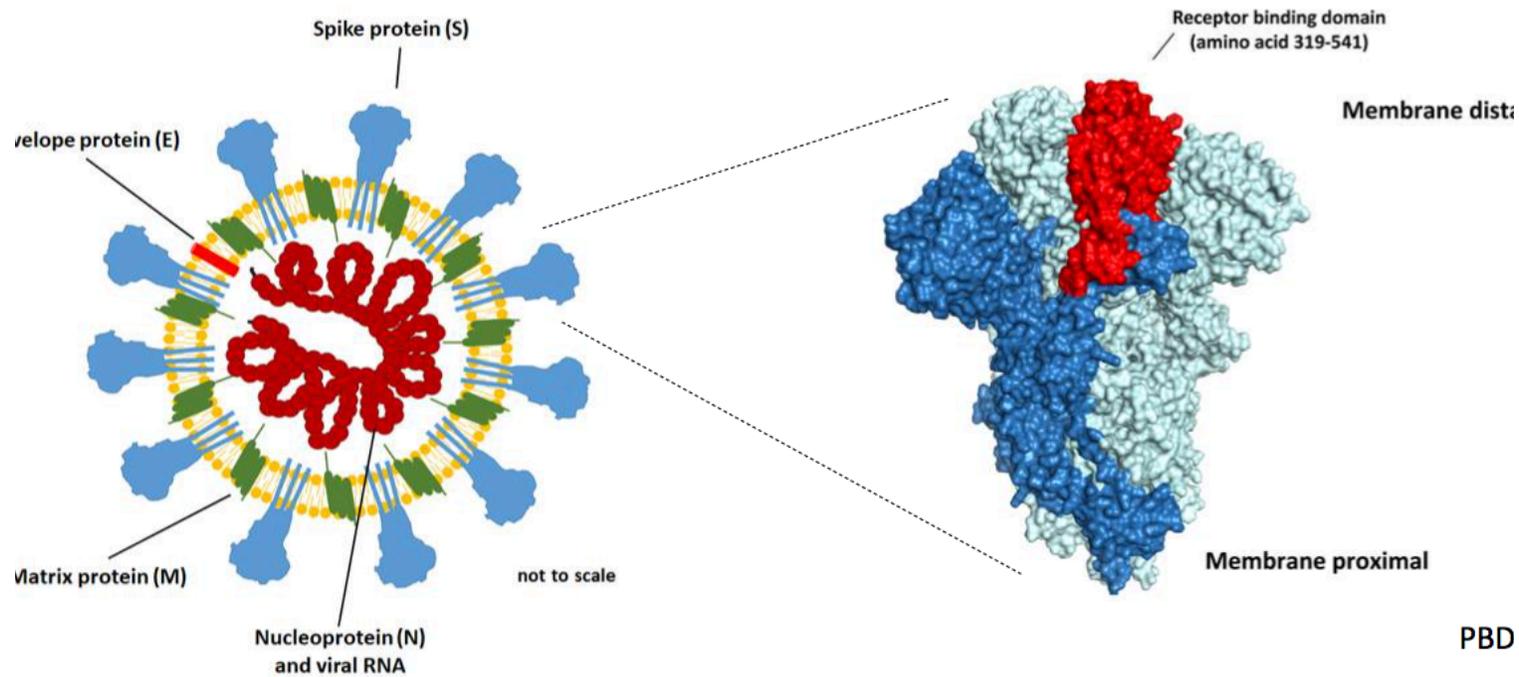
Homemade masks

- Health Canada says they may not be effective in blocking virus particles
- Toronto's Michael Garron Hospital is calling for visitors and discharged patients to use homemade fabric masks when physical distance not possible and manufactured masks unavailable
- Two-ply, pleated design (dark-coloured polyester outside, light-coloured 100% cotton inside, an elastic recommended)
- More info: Canada.ca/covid-19



- **Universal use** of masks/cloth face coverings
- **Physical distance**
 - 9 feet better than **6 feet** better than 3 feet
- **Avoid crowds** and congregate settings
- **Outdoors is better** than indoors
- **Frequent hand washing**

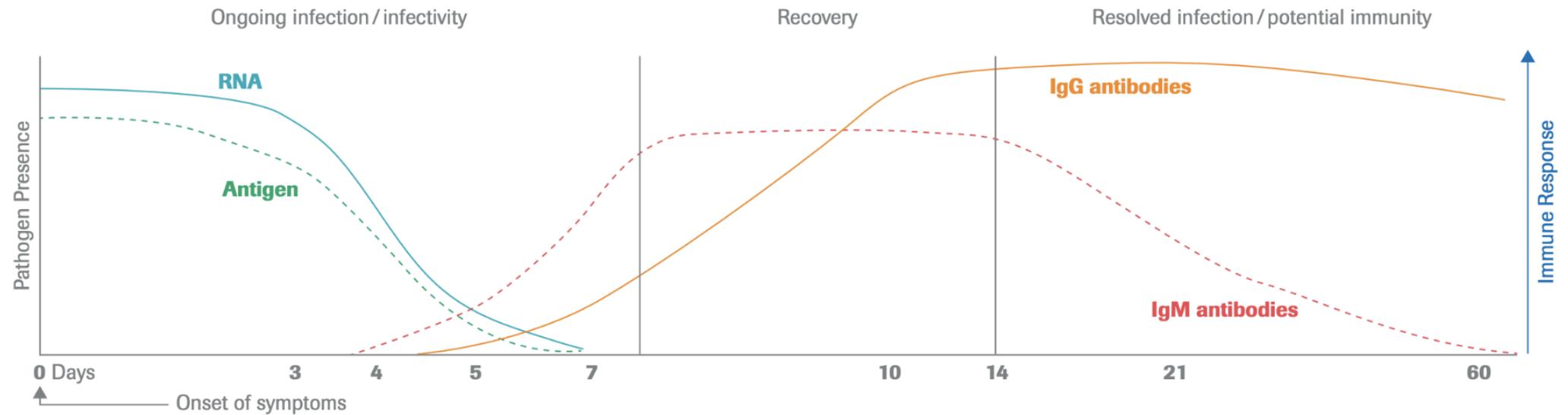
The spike protein is the main target of neutralizing antibodies for many coronaviruses



SARS-CoV-2
Structure

Dynamics of Infection Dictate Which Test to Use

Illustrative course of markers in SARS-CoV-2 infection¹⁹⁻²⁷



Roche Elecsys Anti-SARS-CoV-2 package insert

COVID-19: Diagnostics

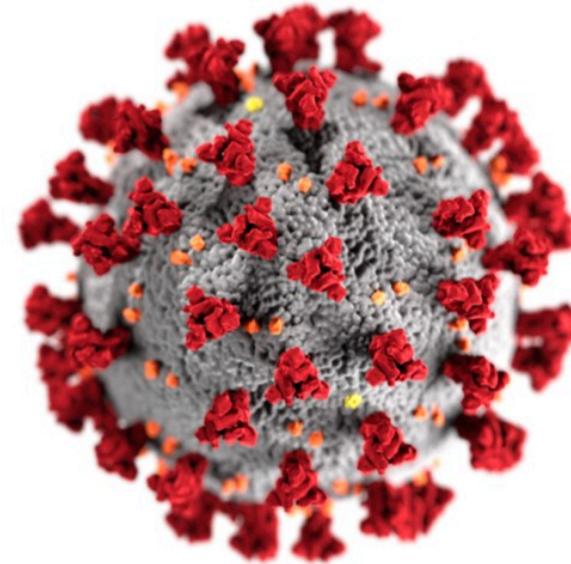


- **NP swab is the standard**
- **PCR** is the best test for symptomatic individuals but still misses ~ 20 %
- **Antigen test** sensitivity is 80 % compared to PCR.
 - Probably best used for surveillance of asymptomatic individuals but still not known
- **Serology**
 - Useful for public health surveillance
 - Not appropriate for screening
 - Helpful if suspicion for COVID is high in individuals with symptoms for > 14 days with negative PCR

People at Increased Risk for Severe COVID-19 Illness

- Older adults

- People of any age with certain underlying medical conditions



Source: CDC, 6/25/2020

Underlying Conditions Morbidity and Mortality

Hospitalization and Death Drivers

- Age is the mortality driver
- Death:
 - 19.5% with underlying conditions
 - 1.6% without underlying conditions
- Hospitalization:
 - 45.4% of those with underlying conditions
 - 7.6 % of those without underlying conditions
- Morbidity:
 - CVC 32%, diabetes 30%, COPD 18 %

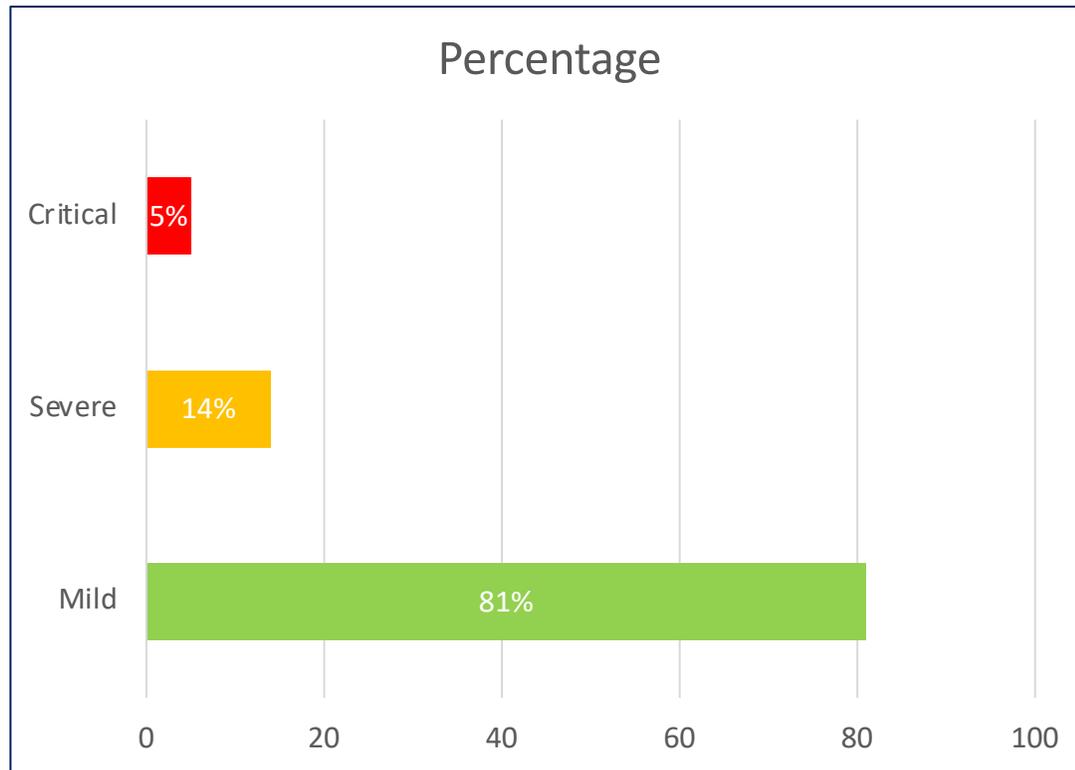
Underlying Conditions that Increase Risk of Disease Progression

- Strongest evidence:
 - Serious heart conditions (HF, CAD, cardiomyopathies), CKD, COPD, Obesity, (BMI>30, sickle cell disease, solid organ transplantation, T2DM)
- Mixed evidence:
 - Asthma, Cerebrovascular disease, HTN, pregnancy, smoking, use of steroids/immunosuppressive agents
- Limited evidence:
 - BMT, HIV, immune deficiencies, inherited metabolic disorders, neurologic disorders, other chronic lung disease, liver disease, T1DM, thalassemia.

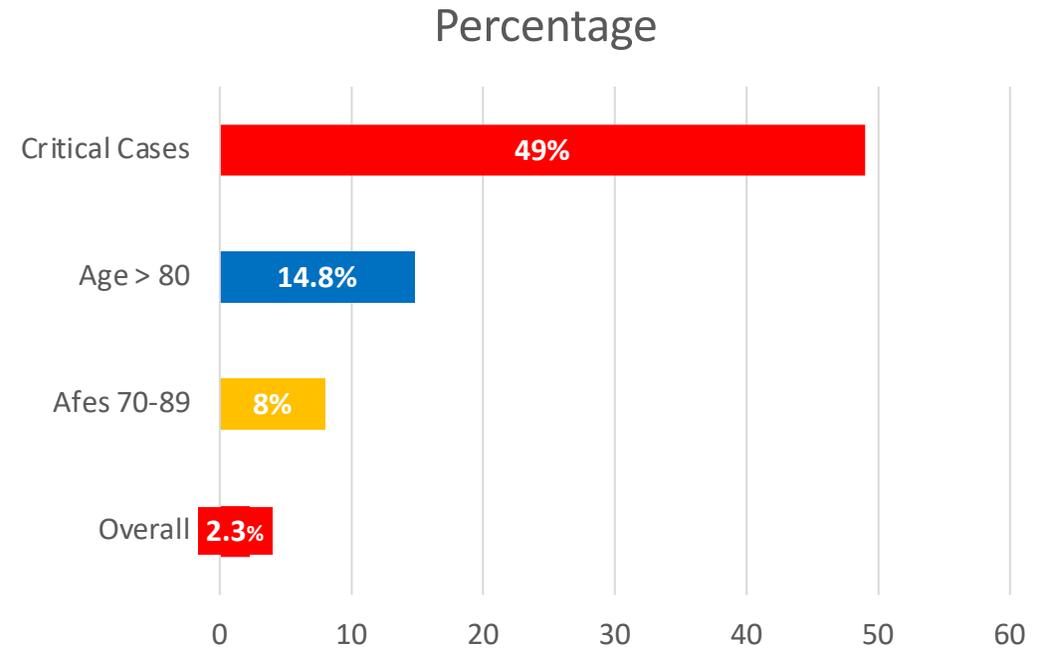
Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China.

Z Wu et al, JAMA 2020

Spectrum of Disease among 44,762 Individuals with COVID-19



Case Fatality Rate



Primary Symptoms of COVID-19

“Symptoms may appear **2-14 days** after exposure to the virus.”

Congestion or runny nose,
new loss of taste or smell

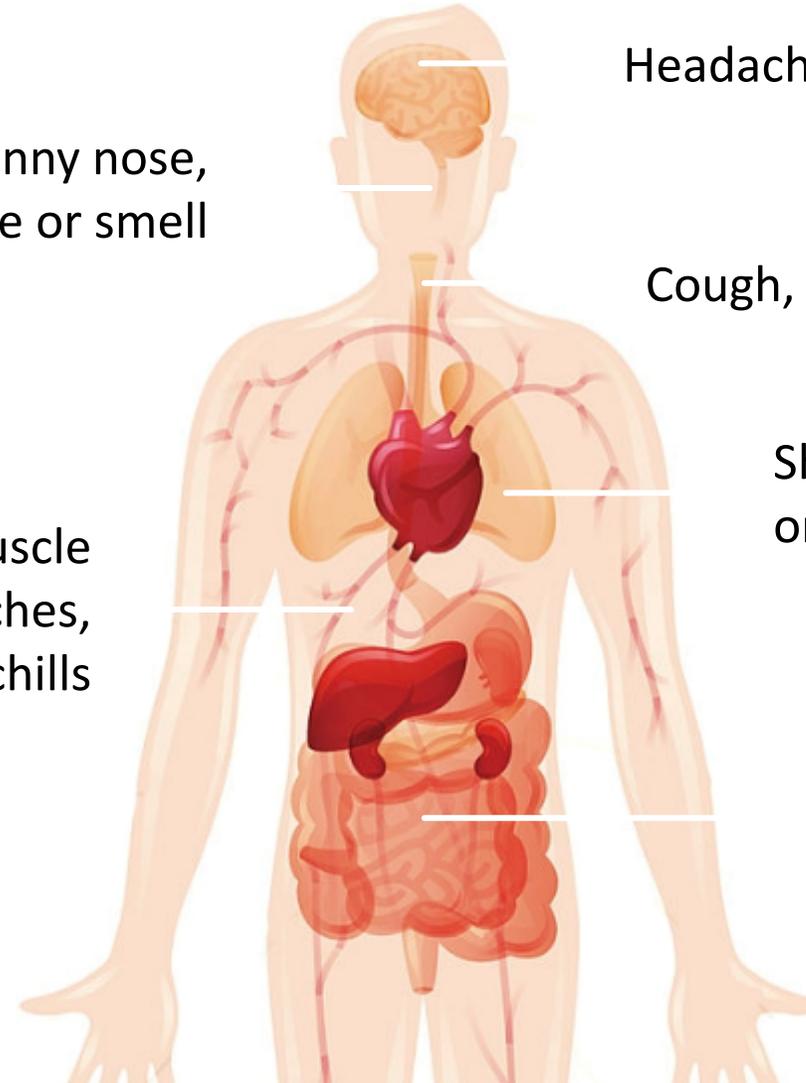
Headache

Cough, sore throat

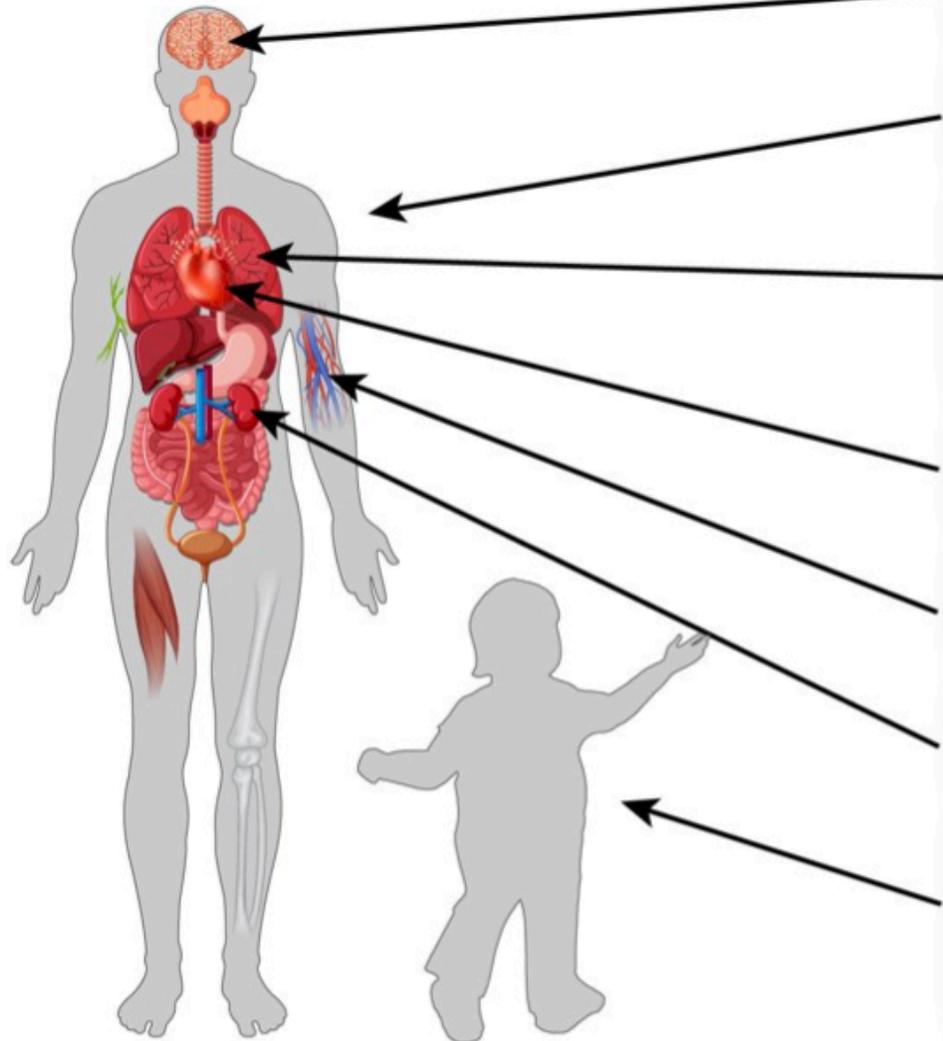
Shortness of breath
or difficulty breathing

Fatigue, muscle
or body aches,
fever or chills

Nausea or
vomiting, diarrhea



Manifestations of Severe COVID-19



Neurological disorders

Hyperinflammation

Acute respiratory distress syndrome (ARDS)

Cardiac dysfunction

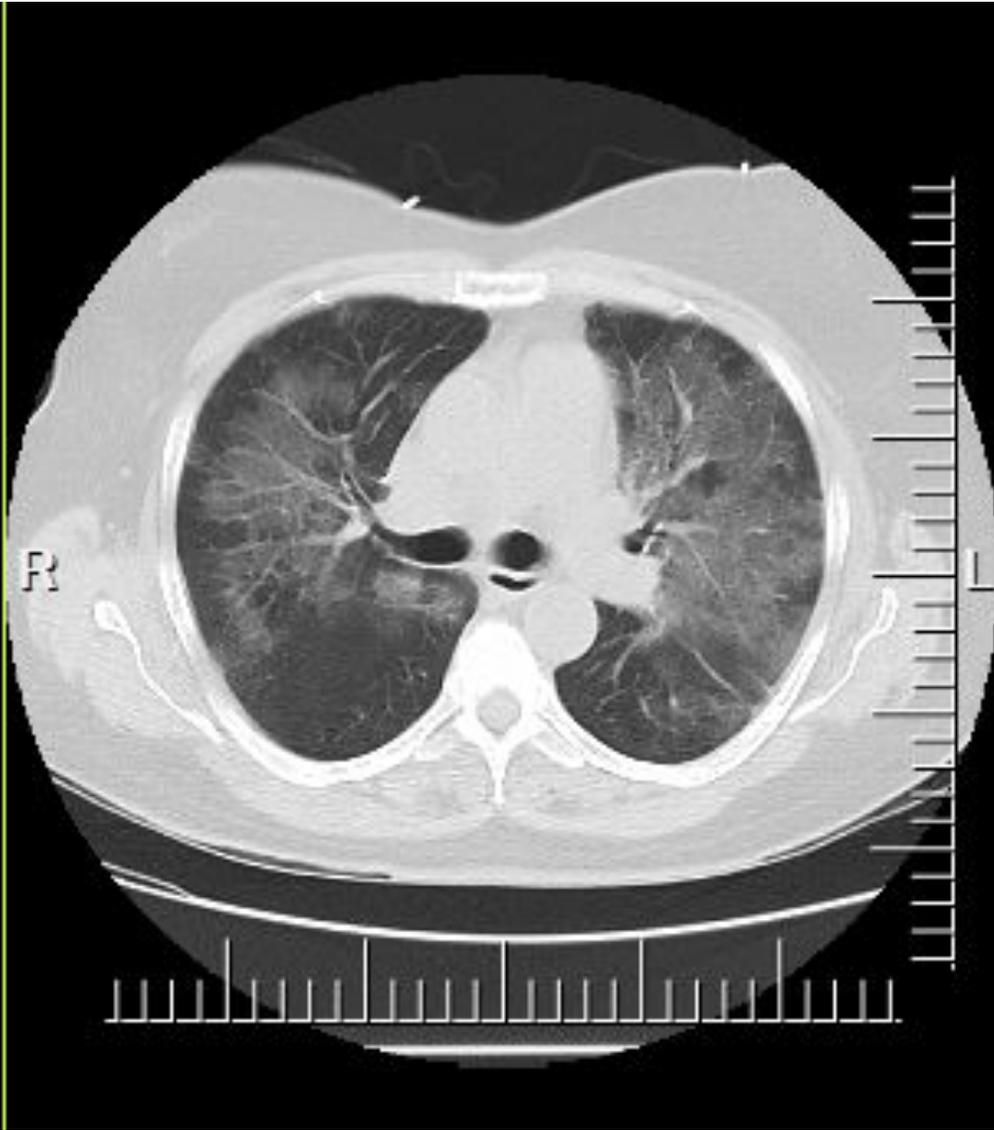
Hypercoagulability

Acute kidney injury

Multisystem inflammatory syndrome in children (MIS-C)

COVID-19 Common Presentation

- **Clinical presentation**
 - 2/3 are SOB at presentation
 - Early hypoxemia (SPO2 < 94%)
 - Bilateral crackles
- May present as GI symptoms
- Lymphopenia a hallmark
- **Imaging**
 - CT superior to CXR
 - Ground glass opacities or consolidation
 - May progress to ARDS
- **Peak findings** in day 10 of illness
- **Resolution** starts on day 14



The Elephant in the Room: Asymptomatic COVID 19

- Longer viral shedding
 - Greater infectious potential
- Less cytokine generation
- Less serological responsiveness
 - 40% asymptomatic were seronegative vs 12.% of symptomatic
 - Protective immunity may not be long-lived

COVID-19 Ethnic/Racial Disparities



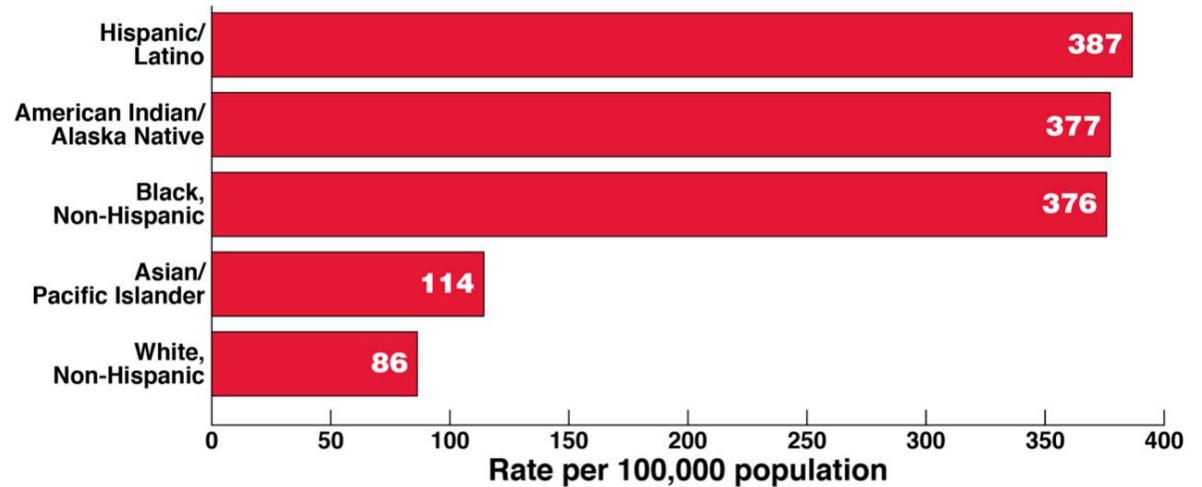
Viewpoint

COVID-19 and Racial/Ethnic Disparities

MW Hooper, AM Nápoles and EJ Pérez-Stable

“The most pervasive disparities are observed among African American and Latino individuals, and where data exist, American Indian, Alaska Native, and Pacific Islander populations.”

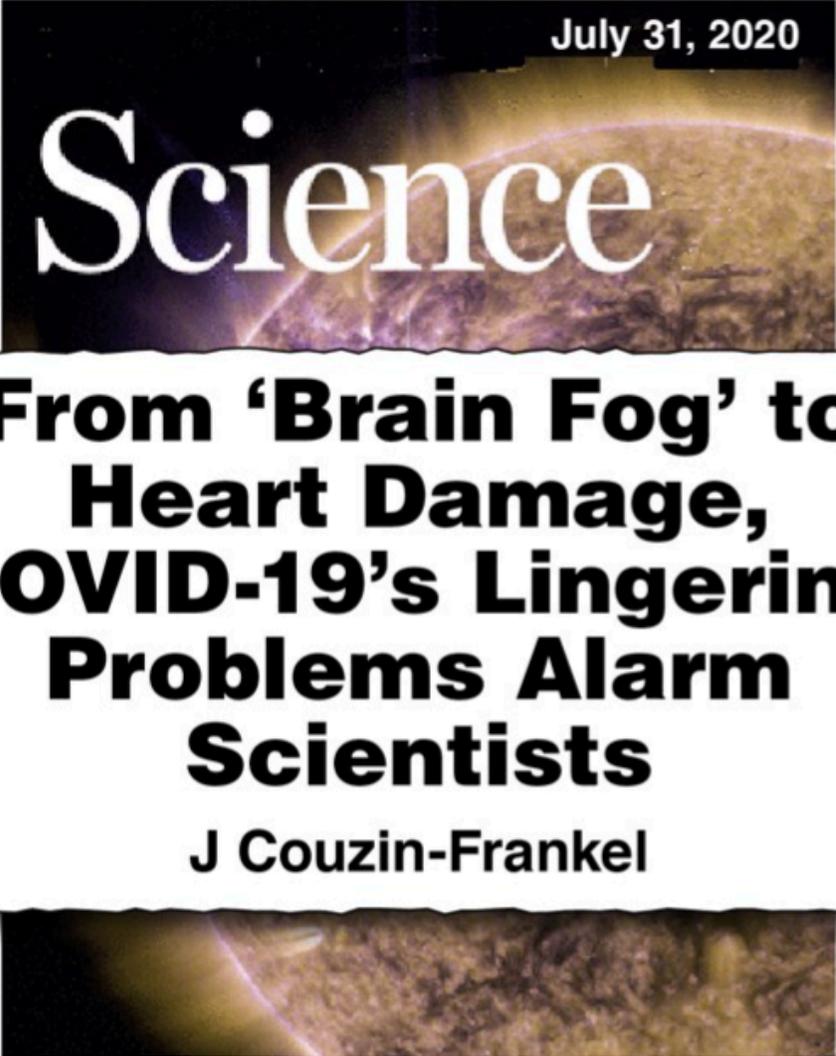
Age-Adjusted COVID-19-Associated Hospitalization Rates by Race and Ethnicity, United States, March 1 – October 10, 2020



Source: CDC COVID-NET. Data from 14 states.

Post-COVID-19 Syndrome

July 31, 2020

The image shows the cover of the July 31, 2020 issue of the journal Science. The cover features a photograph of a planet's horizon with a thin layer of atmosphere. The word "Science" is printed in a large, white, serif font across the top half of the cover.

Science

**From 'Brain Fog' to
Heart Damage,
COVID-19's Lingering
Problems Alarm
Scientists**

J Couzin-Frankel

August 12, 2020

STAT

**Long After the Fire
of a COVID-19
Infection, Mental
and Neurological
Effects Can Still
Smolder**

E Cooney

June 30, 2020

Science

**Just 50% of
Americans Plan to
Get a COVID-19
Vaccine.
Here's How to Win
Over the Rest**

W Cornwall

Do you plan to get a coronavirus vaccine when one is available?

Overall



Under age 60



Age 60 and older



White



Black

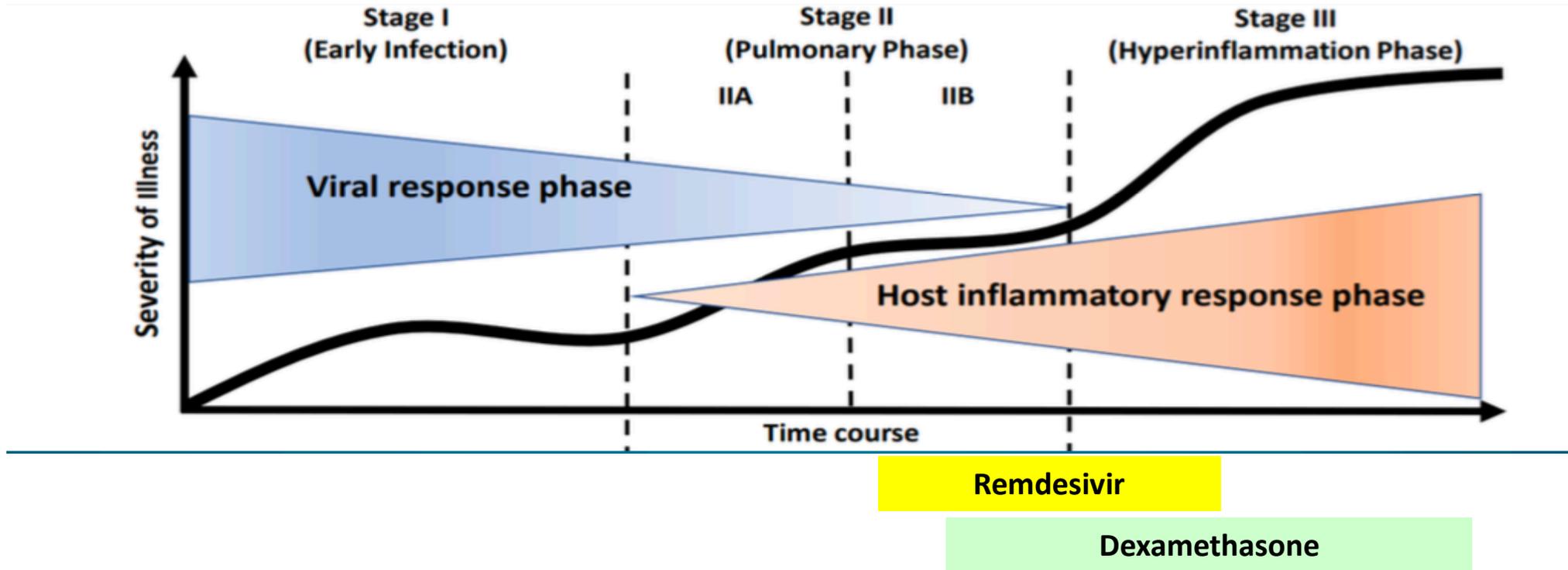


Hispanic



Yes Not sure No Did not answer

Considerations for Treatment: Timing?



- No treatment available for outpatients
- Remdesivir **decreases length of stay** in hospitalized patients who require oxygen but not too much oxygen
- Dexamethasone **decreases mortality** in hospitalized patients who require oxygen
 - Mortality decreased on patients on mechanical ventilation from 40% to 28%, On oxygen from 25% to 20%

COVID-19 What Works and what Helps

- Don't kid yourself, this is not the flu!!!
- Hydroxychloroquine does not work!!!!!!!!!!
- Ingesting bleach does not work!!!!
- **What works to mitigate the pandemic**
 - Mask works
 - Physical distancing works
 - Hand washing works
 - Public health works
- **What helps us moving forward**
 - Following Science
 - Perseverance
 - Empathy
 - Kindness
 - Finding meaning in what we do