

# COVID 19 and our Cleveland Community

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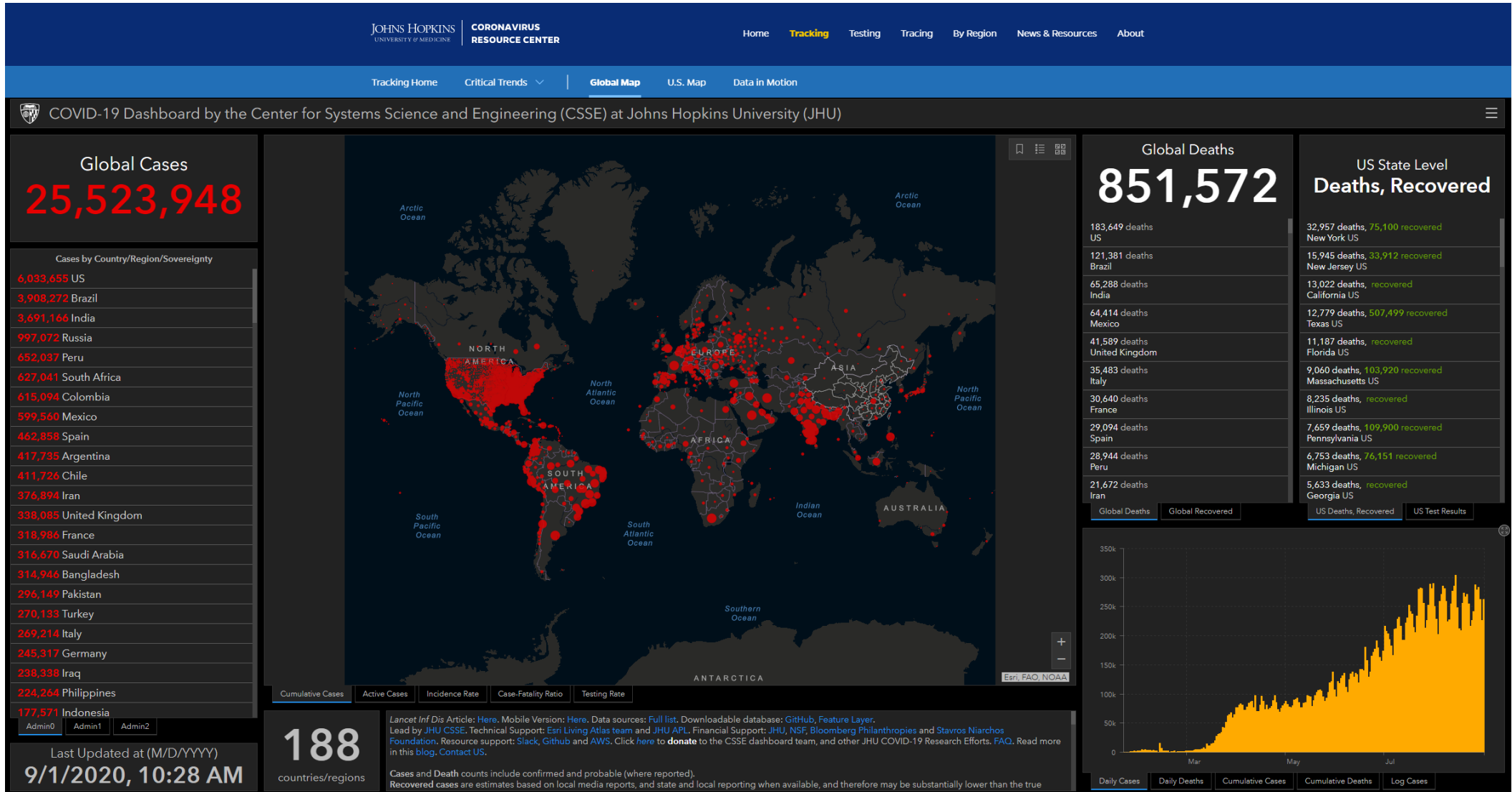
# Disclosures

Dr. Karn discloses the following financial relationships with commercial entities that produce health-care related products or services relevant to the content of this lecture:

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# SARS-CoV-2 pandemic is now a leading cause of death



# SARS-CoV-2 Epidemic Timeline

**Dec. 31, 2019**



China alerts World Health Organization (WHO) to several cases of pneumonia with no known cause in Wuhan. The disease goes on to be named COVID-19.

**Jan. 7**



WHO officials announce they have identified a new virus named SARS-CoV-2 that causes COVID-19. It belongs to the coronavirus family, which includes viruses that cause SARS, MERS and the common cold.

**Jan. 11**



China announces the first death linked to COVID-19.

**Jan. 13**



WHO reports the first case outside of China in Thailand.

**Feb. 26**



National Institutes of Health (NIH) begin the first clinical trial in the U.S. for a potential COVID-19 treatment, remdesivir, an antiviral drug originally developed to treat Ebola.

**Feb. 29**



The FDA took steps to expand novel coronavirus testing to hospital clinical microbiology laboratories.

**Mar. 11**



WHO declares COVID-19 a pandemic, with more than 100,000 cases and 4,000 deaths in 114 countries.

**Apr. 2**



Confirmed cases of COVID-19 top 1 million worldwide.

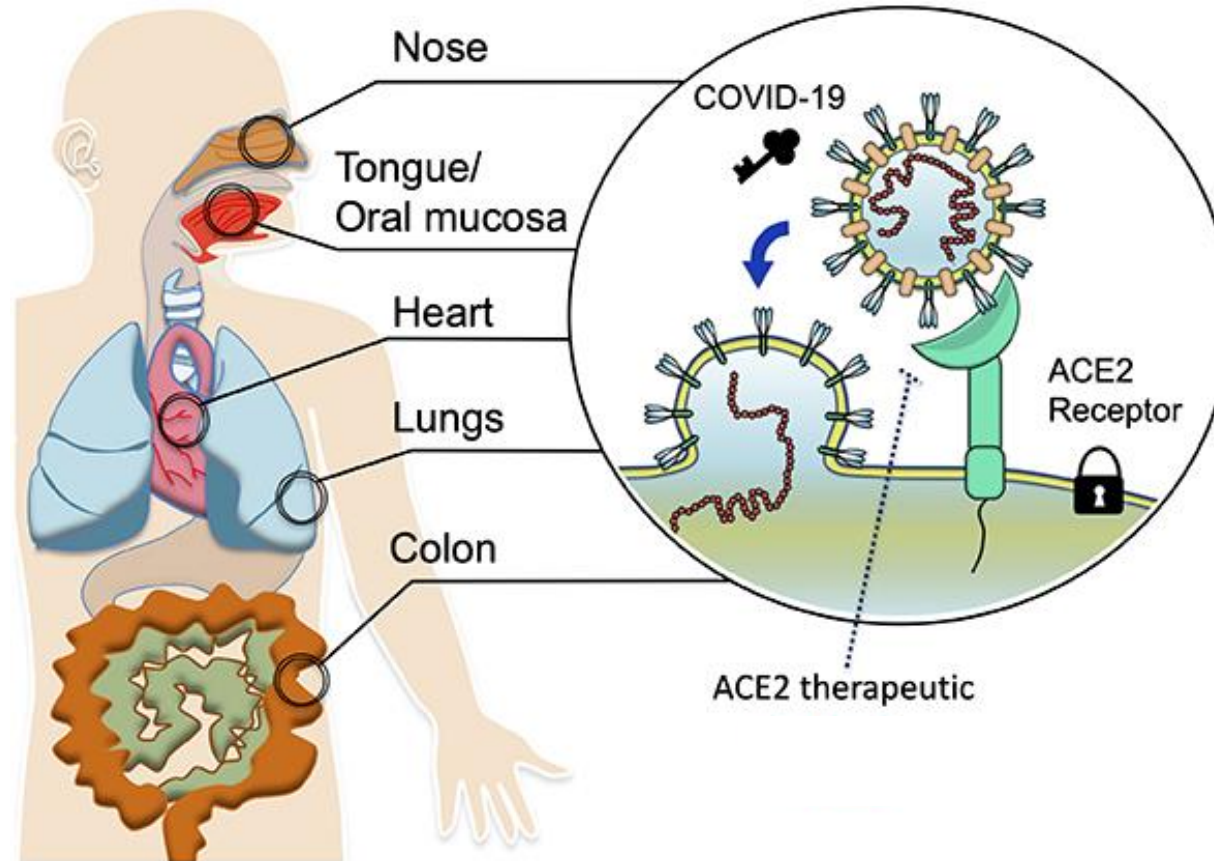
**Apr. 10**



Global deaths due to COVID-19 top 100,000.

# Lesson 2: Follow the receptor SARS-CoV-2 utilizes ACE2;

## SARS-CoV-2



# COVID19- what is known

- RNA virus
- Family of common cold viruses "coronaviridae"
- Similar to SARS (outbreak Toronto) and MERS (carried by camels)
- Some people asymptomatic while others get very sick and die
- Transmission is airborne- respiratory virus
- Masks reduce how many individuals are infected
- Treatments under study but no one works
- Prevention is critical
- When people become ill avoid artificial ventilation if at all possible

# COVID19- what is not known

- Why are some people asymptomatic and some people get very sick unknown
- Older age, obesity, diabetes, non-Caucasian all risk factors for severe disease
- Which medicines work best at different stages of disease
- Does having COVID infection prevent re-infection?
- How long can old infection prevent re-infection?
- Are B-cells that make antibodies or T-cells most important for long term immunity?
- Which vaccines will work best and for how long?

# SARS-CoV-2 Epidemic: Accelerating research by following the HIV playbook

There are **66 programs** working on **3 different approaches**:





# COVID assays are key to surveillance and developing therapies

## RNA-based assays

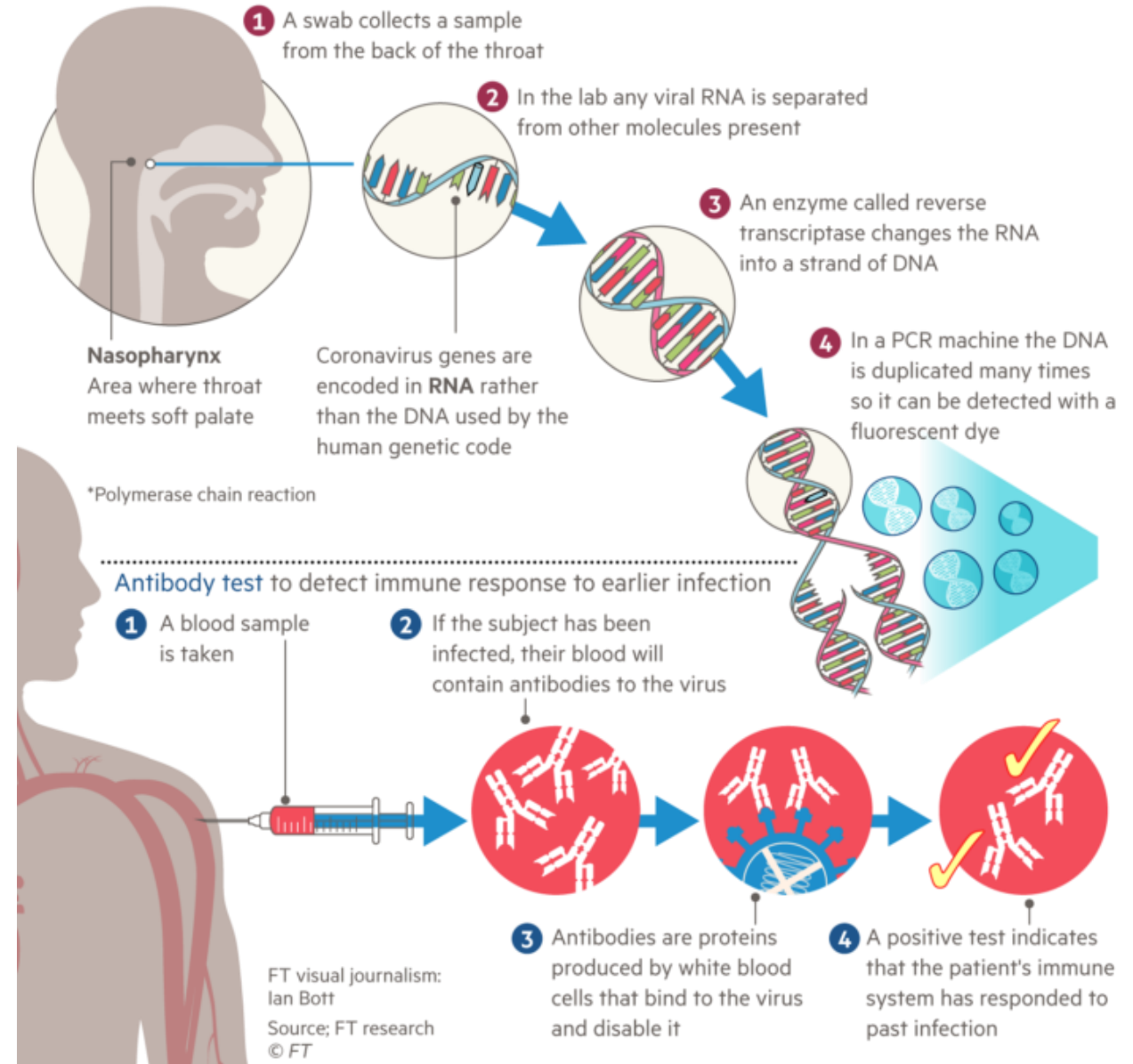
- Only semi-quantitative
- High false negative rates (>5%), manageable false positive rates
- Don't distinguish between replicating virus and RNA fragments
- Too slow, too complex, too expensive for large population studies

## Antibody-based assays

- High false positive rates
- Don't detect early stages of infection

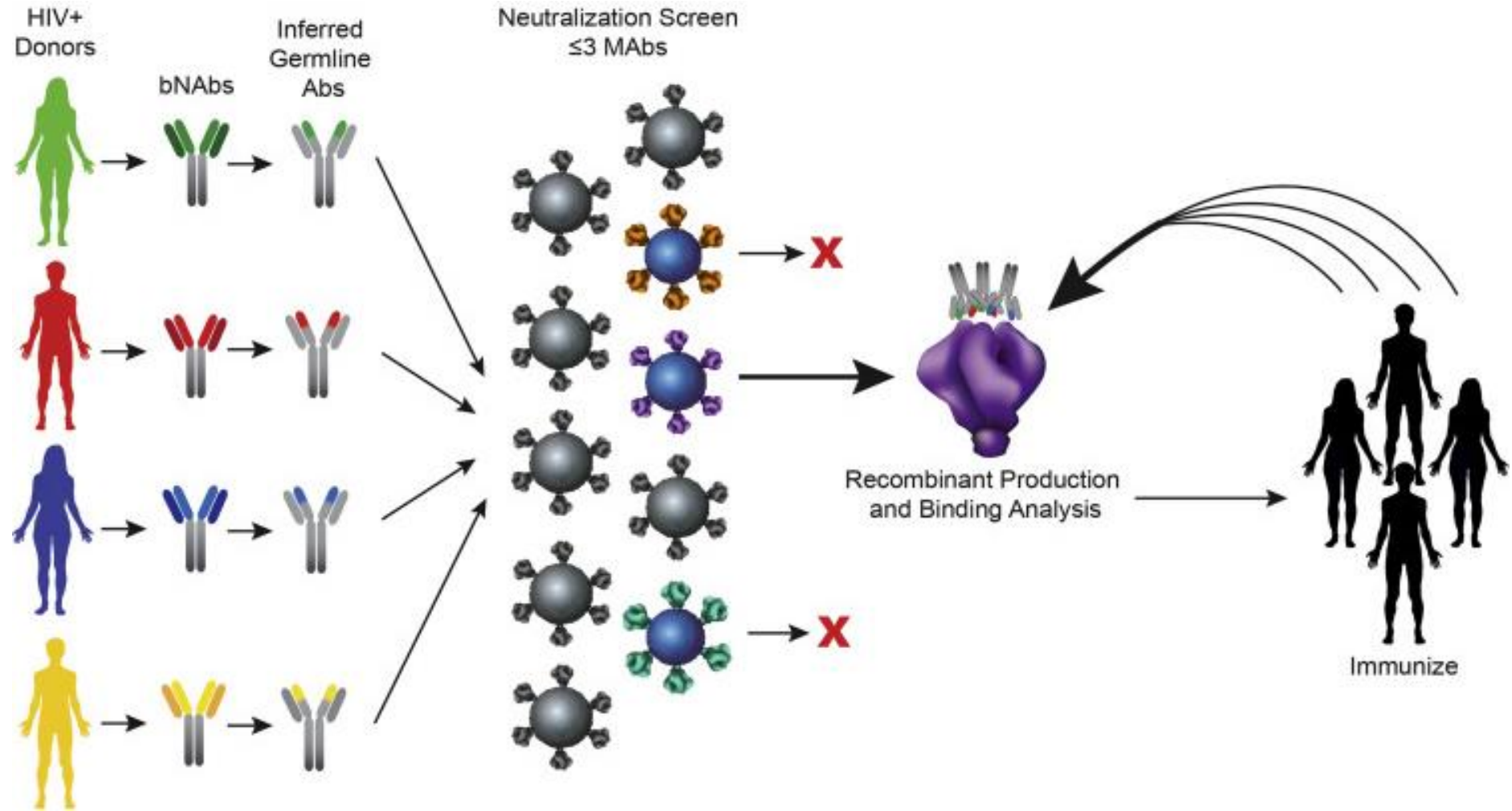
## Coronavirus testing methods

PCR\* antigen test to detect presence of virus in body



# Mimic the immune response

## Passive immunotherapy with broadly neutralizing antibodies (bNAbs)



# Vaccines need rigorous population studies

## How close is the world to a Coronavirus vaccine

### The Good News:

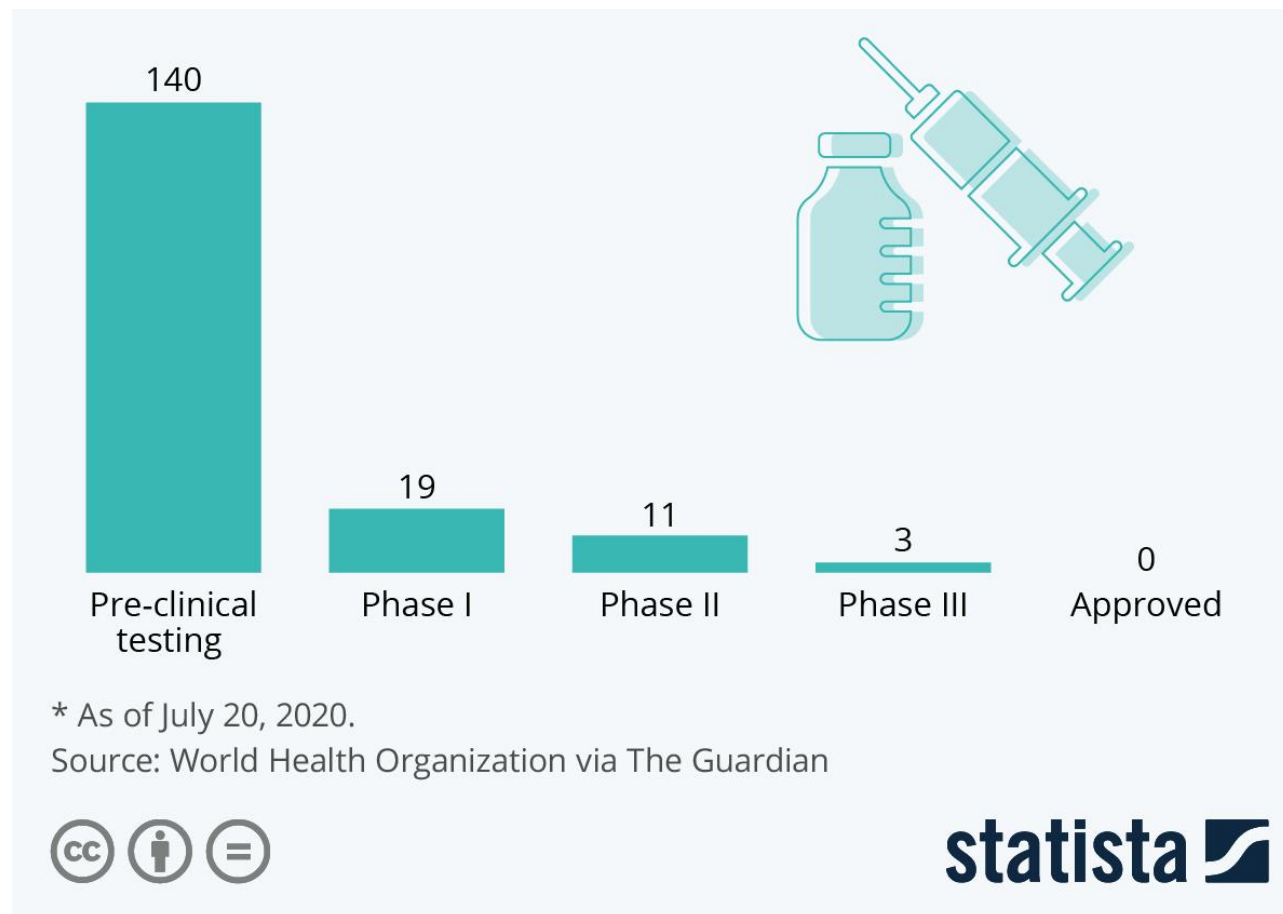
Vaccines appear to be safe and elicit neutralizing antibodies

### The Bad News:

Most patients rapidly lose antibody responses  
Patients can be reinfected

### The unknown:

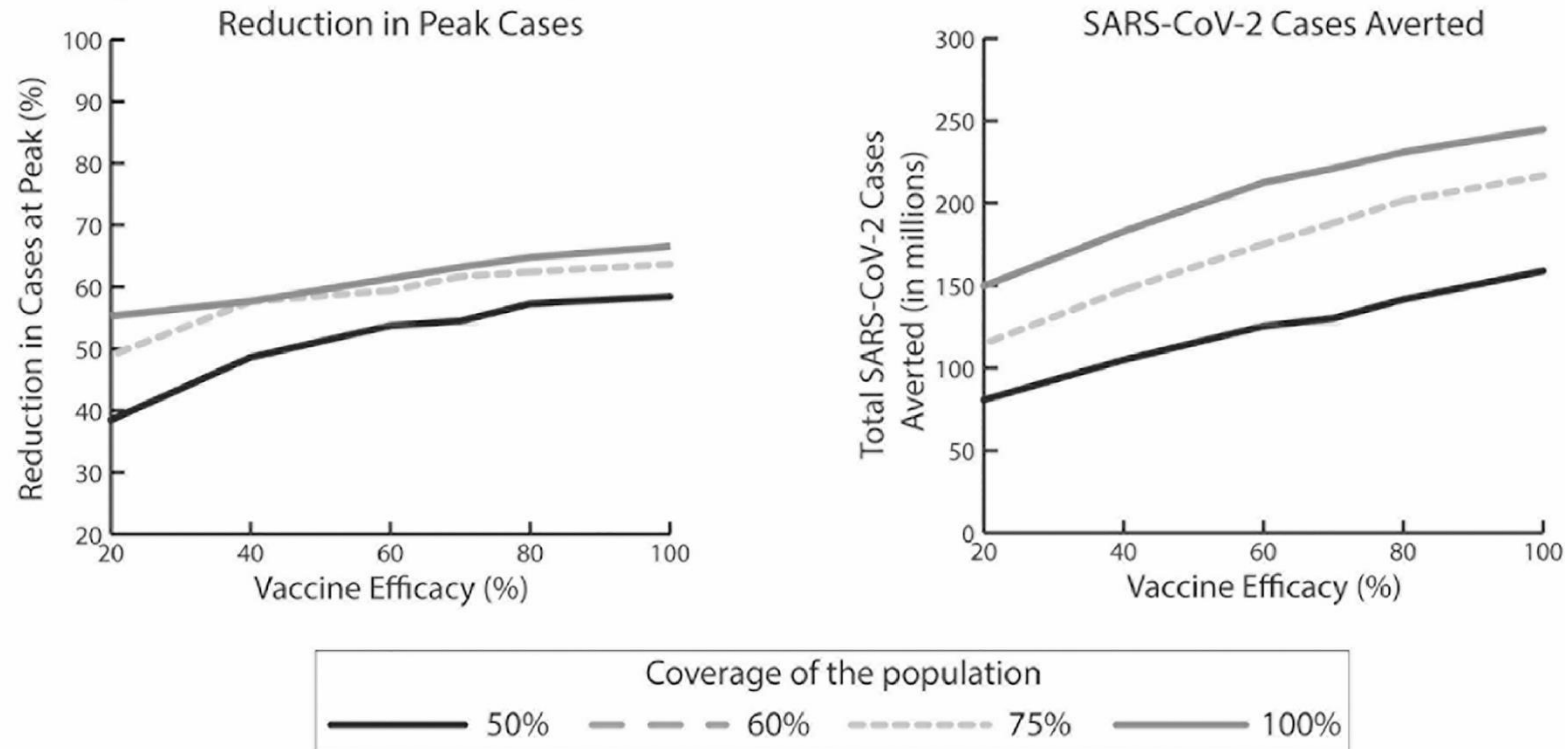
How durable is the protective effect, if any?  
Will vaccines attenuate disease if they don't protect?



# Vaccines need rigorous population studies

## High vaccine efficacy is needed to stop an epidemic as the sole intervention

C. Asymptomatic cases as infectious as symptomatic cases, vaccine prevents infection, vaccinating when 15% of the population has been exposed,  $R_0$  2.5

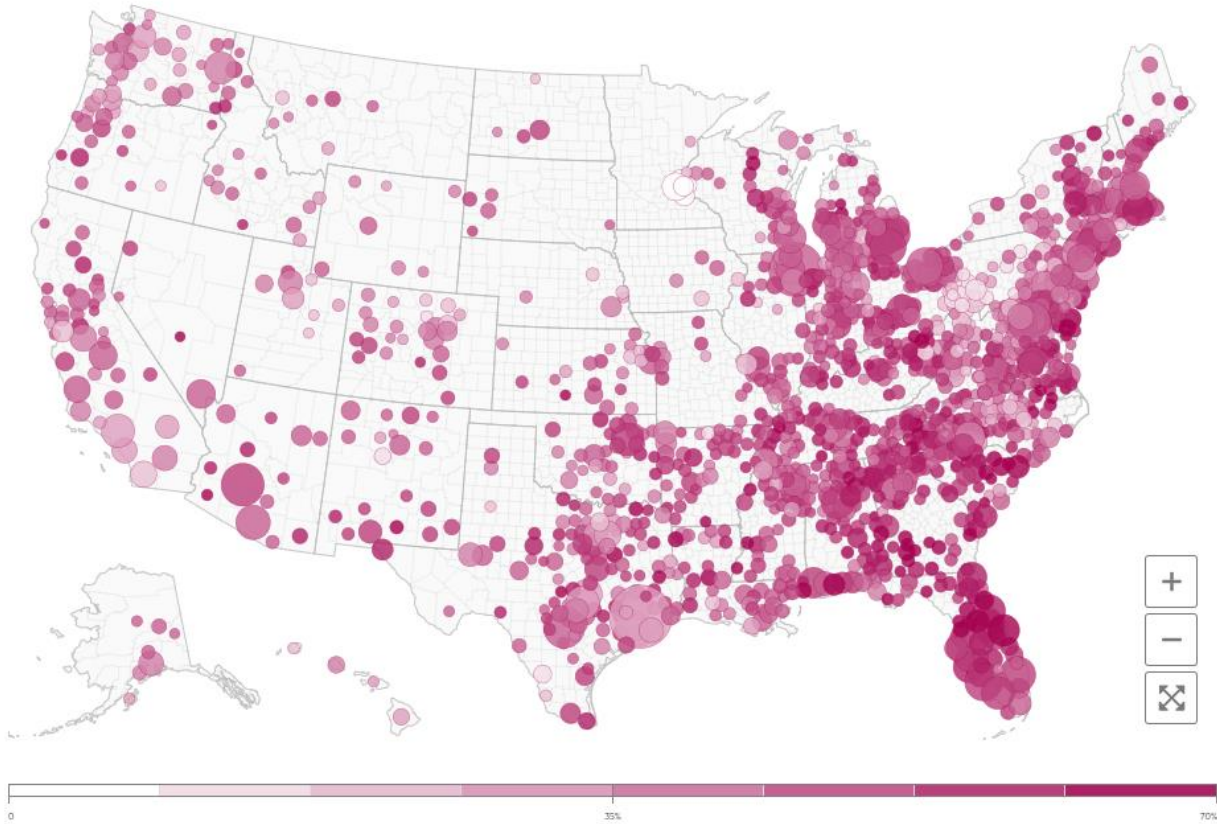


When vaccination occurs after 15% of the population has already been exposed, the resulting reduction in the peak is, at most, 65%.

Bartsch et al., Amer. J. Preventive Med. Published: July 15, 2020  
DOI: <https://doi.org/10.1016/j.amepre.2020.06.011>

# Lesson 9: It is very hard to reach the people who are most at risk

## At risk populations for COVID



### COVID-19: Populations at high risk of severe illness

#### Risk factors for COVID-19 patients

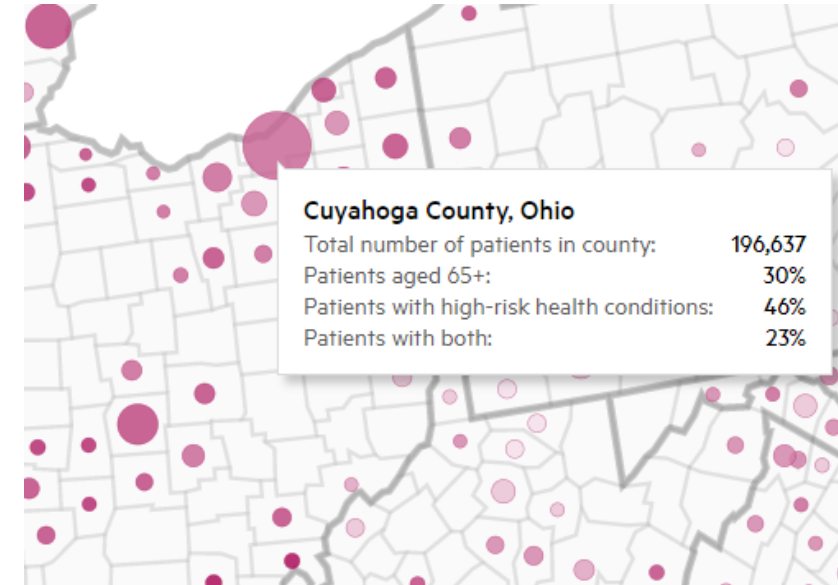
Patients aged 65+

Patients with high-risk health conditions

When filters aren't selected, the dashboard represents the total number of patients seeing providers on the athenahealth network in that specific area

Source: athenahealth

Sample: Based on more than 27 million patients who visited a primary care clinician using athenahealth's electronic health record (EHR) or billing platform between March 2017 and Feb 2020.\*



Patients are considered to be at higher risk if they are aged 65+ or documented as having any of cardiovascular disease, lung disease, diabetes, cancer, chronic kidney disease, liver disease, severe obesity; or who smoke or are immunocompromised.

Which of this information is most important to the community?

How should we make this information available to the community?

What is the best way to get community input into the research study design?

Should we try and identify members of the community to join our research work-groups?

To what extent is the population interested in vaccines?

Who should we talk to about participation in clinical trials for vaccinations to prevent COVID19?

Once the FDA approves one or more vaccines will that make the community seek vaccines?

What are the trust issues with vaccines in clinical trials and vaccines given clinically?

How can maximize that community seeing the doctors involved as trustworthy?

Will the community being receptive to comparing how well different vaccines work in a clinical study?