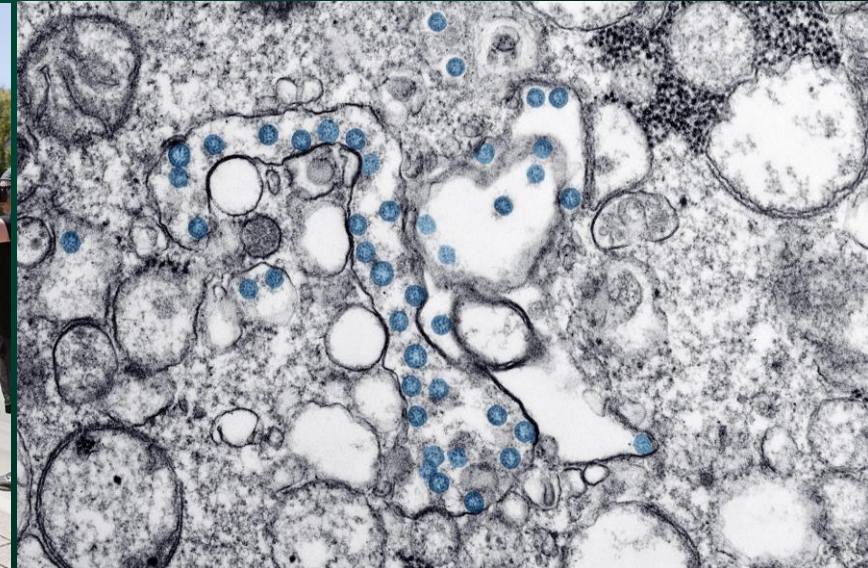
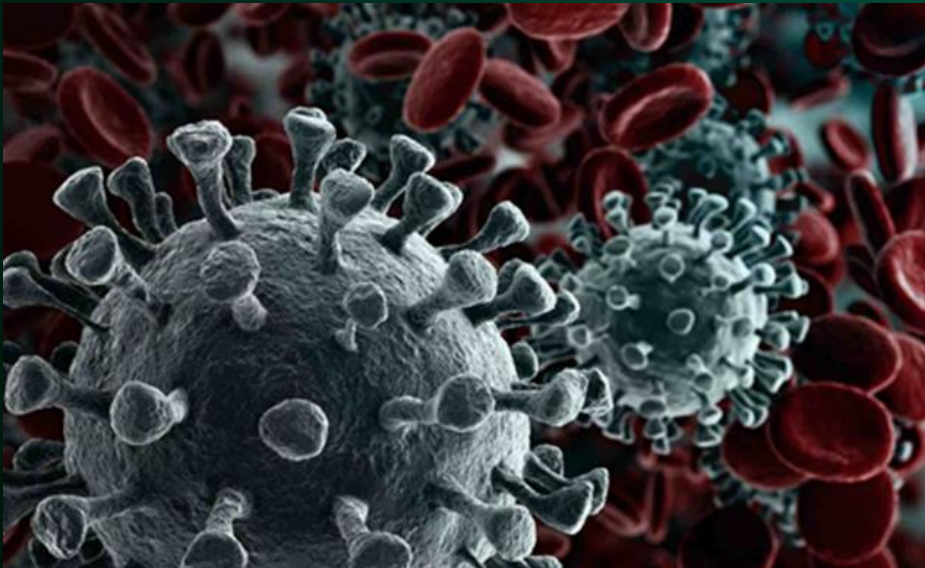


Laboratory Diagnosis of COVID-19: A Target for Misinformation?

*Paul J Carson, MD, FACP
North Dakota State University
Dept. of Public Health*





Outline:

1. Review some of the common misinformation tropes
2. Show data to counter the most common tropes
3. Review the historical and psychological roots of misinformation and vaccine hesitancy
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LOUDER WITH CROWDER





THRIVESHOW.COM

DOCTOR AND SENATOR

SCOTT JENSEN

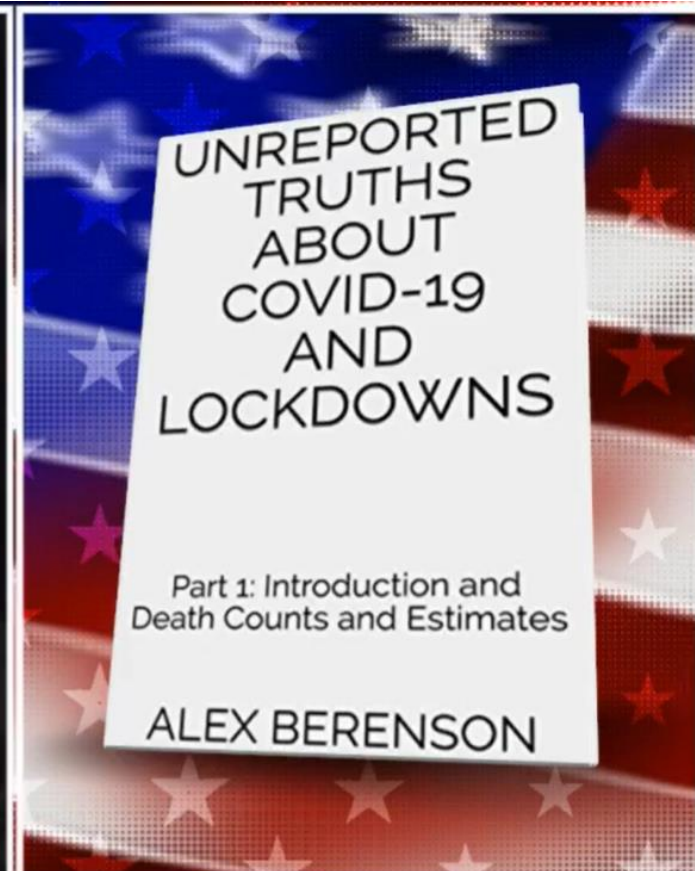
HOW THE NUMBER OF COVID-19 DEATHS ARE BEING INFLATED



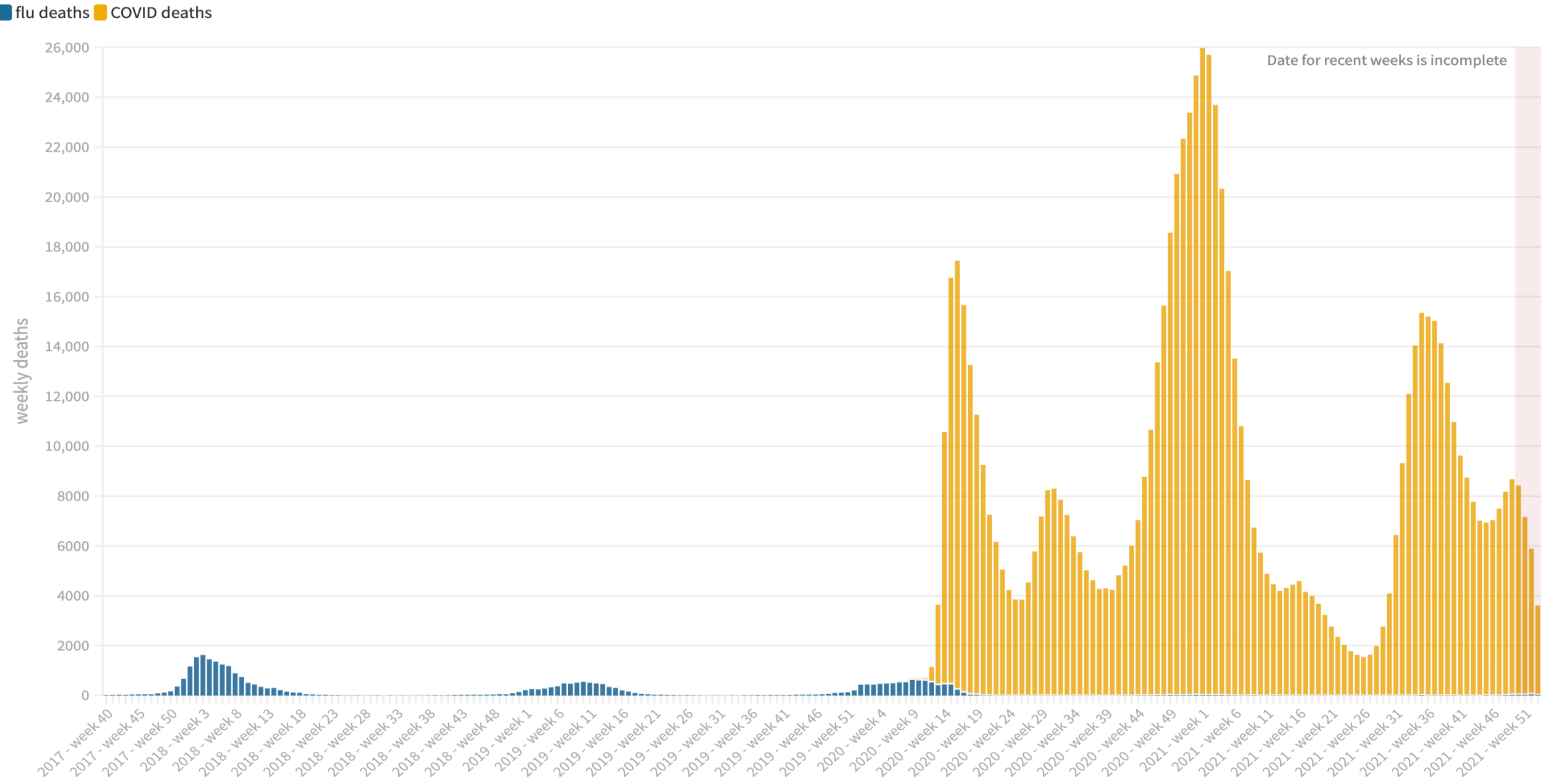
Alex Berenson says worldwide COVID outbreak has so far only been 'slightly worse than a bad flu year'

CORONAVIRUS · Published August 12

'Hospitals are not overflowing. Bodies are not piling up in the streets'

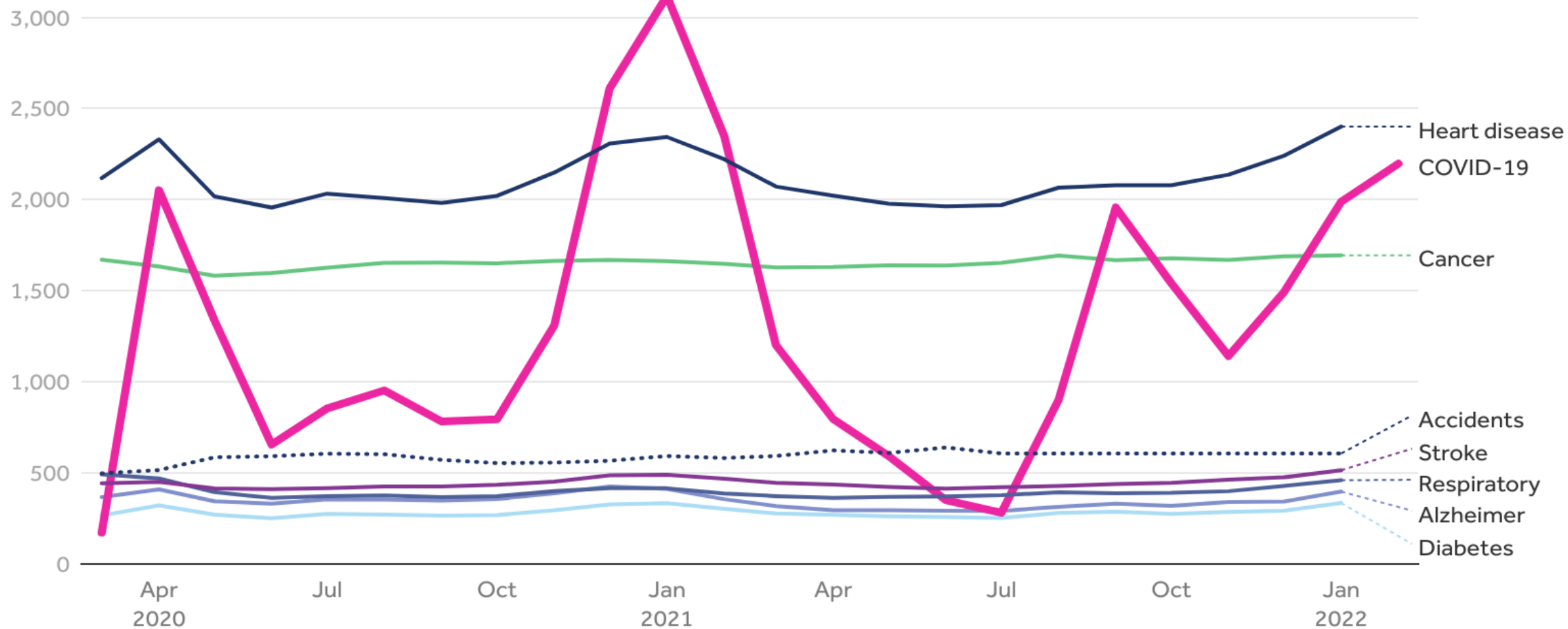


Deaths from COVID vs. influenza in the United States



Source: [Pneumonia and Influenza Mortality Surveillance from the National Center for Health Statistics Mortality Surveillance System](#) • By: Harriet Blair Rowan - Bay Area News Group

Average daily deaths in the United States, by cause (March 2020 - February 2022)

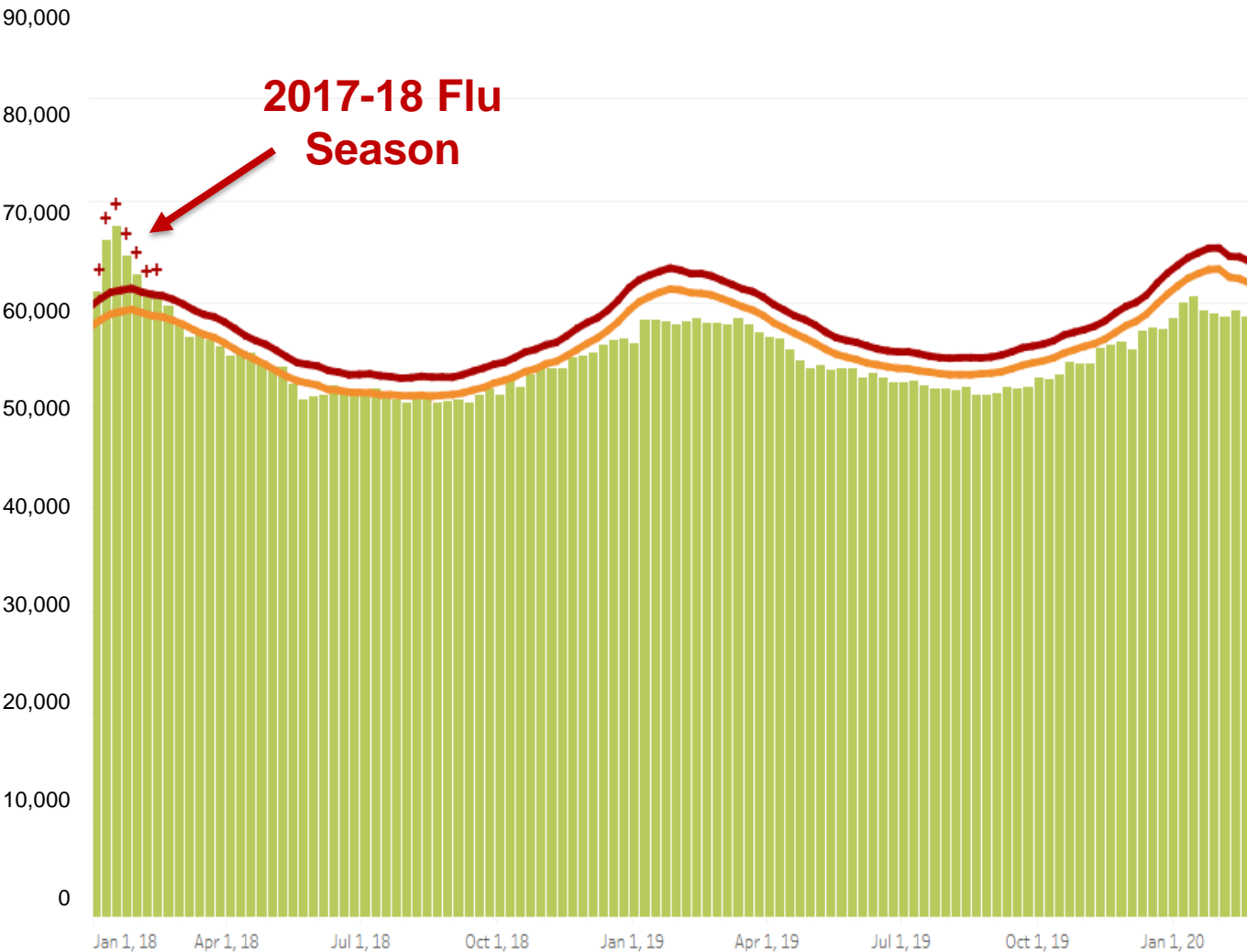


Notes: For accidents from July 2021 onward, the January - June 2021 daily average is plotted. Respiratory disease represents chronic lower respiratory disease.

Enormous Excess All-Cause Mortality in U.S. in 2020 and 2021 Almost All Accounted for by COVID-19

Weekly number of deaths

Comparing excess deaths including/excluding COVID-19



NEWS

Radio Host Adam Carolla Says Only 'Old or Sick' Die of Coronavirus, Asks 'Who's Going to Get Played Next Time'

BY **AILA SLISCO** ON 9/2/20 AT 10:01 PM EDT

Newsweek



**The
Adam
Carolla
Show.**

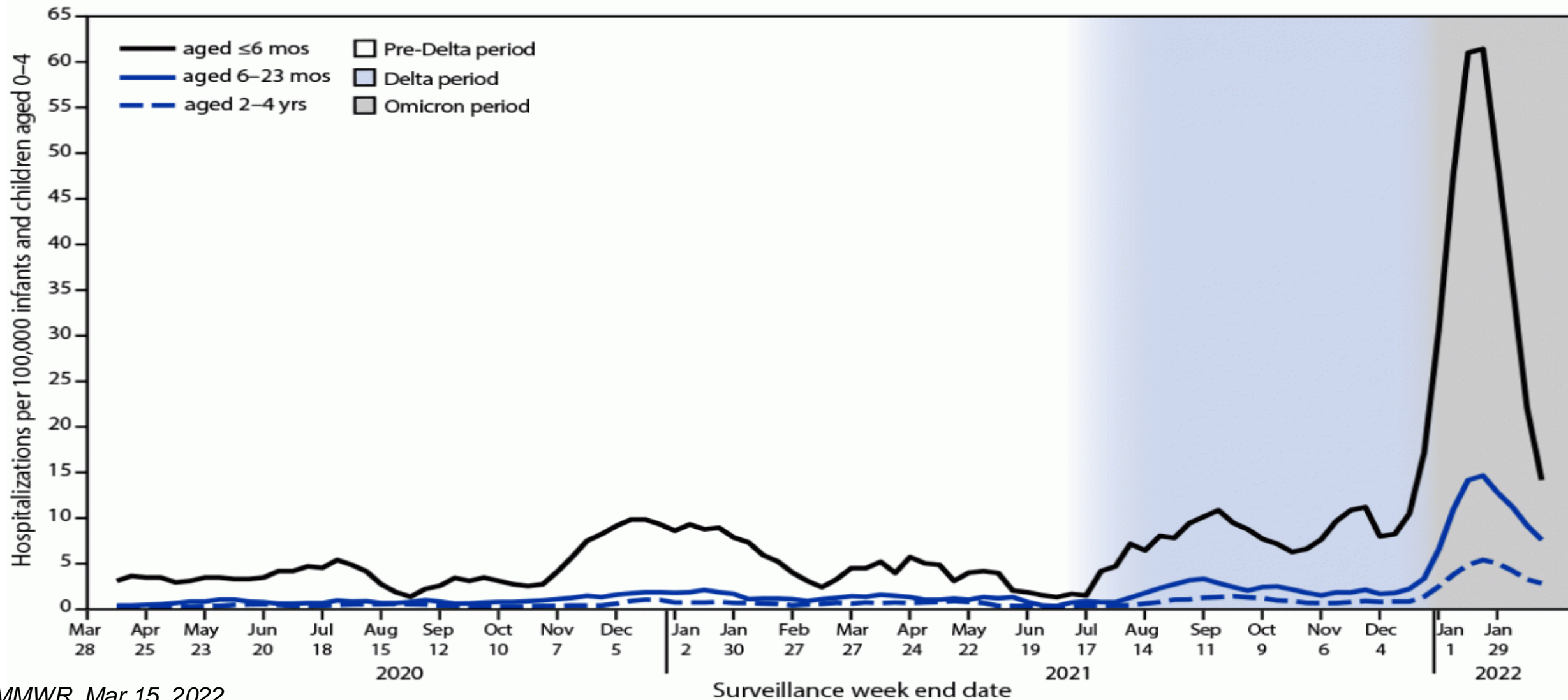
More than 200,000 kids have lost a parent or caregiver to Covid. Efforts to help them have been haphazard.



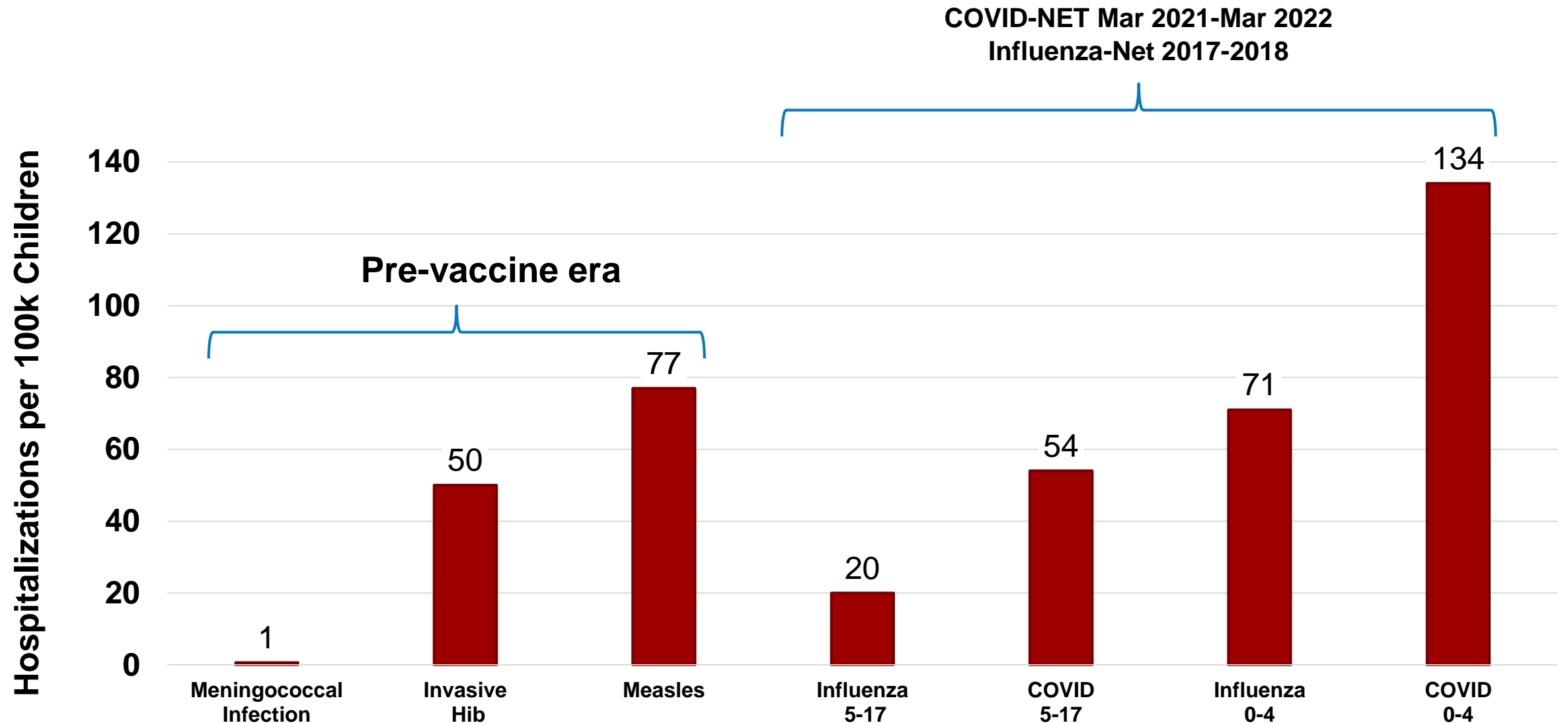
“If a child has lost a parent, someone needs to show up at that doorstep right away – and I mean right away,” one professor of pediatrics said.



3-Week Moving Average COVID-19 Hospitalization Rates in Children < 5 y.o., Mar 2020 – Feb, 2022



COVID Morbidity in Relation to Other VPDs



COVID-19 can make some children very sick

Among nearly 400 **children ages 5–11 years**
hospitalized with COVID-19 during the first few months of Omicron:*



3 in 10
had NO underlying conditions

9 in 10

were
unvaccinated



2 in 10
required ICU care

**Protect all eligible children by
keeping their vaccinations up to date**



* Dec 19, 2021–Feb 28, 2022

bit.ly/MMWR7116

APRIL 19, 2022

MMWR

“I have heard the vaccine could cause female infertility? Is this true?”

A doctor's hand, wearing a white lab coat, holds a silver stethoscope. The stethoscope is positioned next to a clipboard. The clipboard has a white sheet of paper with the word 'INFERTILITY' written in large, bold, black capital letters. A large, thick red 'X' is drawn over the word, indicating it is false or incorrect. The background is a soft, out-of-focus blue and white.

INFERTILITY

**THIS IS
FALSE!!**

Michael Yeadon, PhD
Retired pharmacologist
researcher at Pfizer

- Allergy and asthma treatments
- Let go by Pfizer in 2011



Spring 2020

“Just a common and garden variety virus, to which the world has over-reacted”

“There isn’t going to be a 2nd wave. Viruses don’t do waves, and btw, herd-immunity is almost certainly accomplished”

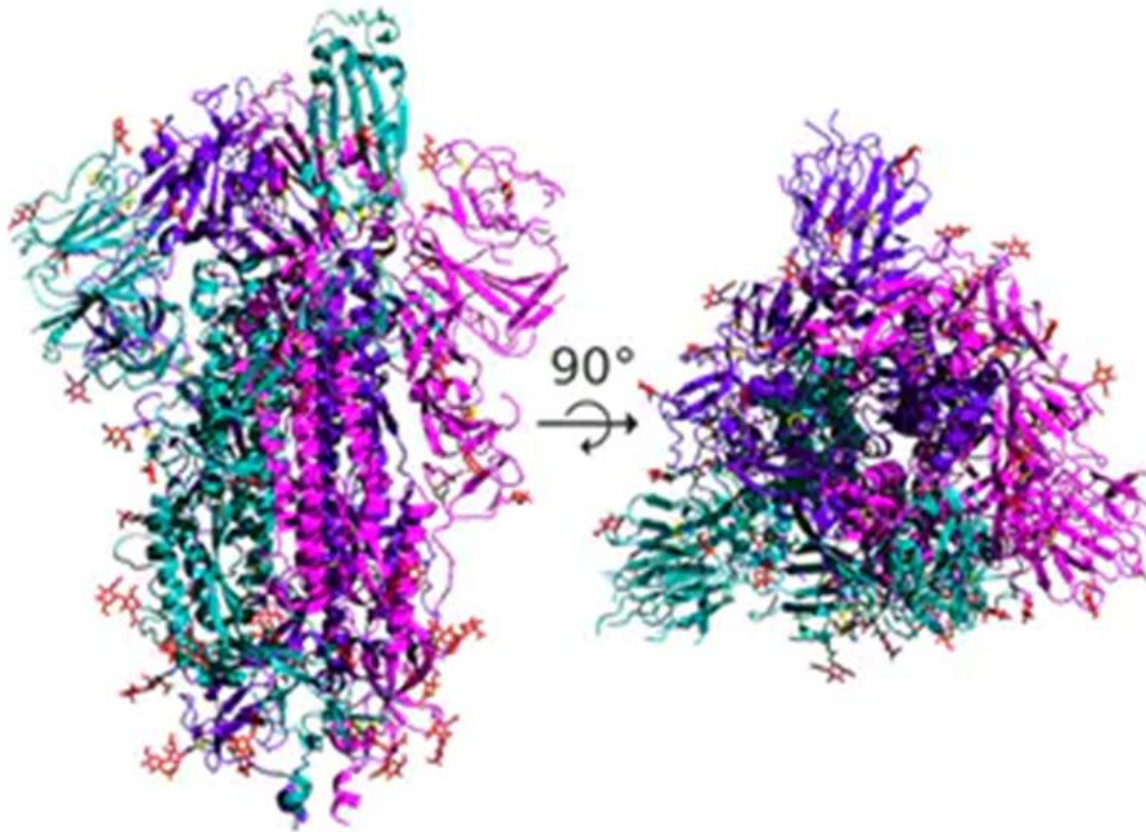
“The pandemic is all but over”

December 2020

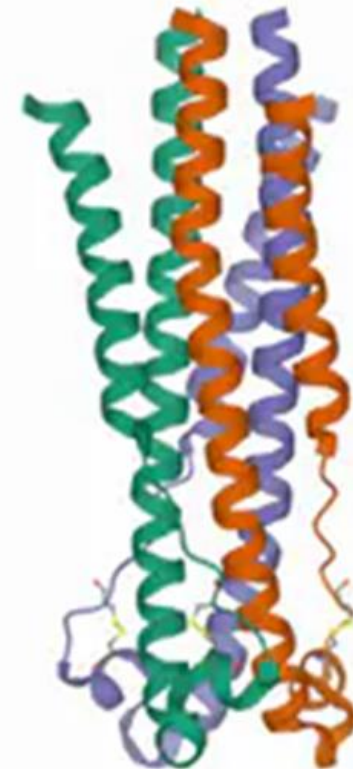
“Female infertility could result from vaccine-induced antibodies”

-----ALGTGIGGITTSTQFYK-----SQELNGDMERVADSLVTLQDQLNSLAAVVLQNRRALDLLTAERG-----
AMQMAYRFNGIGVTQNVLYENQKLIAQFNSAIGKIQALDSLSTASAVLGKLVVNQNAQALNTLVKQLSSNFGAISSVLNDILSRD

Spike Protein



Syncytin-1



Illustrative (and disturbing) little exercise:

Google the term “infertility” or “depopulation”, and the following vaccines:

1. MMR
2. Polio
3. Tetanus
4. HPV
5. Influenza

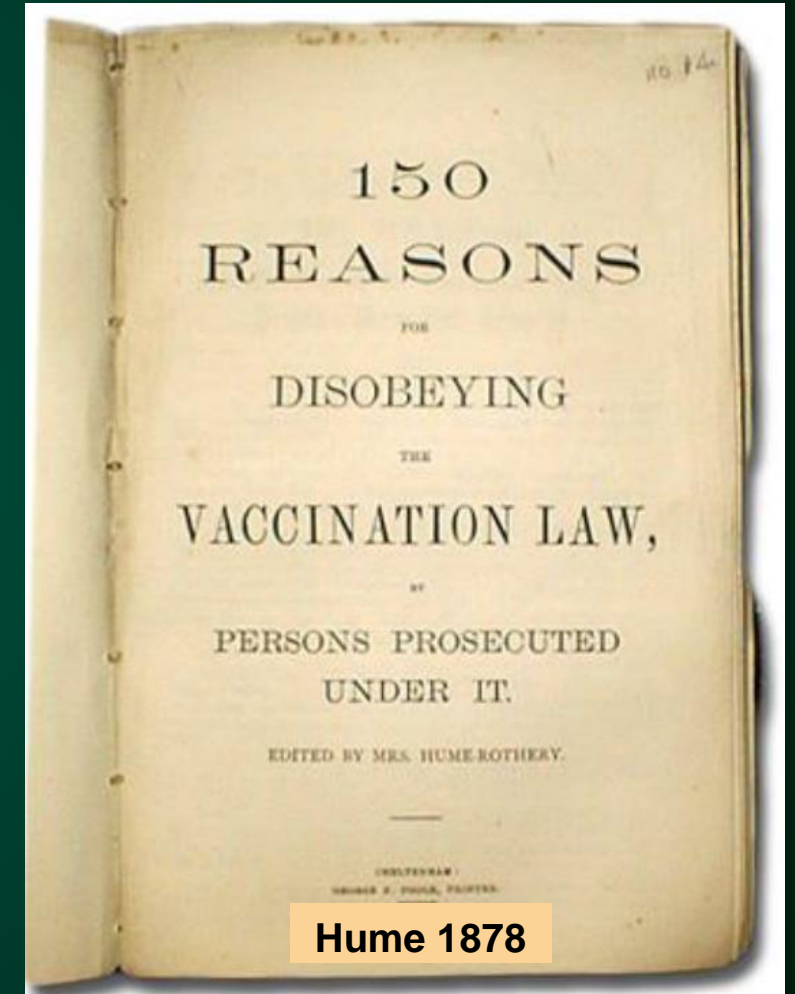
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Roots of Misinformation and Vaccine Hesitancy

- History
- Competing goods
- Free riding on herd immunity
- Numeracy, science literacy, communication of science
- Psychological roots

Vaccine Hesitancy is Not New



Pub^d June 12th 1858. by H. Humphrey 3rd James's Street.
the Publications of y^e Anti-Vaccine Society.

Competing Goods

Personal Liberty
Autonomy
“Health Freedom”

Common Good
Solidarity
Public Health

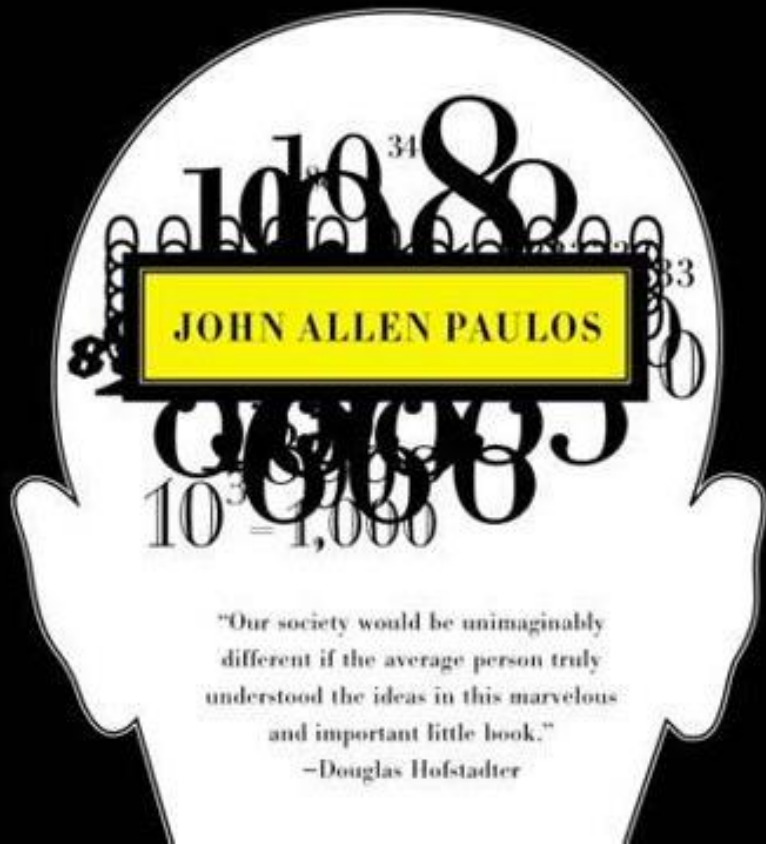


Free Riding

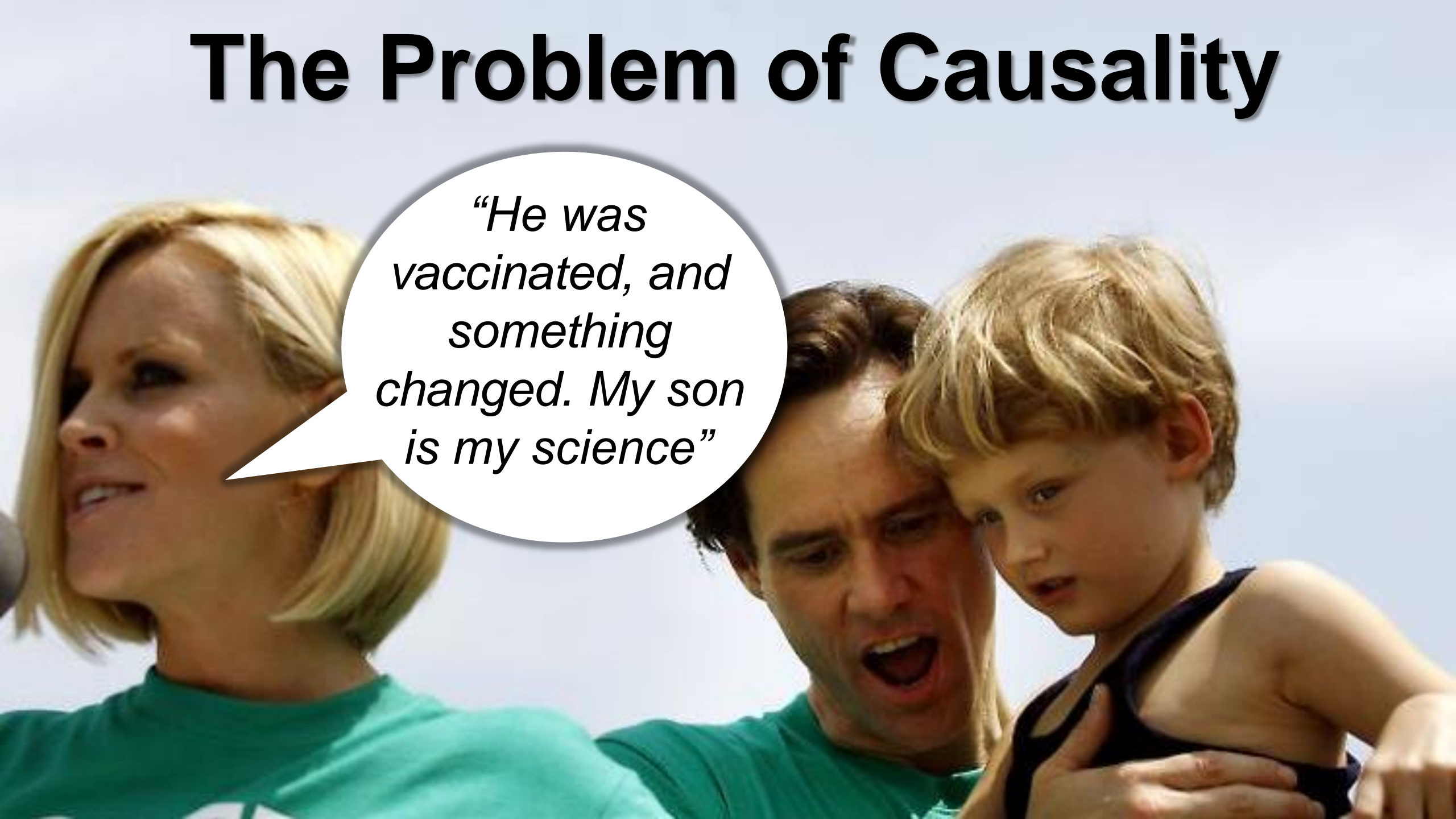


INNUMERACY

MATHEMATICAL ILLITERACY
AND ITS CONSEQUENCES



The Problem of Causality

A photograph of a family consisting of a blonde woman, a man with dark hair, and a young child. The woman is on the left, looking towards the right. The man is in the center, looking down with a concerned expression. The child is on the right, looking towards the left. A white speech bubble with a black outline is positioned over the man's face, containing the text: "He was vaccinated, and something changed. My son is my science".

"He was vaccinated, and something changed. My son is my science"

A Typical Day in America



2,200 heart attacks

2,500 blood clots (DVT)

2,200 strokes

4,900 new cases of cancer

8,000 deaths





Study Group



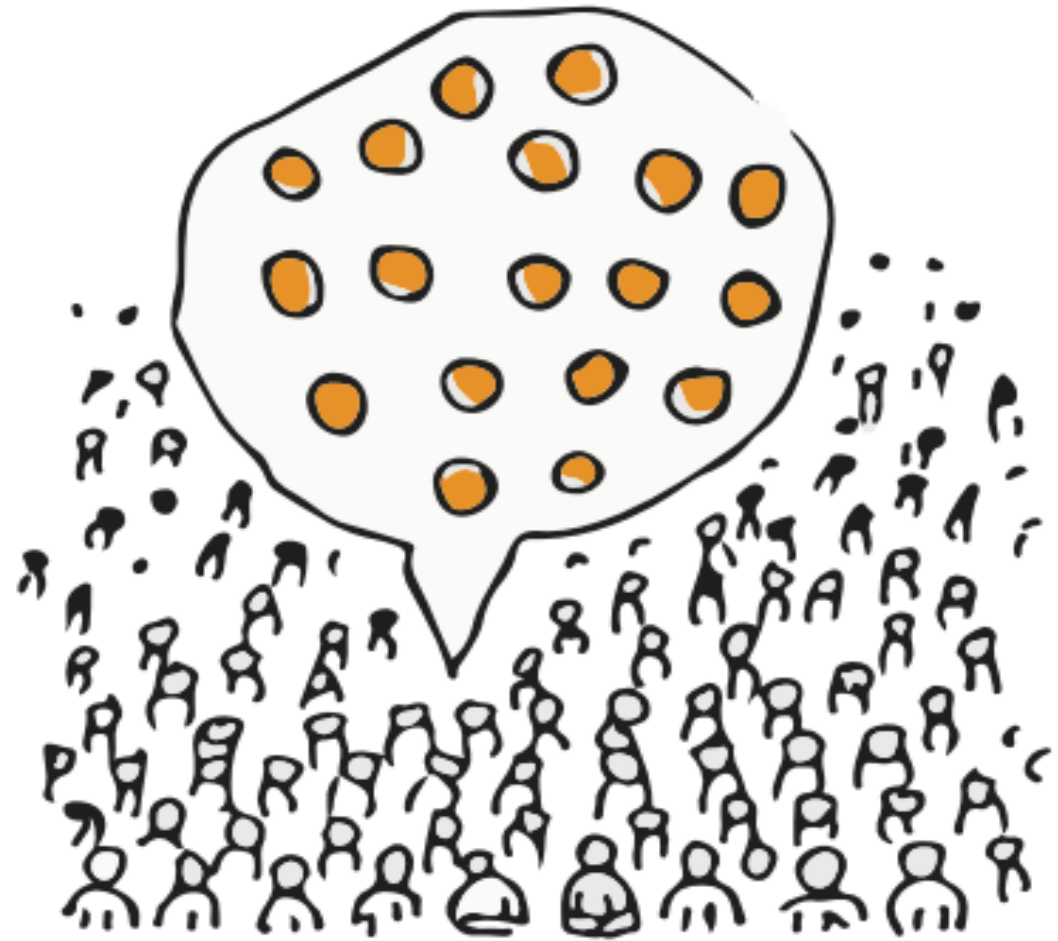
Control Group

**WHAT DO CASE
STUDIES, CASE
SERIES,
AND ECOLOGICAL
STUDIES LACK?**

Science communication



scientists



the public

The “Black Swan” Dilemma and the Communication of Science

- My hypothesis: “All swans are white”
- How can I “know” all swans are white?
- Assess a sample, how large a sample is enough?
- The more and more swans I sample, the greater certainty I have in my hypothesis
- The language of science never allows me to now say “I now know that all swans are white”, I can only have greater and greater degrees of certainty for my hypothesis



Media Frequently Gives Appearance of a Legitimate Debate, With Equal Sides



Ineffective Science Communication

Vaccine Effectiveness in Israel

Outcome	20/06-17/07		
	VE	Lower CI	Upper CI
SARS-CoV-2 cases	39.0%	9.0	59.0
Symptomatic COVID-19*	40.5%	8.7	61.2
COVID-19 hospitalization	88.0%	78.9	93.2
Severe COVID-19**	91.4%	82.5	95.7

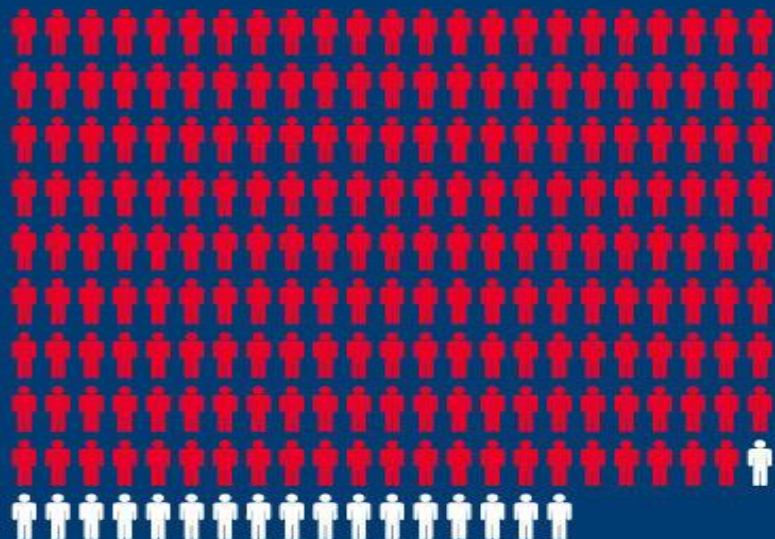
COVID-19 HOSPITALIZATIONS

SANFORD
HEALTH

On Dec. 14, 2021

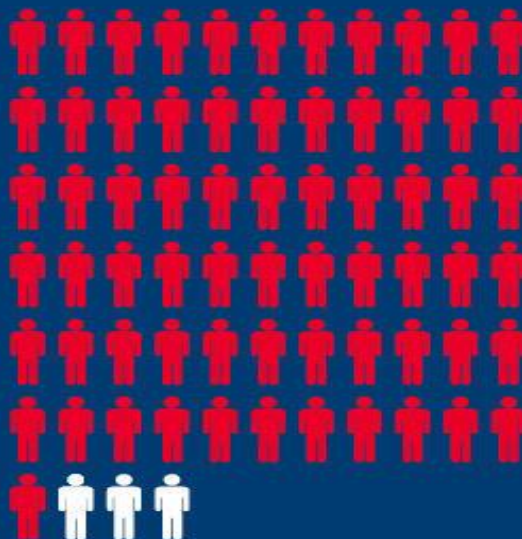
Total number of patients with COVID-19 at Sanford Health*

224
HOSPITALIZED



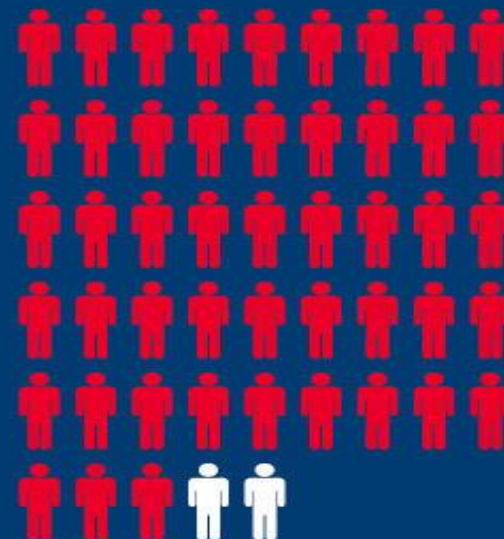
206 unvaccinated
18 vaccinated

70
IN THE ICU



67 unvaccinated
3 vaccinated

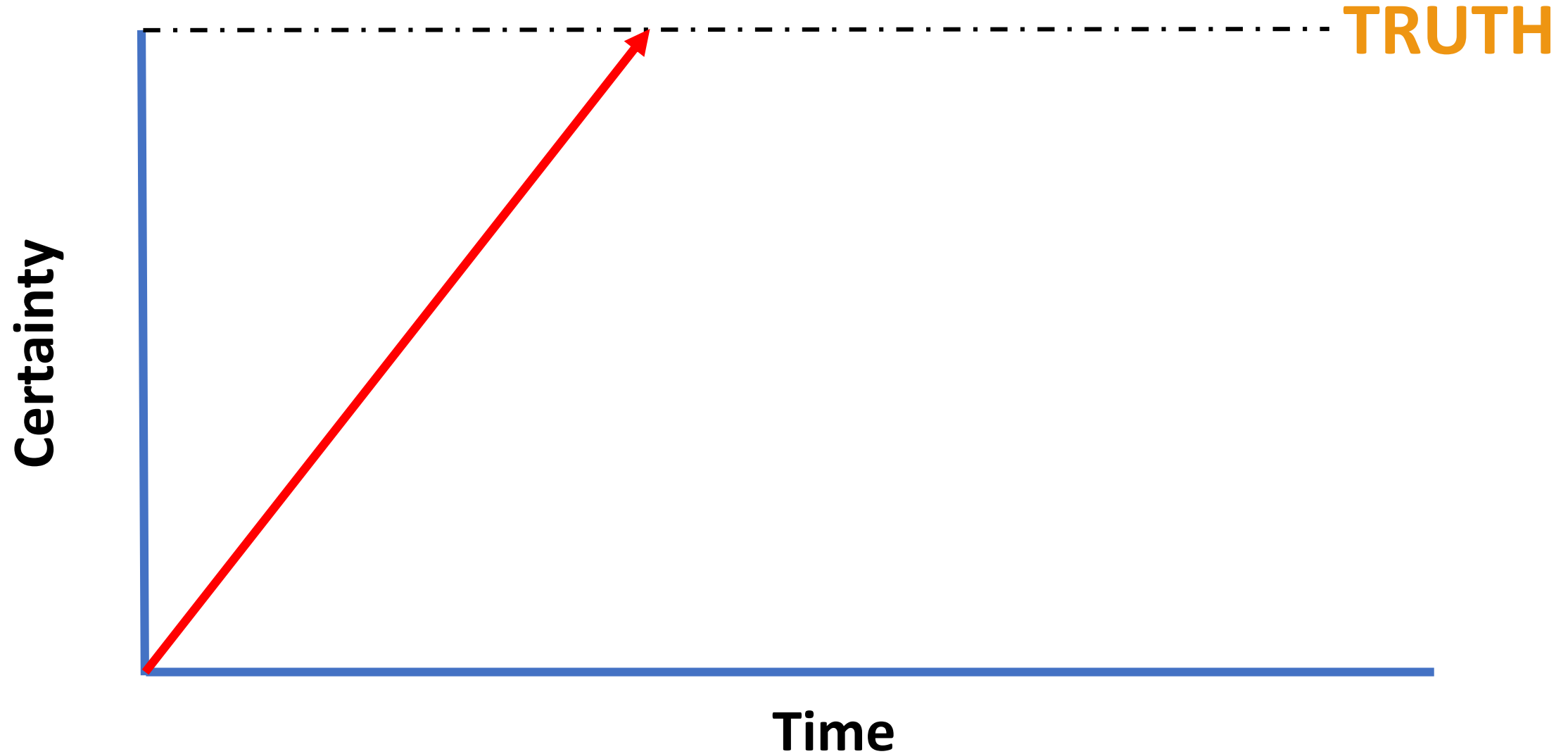
50
ON VENTILATORS



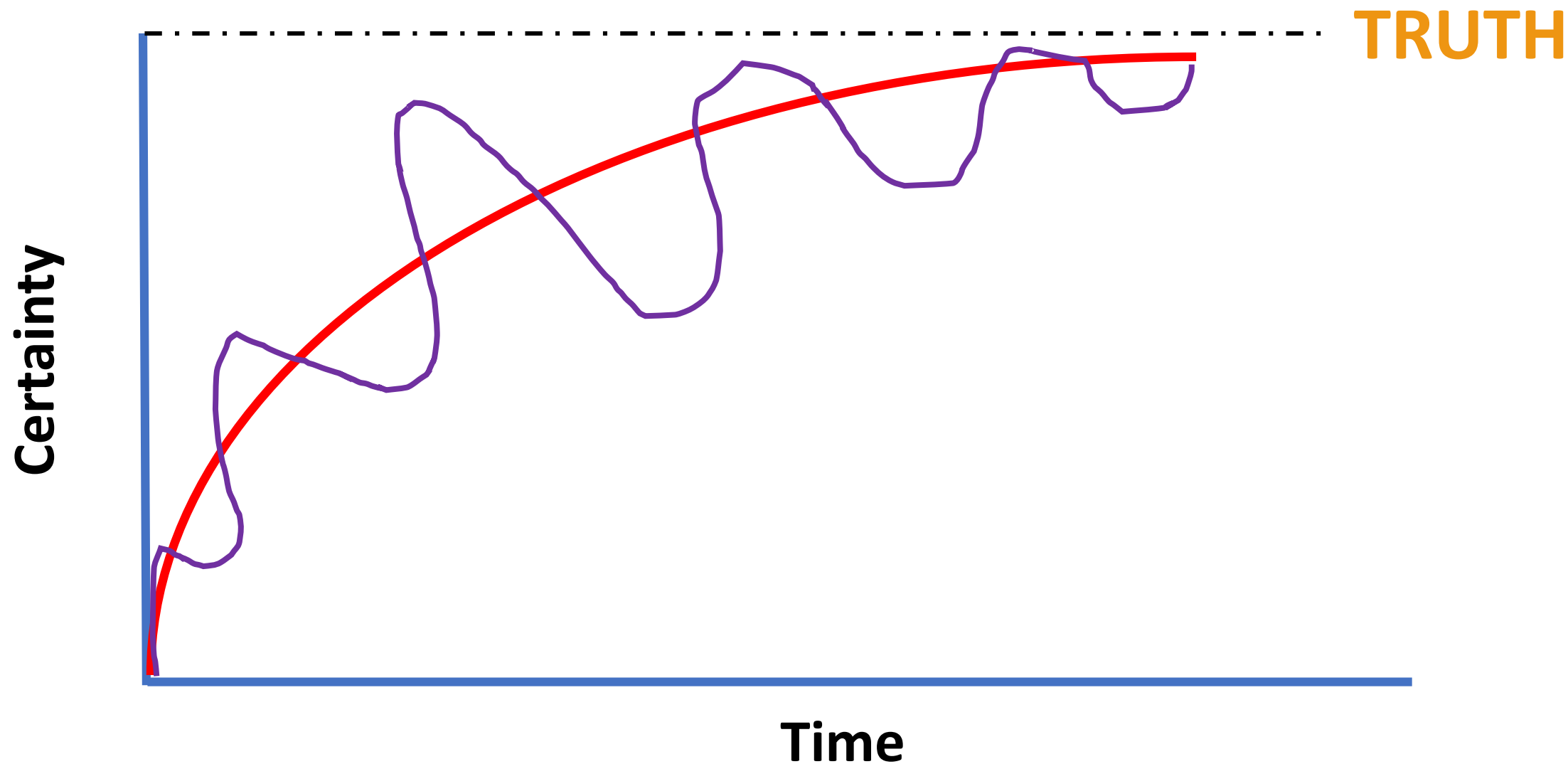
48 unvaccinated
2 vaccinated

*22 Sanford Health-owned hospitals

Advances in Science



Advances in Science





March 2020: Dr. Anthony Fauci talks with Dr Jon LaPook about COVID-19



BY BRIT MCCANDLESS FARMER
MARCH 8, 2020 / 7:02 PM / CBS NEWS



“There’s no reason to be walking around with a mask”

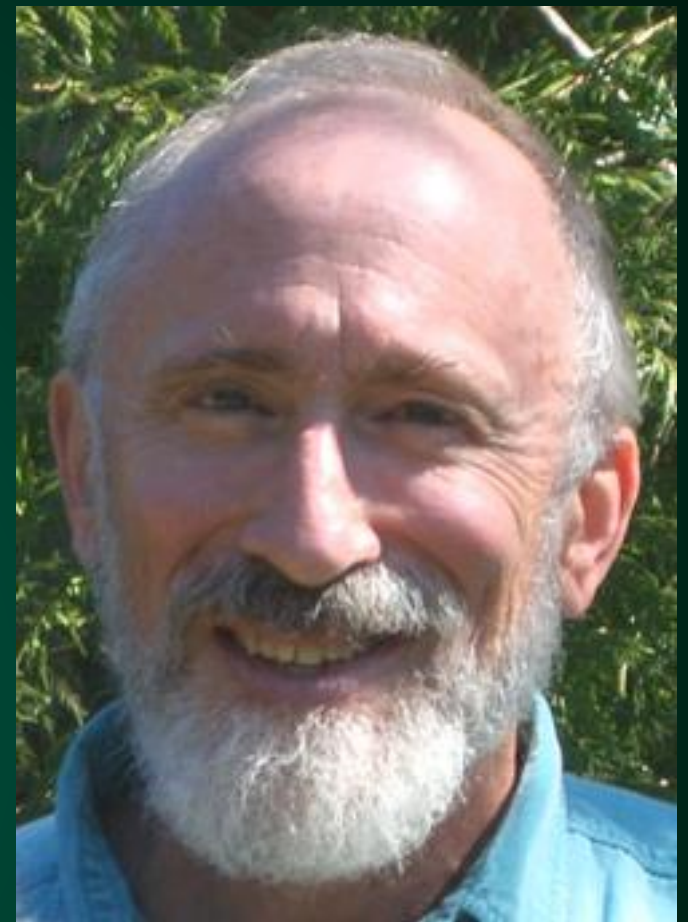
CDC director says masks more guaranteed to work than a vaccine

BY PETER SULLIVAN - 09/16/20 12:11 PM EDT

1,483 COM



The capacity for self-correction is the source of science's immense strength, but the public is unnerved by the fact that scientific wisdom isn't immutable. Scientific knowledge changes with great speed and frequency—as it should—yet public opinion drags with reluctance to be modified once established. And the rapid ebb and flow of scientific “wisdom” has left many people feeling jerked around, confused, and increasingly resistant to science itself.



Dr. David P. Barash
Author, psychologist

“Paradigms Lost” —
Aeon, 2015



Sausage Making 101



SCHMITT LOCKER

- HOMEMADE SAUSAGE
- MEAT PROCESSING
- BUTCHERING

754•2488•NAPOLEON, N.D.



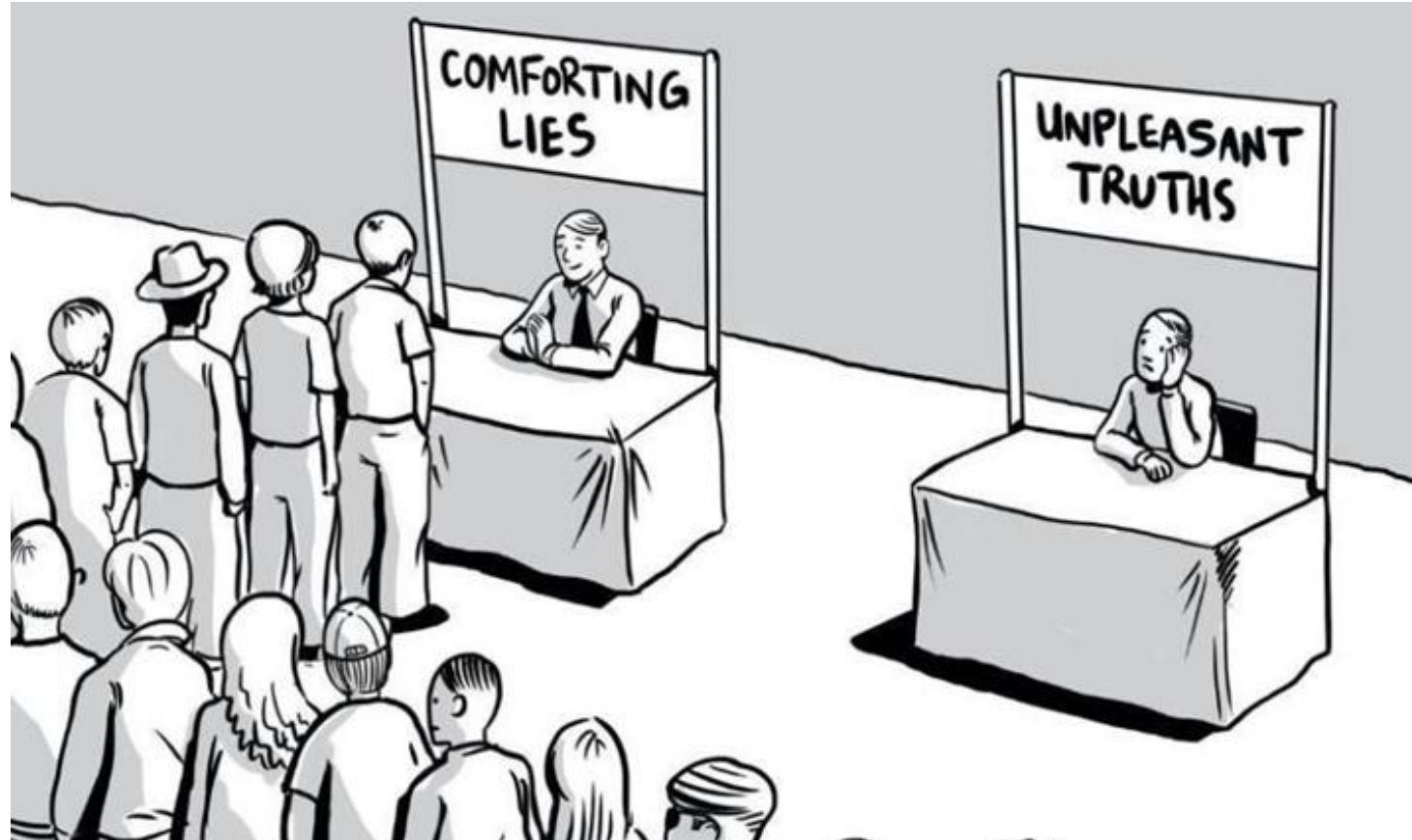
Roots of Misinformation and Vaccine Hesitancy

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- Competing goods
- Free riding on herd immunity
- Numeracy, science literacy, communication of science
- Psychological roots

Confirmation Bias

“What the human being is best at doing is interpreting all new information so that their prior conclusions remain intact.”

— *Warren Buffett*



THIS IS YOUR BRAIN—ON FACTS

Question the way we think—and the way we think we think



CONFIRMATION BIAS

We only pick “evidence” that backs up what we already “know.”



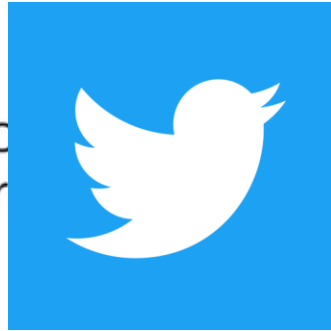
THE BACKFIRE EFFECT

Faced with contradictory evidence, the brain defends existing beliefs like a fortress.



GROUP-THINK

Opinions are symbols of belonging, so we work hard to protect their group’s worth.



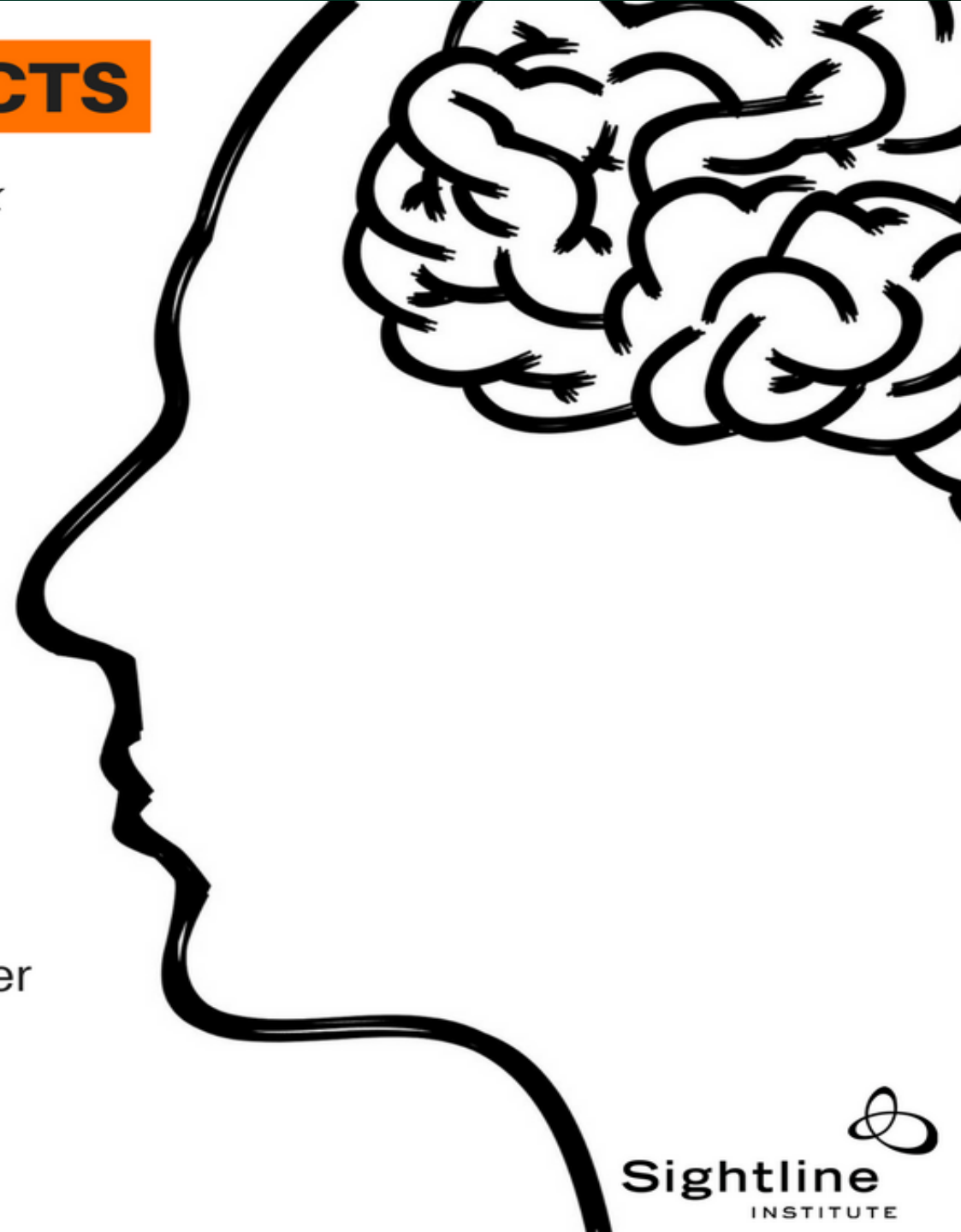
ANCHOR HEURISTIC

Conclusions based on one vivid example overpower logical narratives.



AFFECT HEURISTIC

Feelings trump facts.



Are Smart People Ruining Democracy?

Dan Kahan / TEDxVienna



CONSPIRACY THEORIES

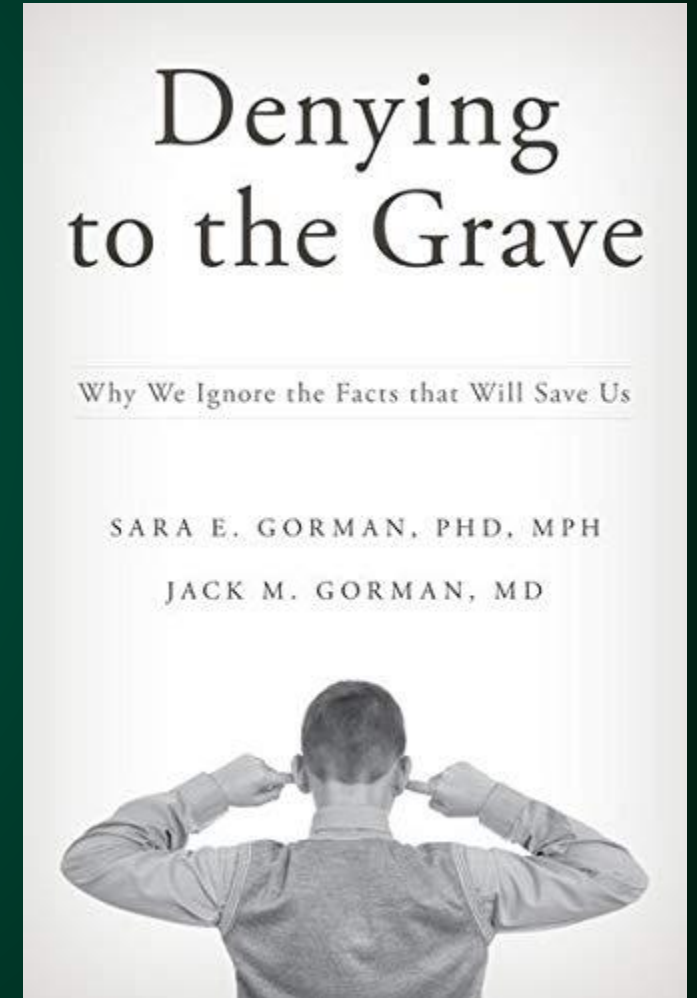


“Conspiracy theories are attractive. They create order out of chaos.”

Paul Offit, MD

Right Conditions for Misinformation and Conspiracy Theories

- Knowledge gaps and uncertainty
- Feelings of powerlessness
 - (I'm now in a group with special knowledge)
- Politicized and polarized issues
- Charismatic leaders with an answer



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PCR TEST*

*and how they've been deceiving people based on one tiny, important detail of how this test works.



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PCR TEST INVENTOR KARY MULLIS SPEAKS ON ITS EFFECTIVENESS



you can find almost anything

00:35

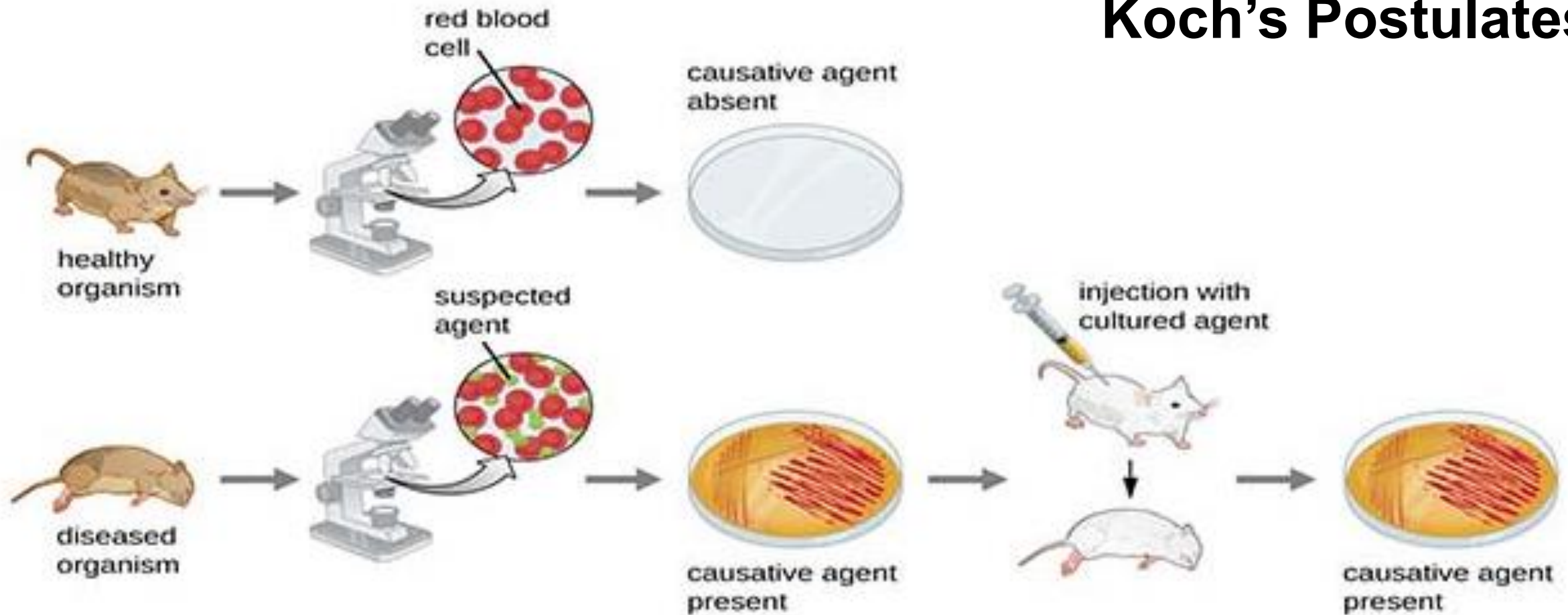


Assumption:

Infectiousness ~ Culturable Virus ~

Higher viral load ~ Lower Cycle Threshold on PCR

Koch's Postulates

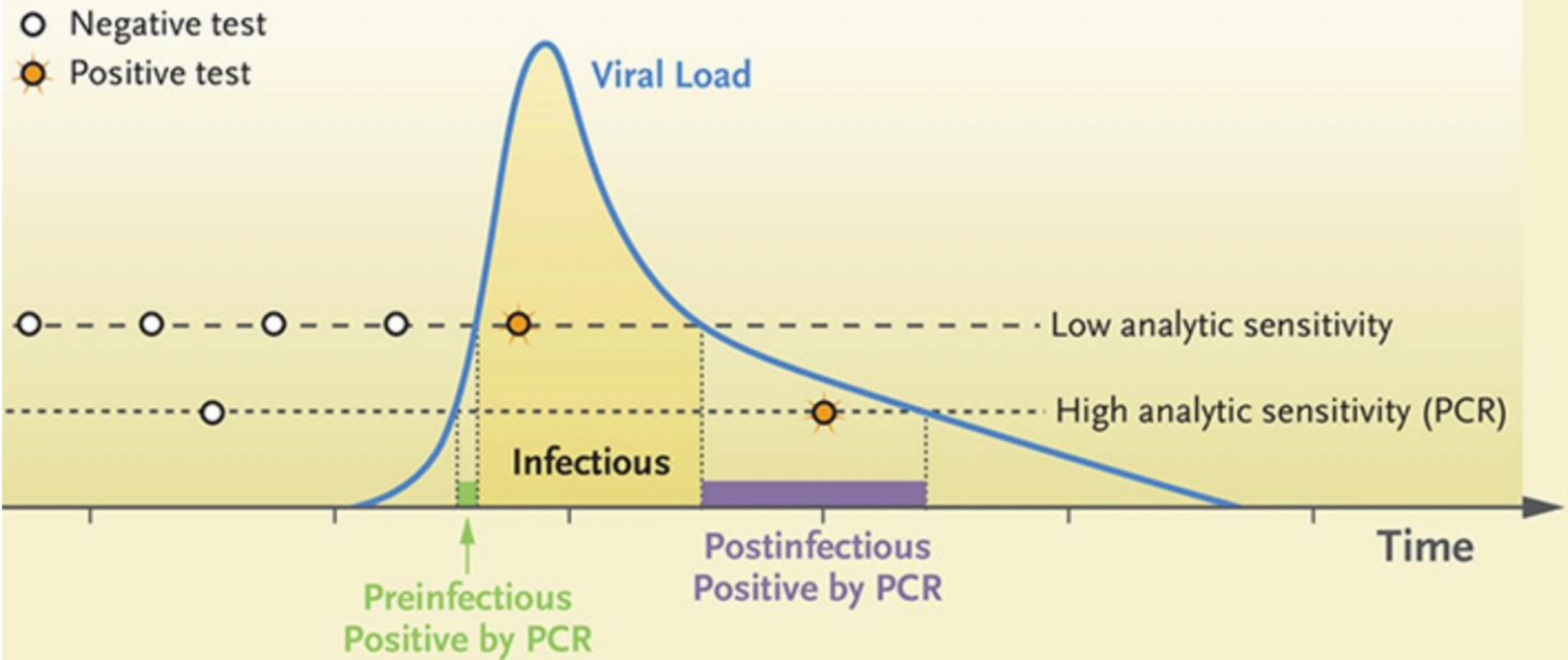


1 The suspected causative agent must be absent from all healthy organisms but present in all diseased organisms.

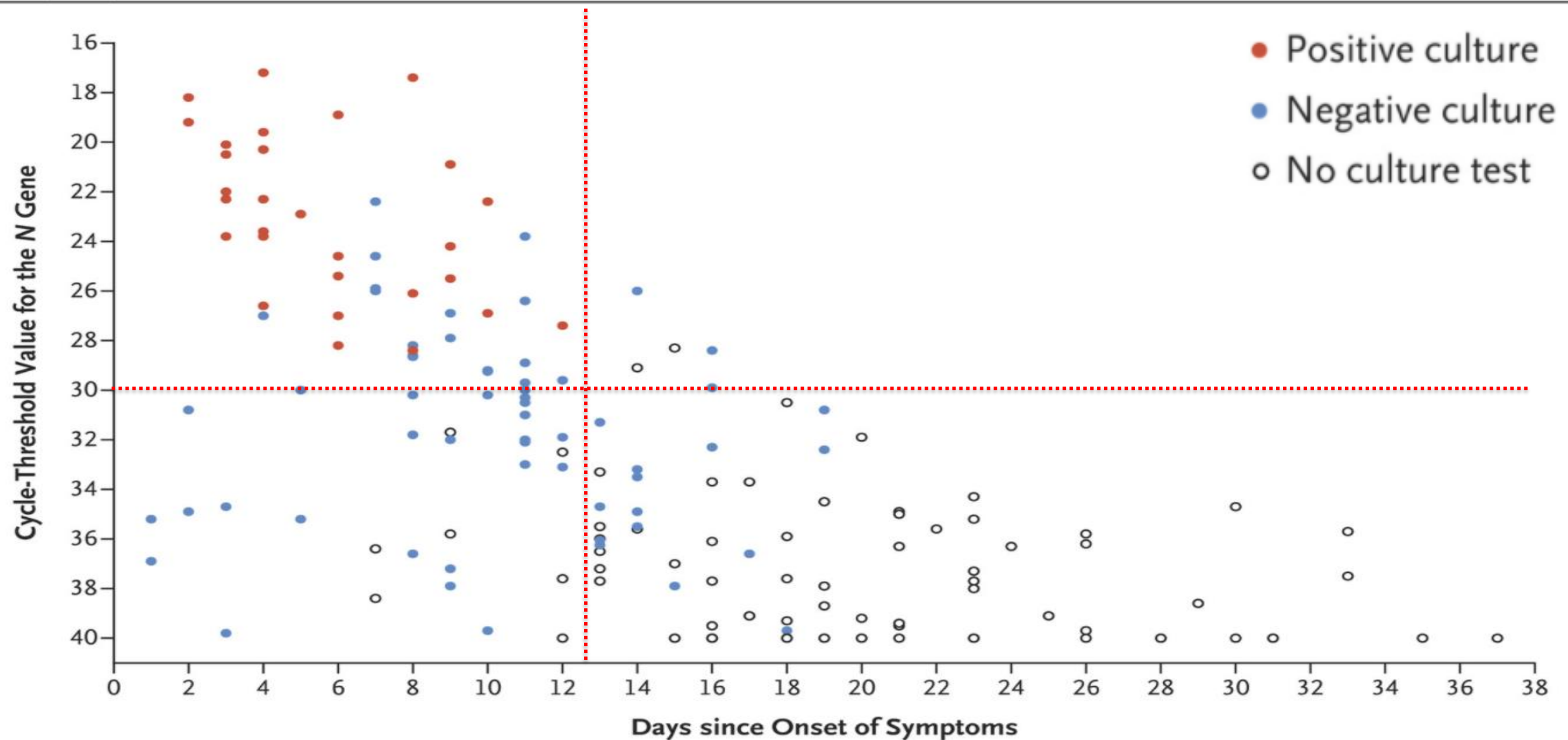
2 The causative agent must be isolated from the diseased organism and grown in pure culture.

3 The cultured agent must cause the same disease when inoculated into a healthy, susceptible organism.

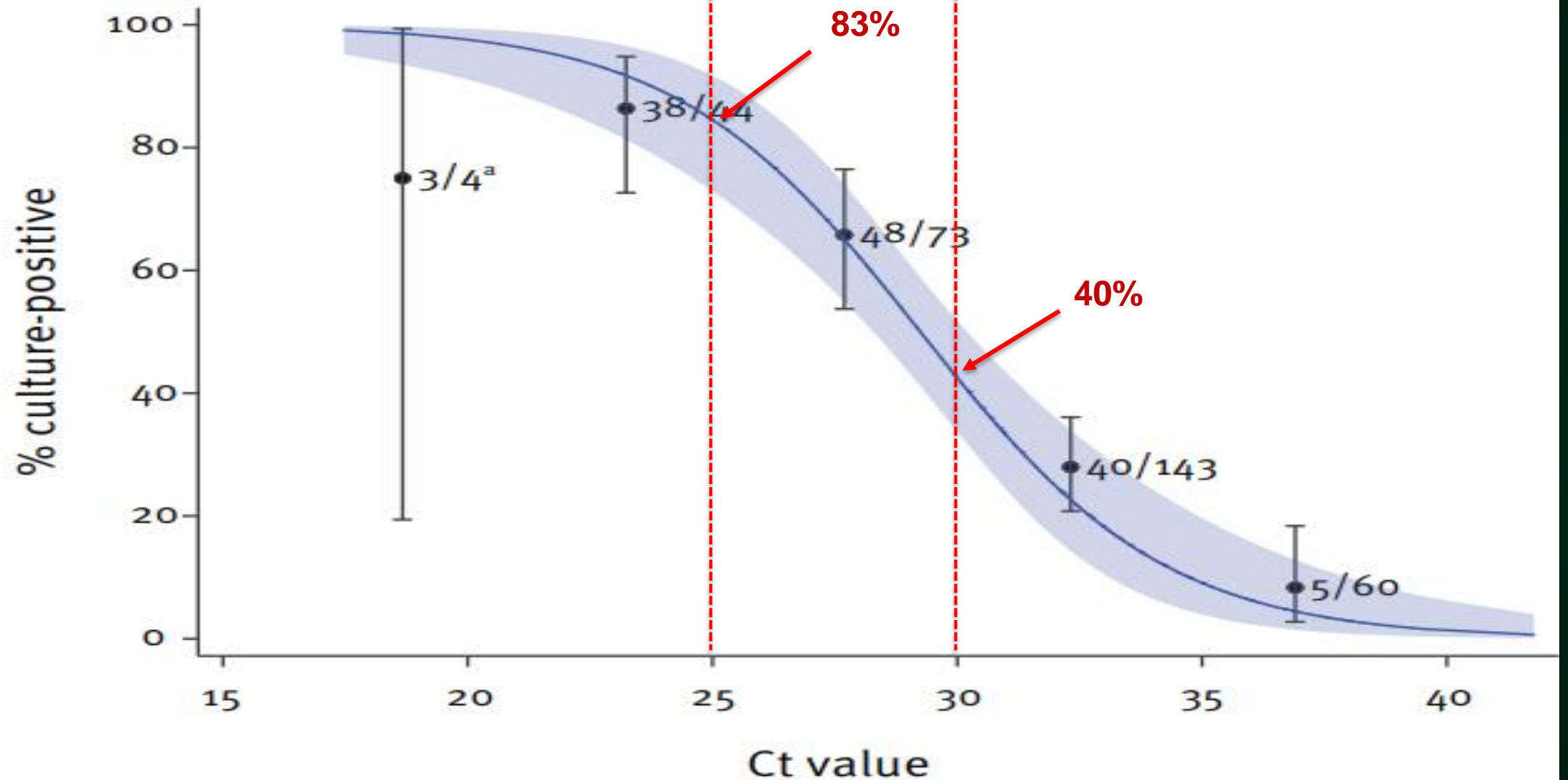
4 The same causative agent must then be reisolated from the inoculated, diseased organism.



Duration of Culturable SARS-CoV2 in Hospitalized Patients with COVID-19



Culture Positivity and Cycle Threshold



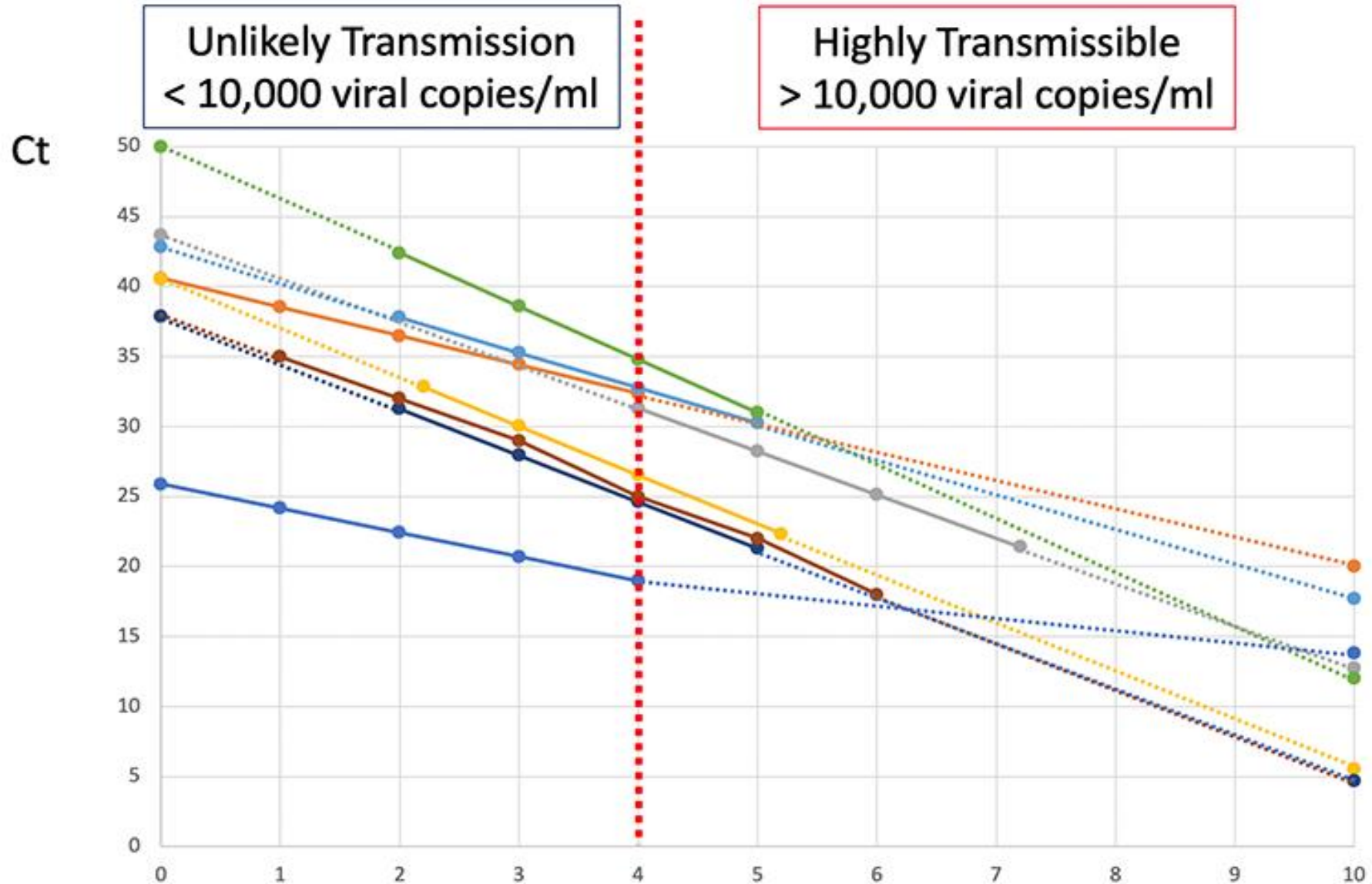
Factors that Impact Cycle Thresholds

Patient factors	Specimen factors	Test factors
Presence or absence of symptoms	Adequacy of specimen collection	Volume of sample subjected to testing
Severity of symptoms	Reproducibility of the specimen collection method	Gene target
Time from symptom onset	Specimen type (e.g., nasal swab, saliva, BAL)	PCR primer and probe design, which may be variably affected by emerging viral variants
Immune status	Dilution of the sample in transport medium or other liquid	Nucleic acid extraction efficiency (note, not all tests include a nucleic acid purification and extraction step to remove potential PCR inhibitors in the specimen)
Age	Specimen transport and storage conditions	Gene target amplification efficiency
		PCR instrument parameters and settings

College of American Pathologists Ct Study

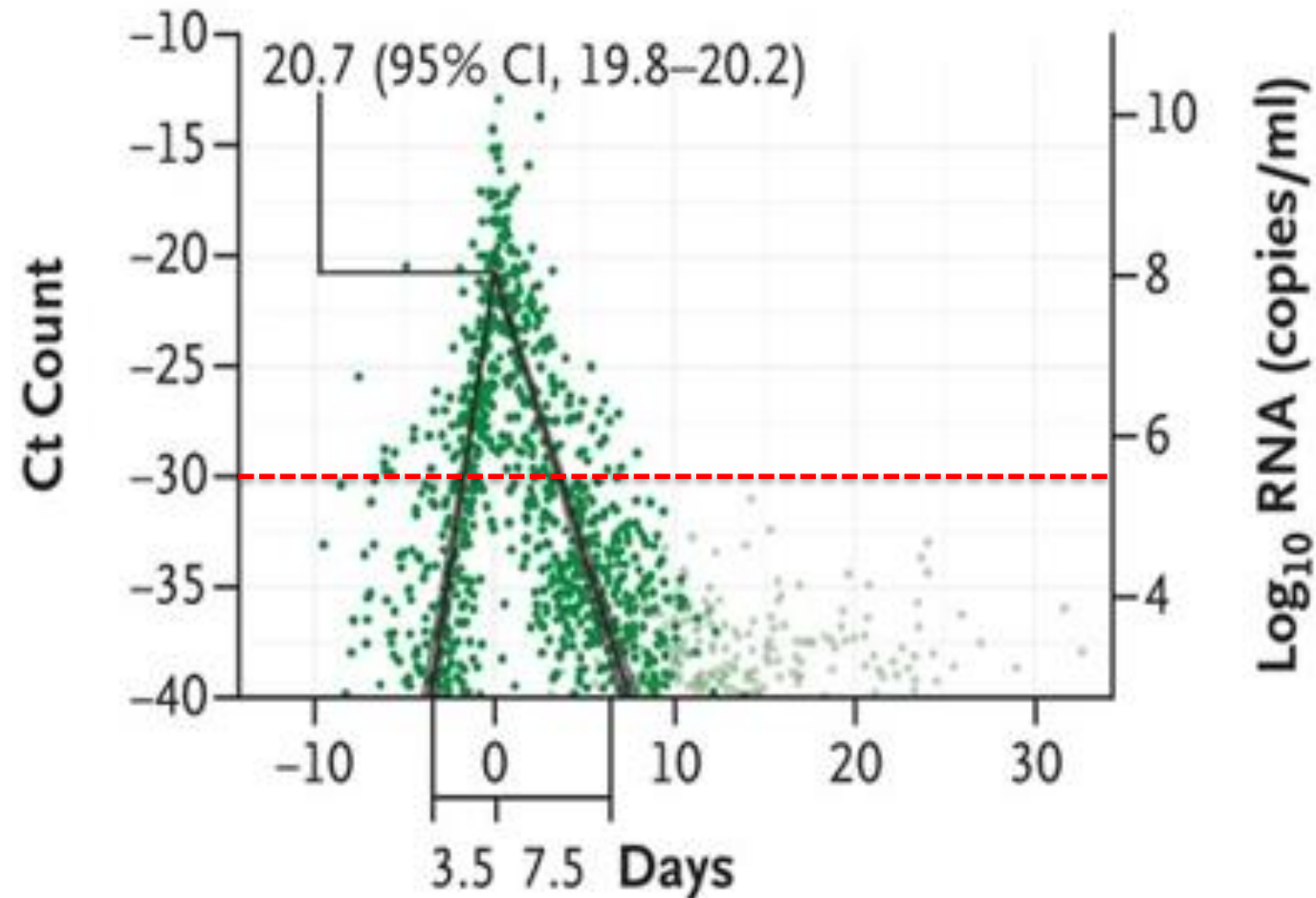
- Sent standardized sample with SARS CoV2 to 700 laboratories across U.S.
- Findings:
 - Ct varied by a median of 3 Cts (10x) *on the same instrument in the same lab*
 - Ct varied by as much as 14 Cts (4000x) across laboratories
 - Ct varied up to 12 Cts for a single gene target for a single method across laboratories

Variability of Ct vs Standardized Viral Load Across 8 Platforms Reported in Literature

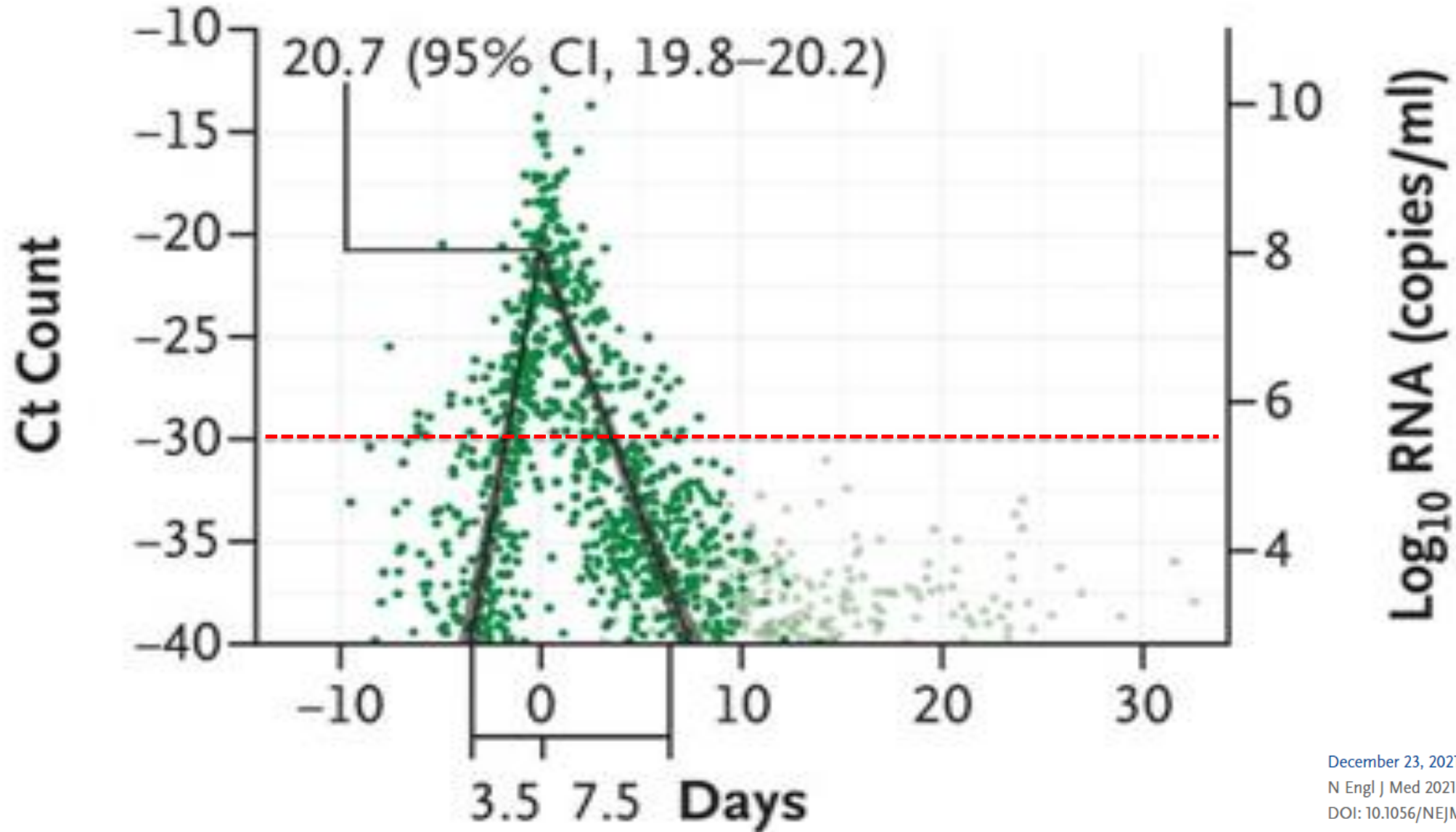


Cycle Thresholds in NBA Occupational Health Program

D Unvaccinated



Cycle Thresholds in NBA Occupational Health Program





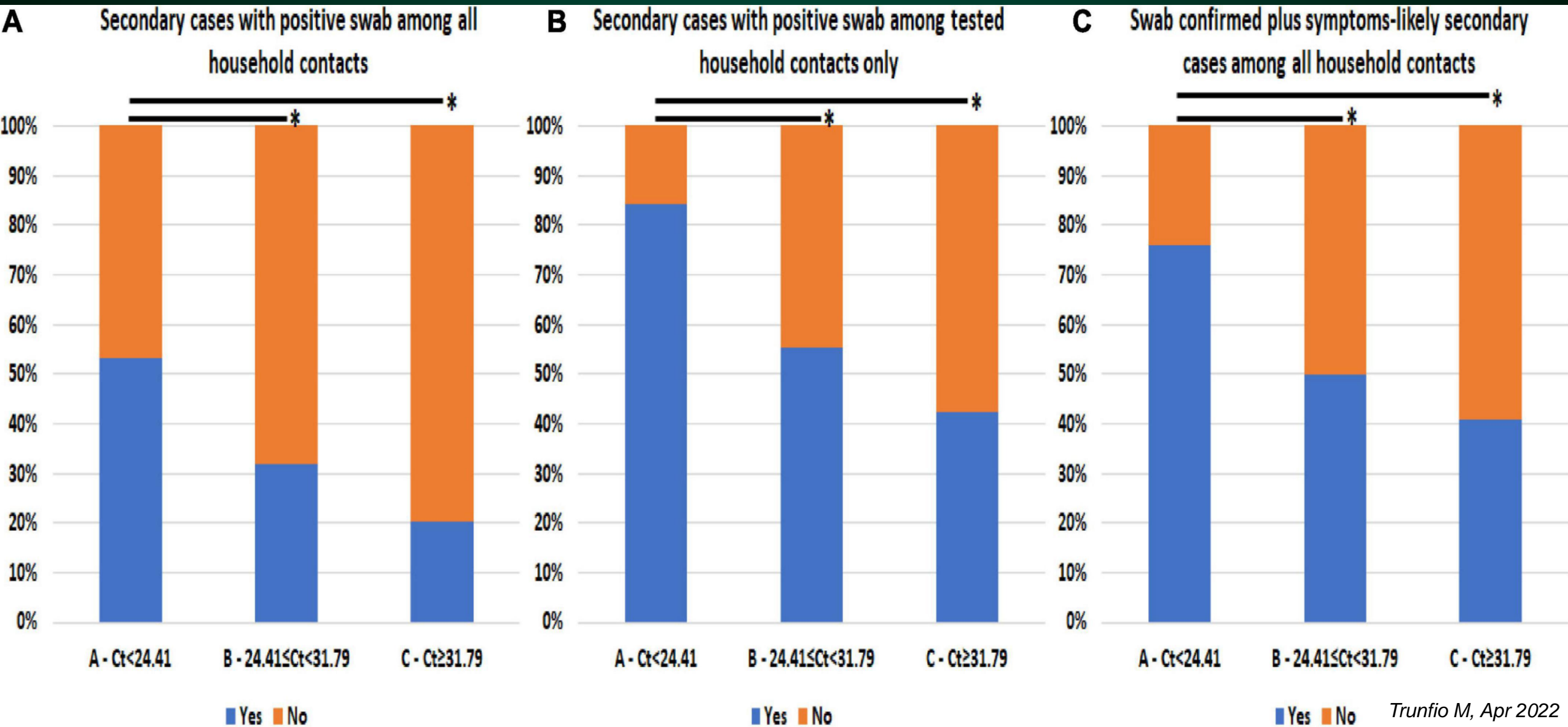
Significant Transmission Occurs in Household Contacts of Cases with Both High and Low Ct's

Cycle Threshold	# Cases Tx to at least 1 contact	% Cases Tx to at least 1 contact
Ct > 30	218/545	40%
Ct ≤ 30	1088/1763	62%

Significant Transmission Occurs in Household Contacts of Cases with Both High and Low Ct's

Cycle Threshold	# Cases Tx to at least 1 contact	% Cases Tx to at least 1 contact
Ct > 30	218/545	40%
Ct ≤ 30	1088/1763	62%

Significant Transmission Occurs in Secondary Contacts of Cases with Both High and Low Ct's





IDSA and AMP joint statement on the use of SARS-CoV-2 PCR cycle threshold (Ct) values for clinical decision-making

Updated March 12, 2021

Although there is a relative relationship between Ct values and the amount of virus in a clinical specimen, Ct values generated by qualitative PCR tests should not be considered quantitative measures of viral load. Due to the myriad of analytical and clinical factors known to impact Ct values, caution is advised when applying published correlations of Ct values with disease severity or as a predictor of active infection and hence transmissibility. At the current time, routine use of Ct values to inform clinical decision making is not advised.

ANY
QUESTIONS?



Outline:

1. Our work in CIRE
2. How the COVID-19 pandemic magnified our work
3. Roots of vaccine hesitancy
 - perfect storm for polarization?
4. Lessons learned and reflections for the academy

"It's going to disappear."

News conference, Feb. 27



Donald J. Trump
@realDonaldTrump

HYDROXYCHLOROQUINE & AZITHROMYCIN, taken together, have a real chance to be one of the biggest game changers in the history of medicine. The FDA has moved mountains - Thank You! Hopefully they will BOTH (H works better with A, International Journal of Antimicrobial Agents).....

10:13 AM · Mar 21, 2020 · Twitter for iPhone

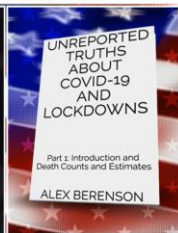


I will not take his word for it



Alex Berenson says worldwide COVID outbreak has so far only been 'slightly worse than a bad flu year'

'Hospitals are not overflowing. Bodies are not piling up in the streets'



health Food Fitness Wellness Parenting Vital Signs

LIVE TV Edition

Over 1,000 health professionals sign a letter saying, Don't shut down protests using coronavirus concerns as an excuse



By Mallory Simon, CNN

Updated 9:08 AM ET, Fri June 5, 2020



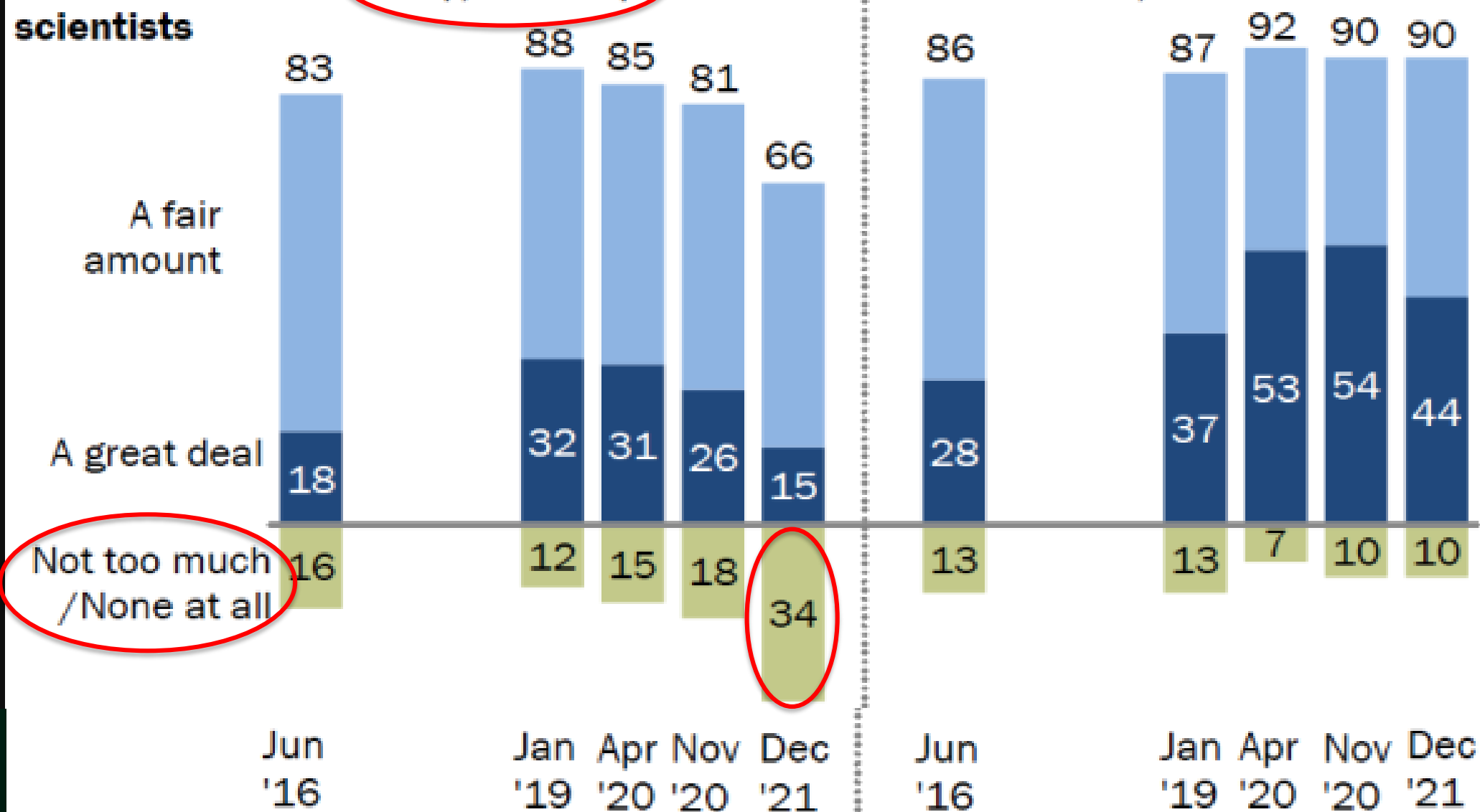
% of U.S. adults who have ____ of confidence in the following groups to act in the best interests of the public



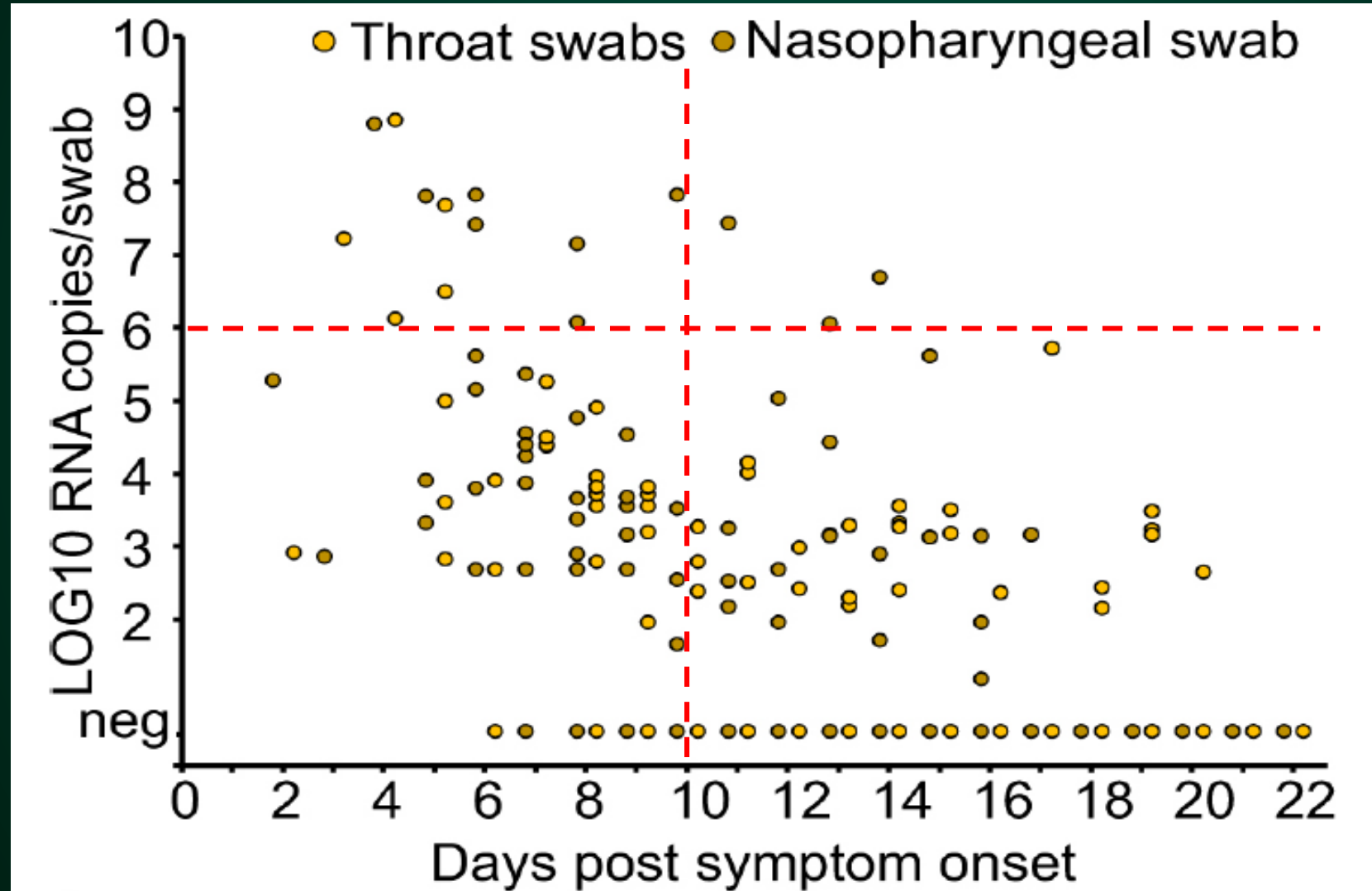
Medical scientists

Rep/lean Rep

Dem/lean Dem



Viral Load from Throat and NP Over Time





DrElizabeth Hesse DC



August 29 at 4:35 PM · 🌐

Copied after I verified it- look for the link below that takes you to the CDC site.

This week the CDC quietly updated the Covid number to admit that only 6% of all the 153,504 deaths recorded actually died from Covid.

That's 9,210 deaths.

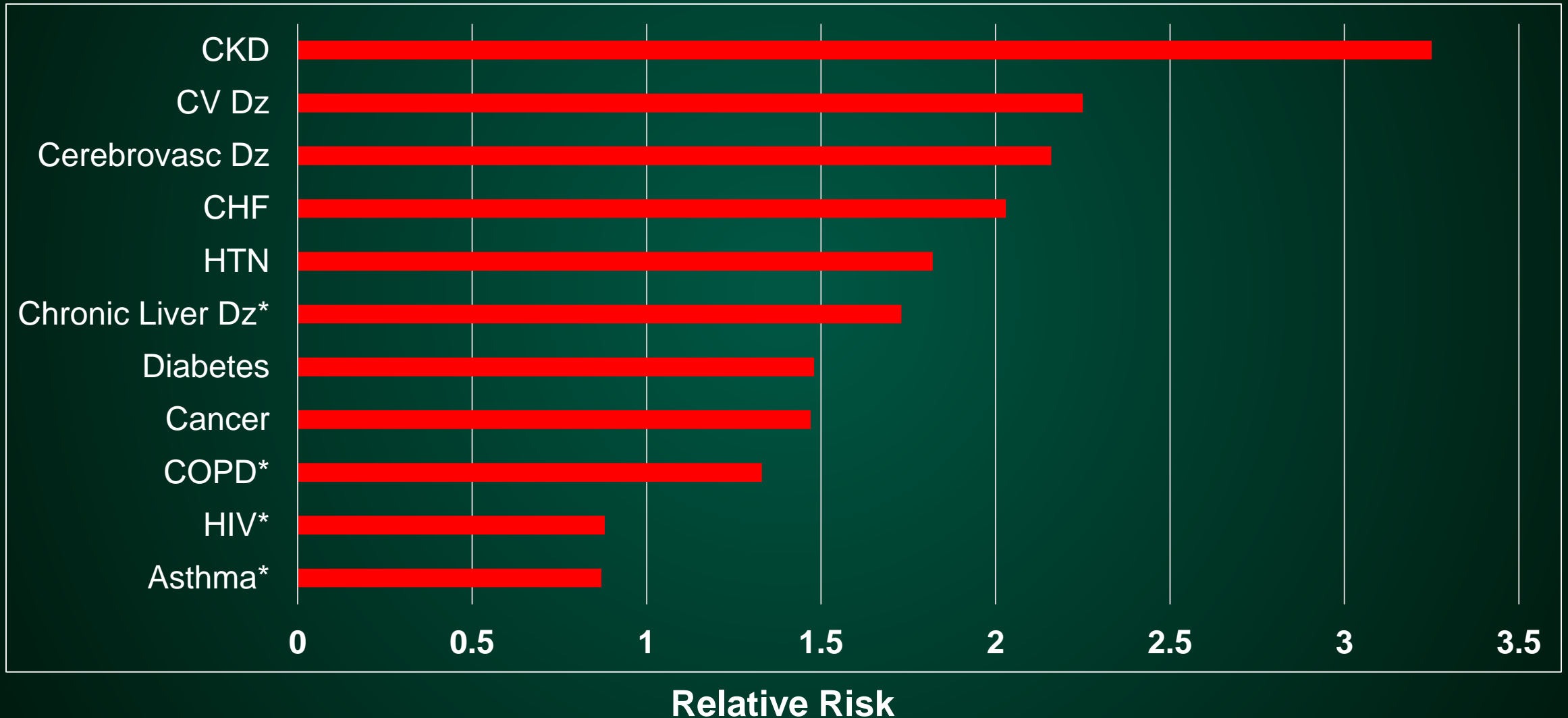
The other 94% had 2 to 3 other serious illnesses and the overwhelming majority were of very advanced age; 90% in nursing homes.

That's a pretty big BOOM.

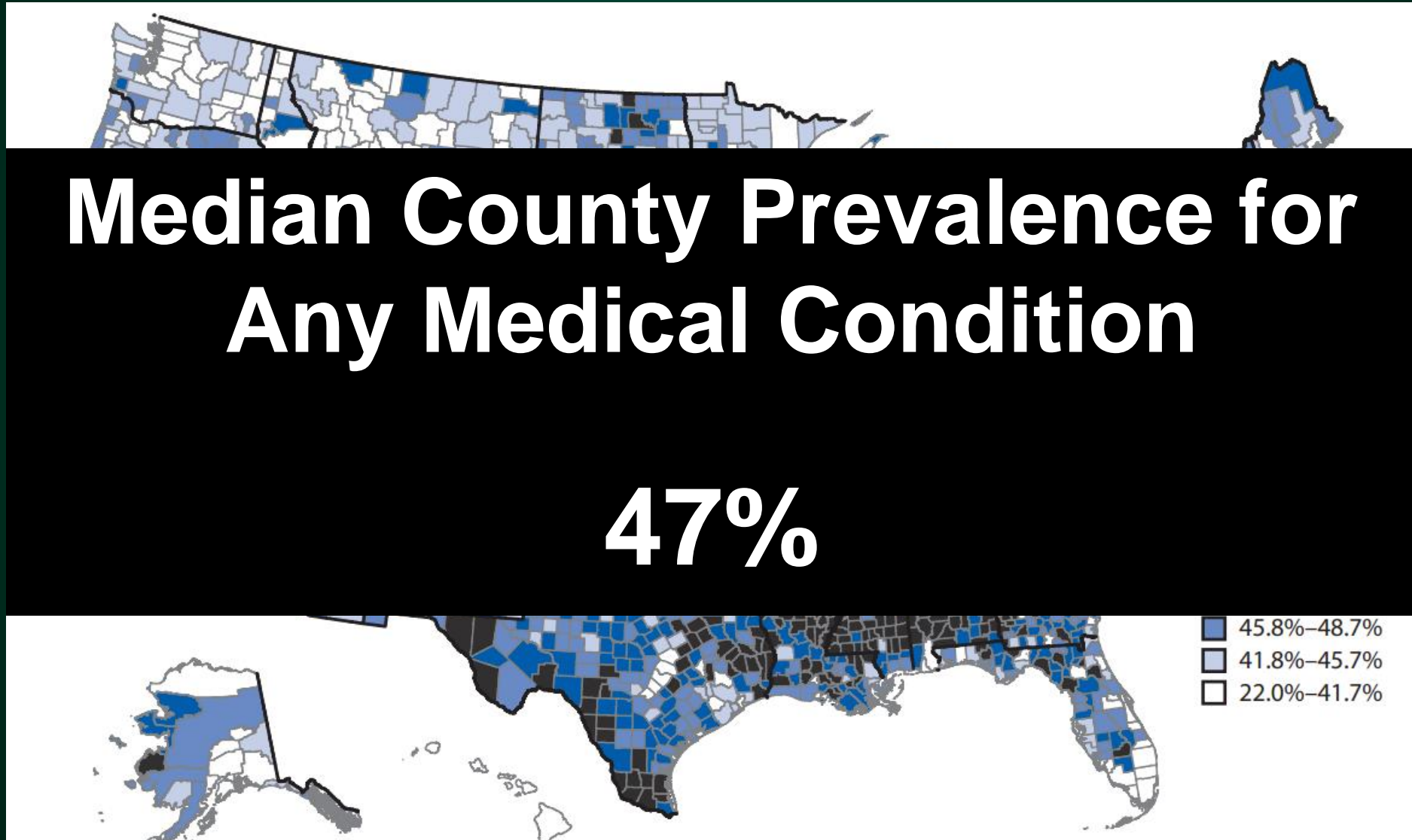


**Well you know....
I heard they had
“underlying
conditions”**

Meta-Analysis of Comorbidities Associated with Mortality and COVID-19



Prevalence of Any Underlying Medical Conditions for Severe COVID-19 Outcomes





Long
COVID

COVID-19 Morbidity and Mortality as of 4/21/22

U.S.

- 80,588,854 cases
- 987,034 deaths
- 1st-3rd leading cause of death
- 3.3-4.6 million hospitalized

ND

- 1:3 tested positive
- 1:95 hospitalized
- 1:340 died

Long COVID – Reasonable Estimate is 5-10 million in U.S.

Household Contact Infections based on Index Case Cts

SARS-CoV-2 incidence, transmission, and reinfection in a rural and an urban setting: results of the PHIRST-C cohort study, South Africa, 2020–21

Cheryl Cohen, Jackie Kleynhans, Anne von Gottberg, Meredith L McMorrow, Nicole Wolter, Jinal N Bhiman, Jocelyn Moyes, Mignon du Plessis, Maimuna Carrim, Amelia Buys, Neil A Martinson, Kathleen Kahn, Stephen Tollman, Limakatso Lebina, Floidy Wafawanaka, Jacques D du Toit, Francesc Xavier Gómez-Olivé, Fatimah S Dawood, Thulisa Mkhencele, Kaiyuan Sun, Cécile Viboud, Stefano Tempia, for the PHIRST-C Group†*

www.thelancet.com/infection Published online March 14, 2022 [https://doi.org/10.1016/S1473-3099\(22\)00069-X](https://doi.org/10.1016/S1473-3099(22)00069-X)

Minimum Ct value

≤30	182/659 (27.6%; 23.5–32.1)	5.8 (2.6–12.8)	5.3 (2.3–12.4)
>30	13/158 (8.2%; 4.8–13.8)	1 (ref)	1 (ref)