10th Annual Dr. Ed Waits Respiratory Care Conference
June 22, 2022

Absolute Risk and Absolute Risk Reduction in the COVID-19 Pandemic

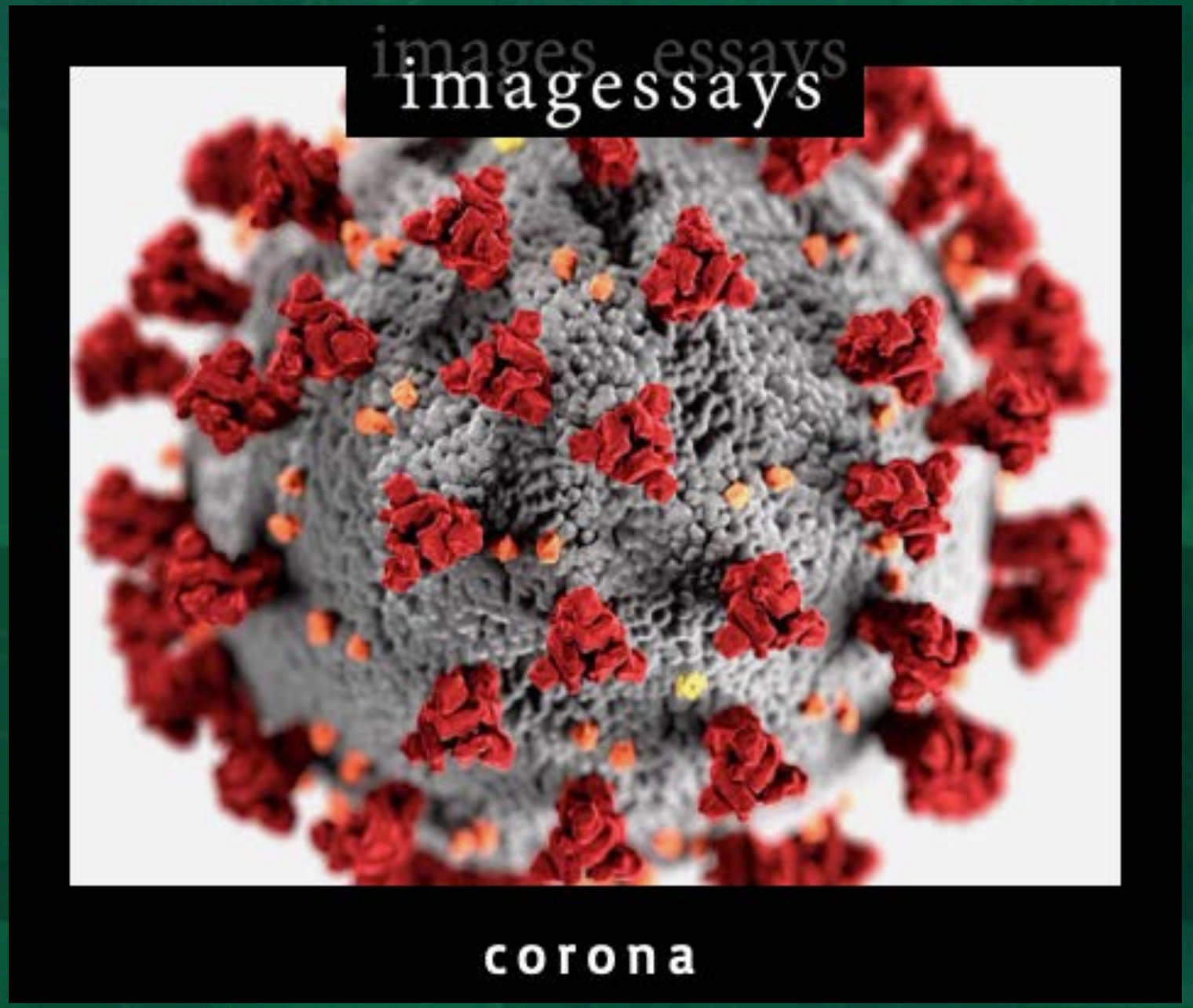
James R. Boogaerts, MD, PhD, FACC
UAB Division of Cardiovascular Disease

What will be covered:

3 numbers to consider when evaluating results of a clinical trial: *perception*

2 ways of thinking about the ongoing COVID-19 pandemic: *perception*

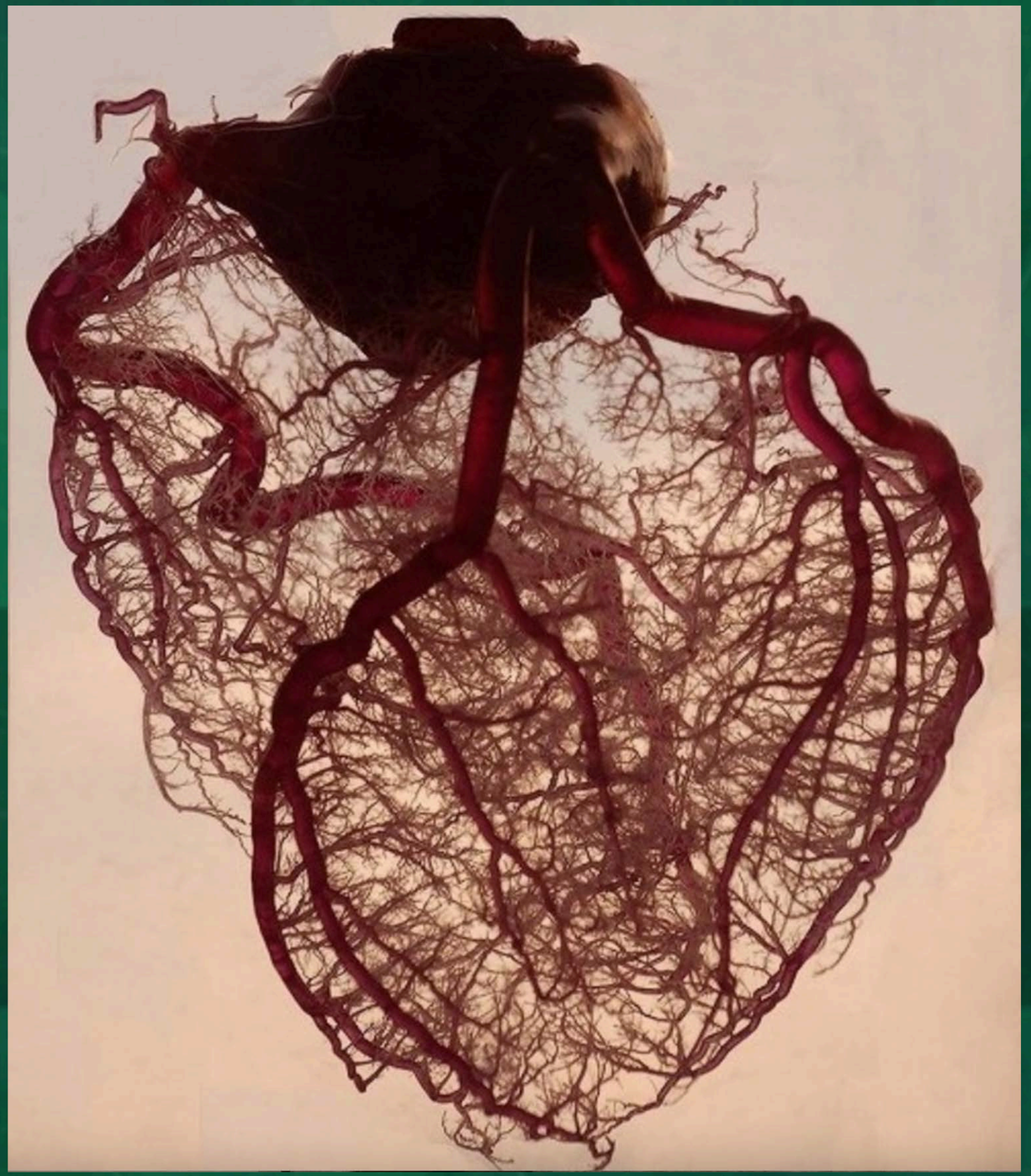
1 million … how to conceptualize that large number: *perception*



See:

corona

webpage
on
imagessays.com



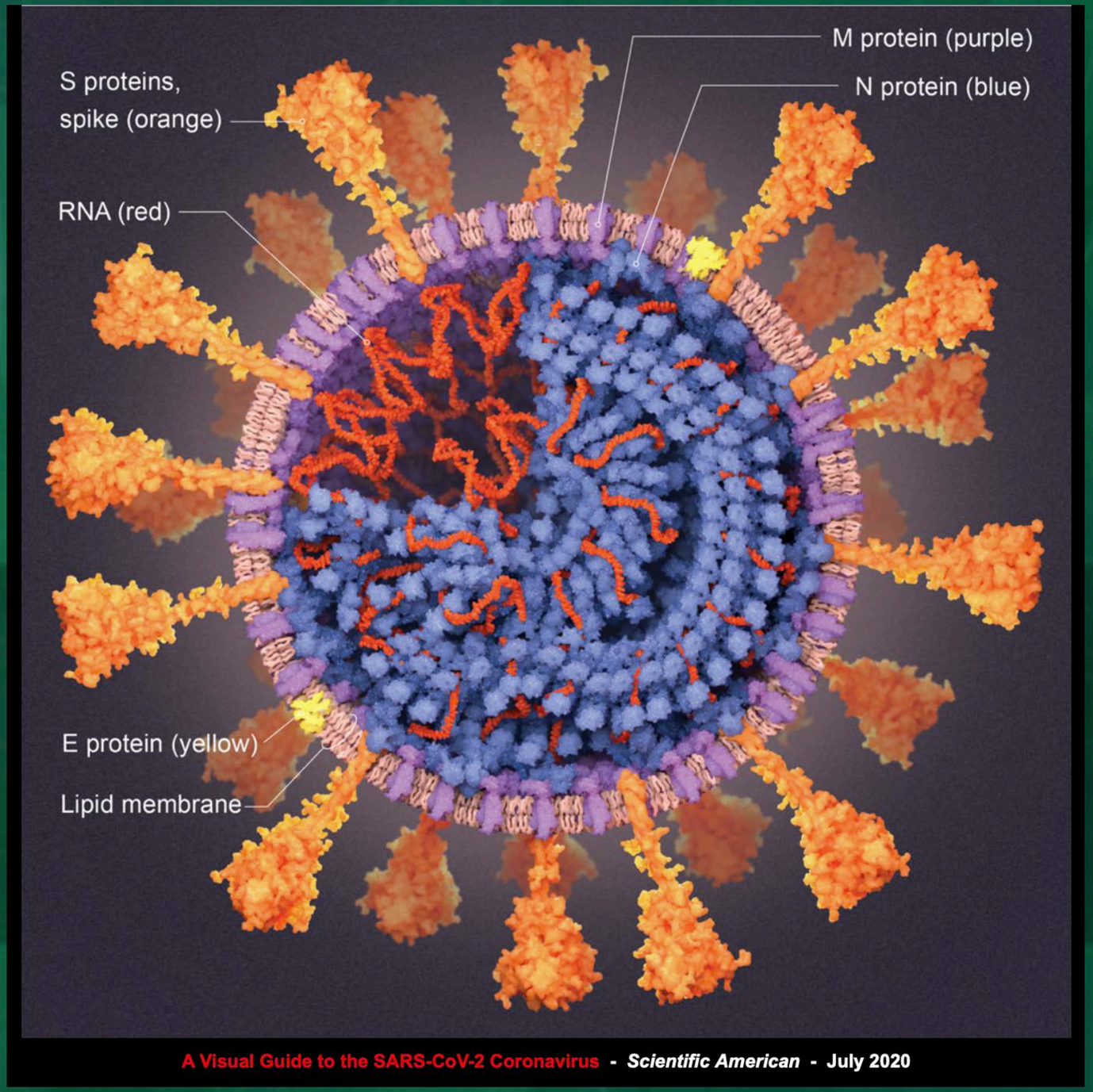
In 1741, anatomists
first named the arteries
which supply
heart muscle**:**

"coronary arteries"

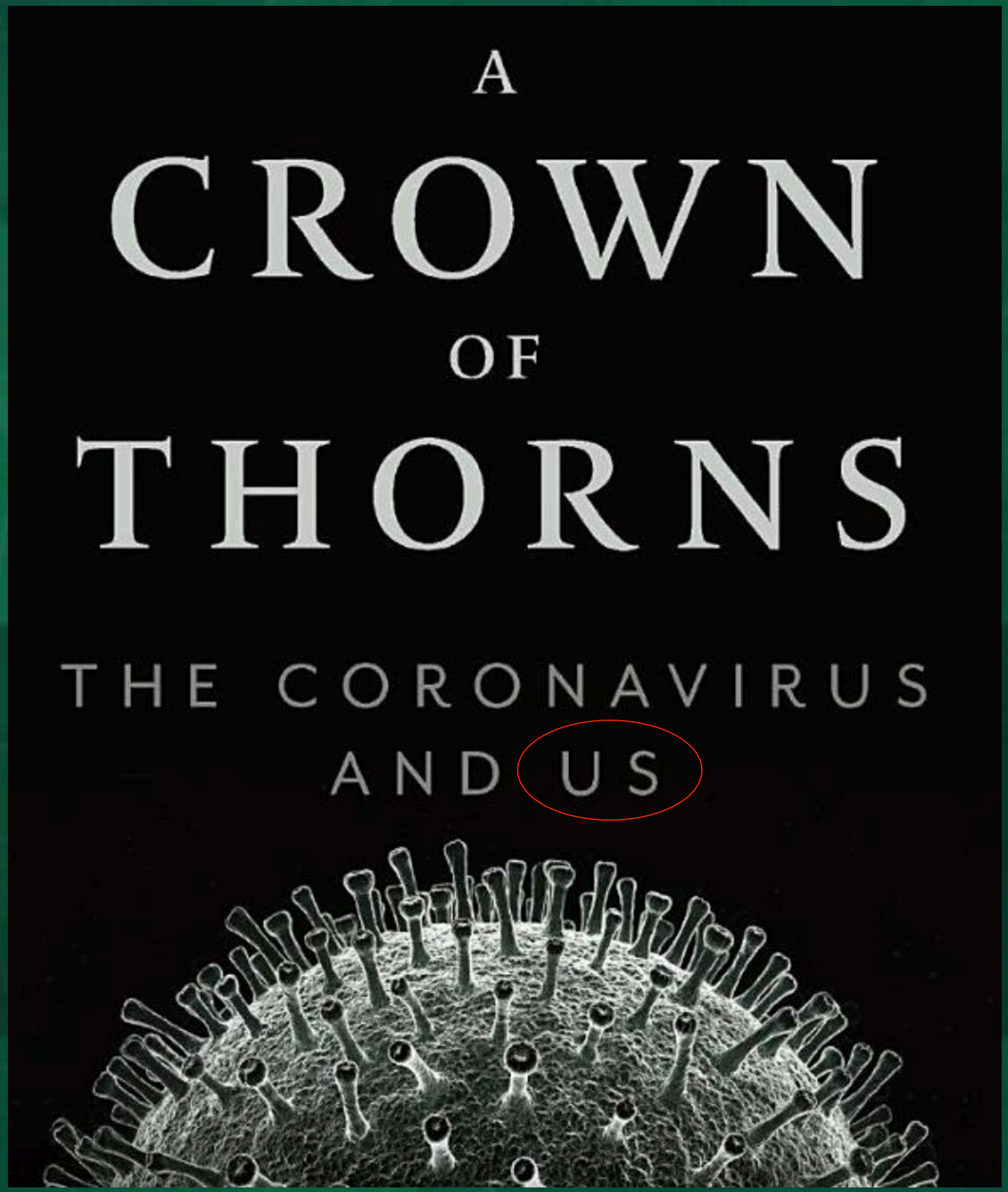
The word
“corona”
is a Latin word
meaning
"crown", from
the Greek
κορώνη.

The word
“corona”
is a Latin word
meaning
"crown", from
the Greek
κορώνη.

"corona"
during
total eclipse of the sun



coronavirus



The first confirmed death was on January 9, 2020

COVID-19 pandemic declared on March 11, 2020

As of June 22, 2022, more than 6,320,000 deaths had been attributed to COVID-19

c. 2020

imagessays

cardiocerebral

See:

cardiocerebral

webpage
on
imagessays.com

“*patient*”

from Latin verb: *patior, pati, passus sum*:

to suffer

“*one who suffers*”

3 numbers to consider when evaluating results of a clinical trial

1) adverse event rate in the untreated group: (CER)

2) adverse event rate in the treated group: (TER)

3) reduction in adverse event rate conferred by treatment (ARR)

Absolute Risk Reduction (%)

Absolute Risk Reduction (%): ARR
[reduction in adverse events (%) related to treatment]

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Absolute Risk Reduction

(%)

absolute

See:

absolute

webpage
on
imagessays.com

Control Group Event Rate (%): CER
[adverse event rate (%) in control group]

Treatment Group Event Rate (%): TER
[adverse event rate (%) in treatment group]

Absolute Risk Reduction = CER *minus* TER

Relative Risk Reduction (%): RRR
is the *difference* between CER and TER *divided by* CER

$$RRR = (CER - TER) \div CER = ARR \div CER$$

.

This results in: RRR (%) >>> ARR (%)

Table 1. 2 × 2 contingency table for SARS-CoV-2 infection in vaccine clinical trials.

	Infection	No Infection	
Vaccine	a	b	a + b
Placebo	c	d	c + d

$$\text{RR} = \frac{a/(a+b)}{c/(c+d)}$$

(Risk Ratio)

Absolute risk reduction (ARR):

$$\text{ARR}\ (\%) = \frac{c}{(c+d)} - \frac{a}{(a+b)}$$

Relative risk reduction (RRR) or vaccine efficacy (VE):

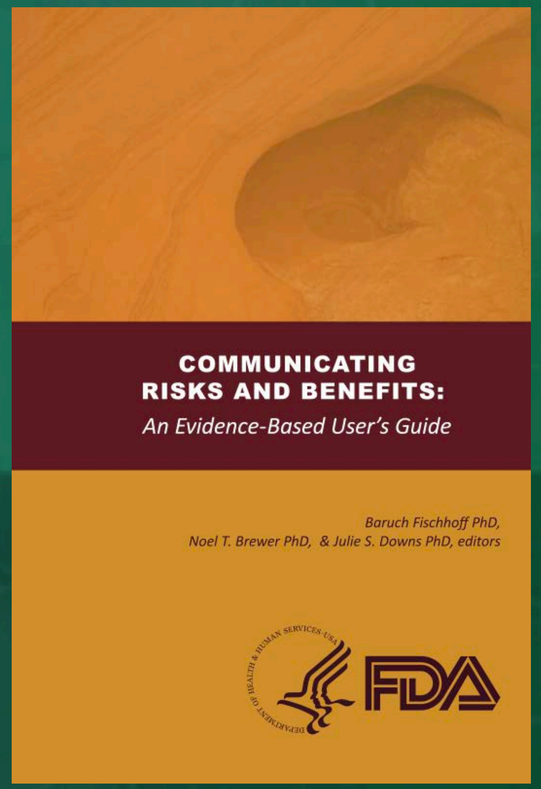
RRR = 1 - RR

$$\text{RRR, VE}\ (\%) = 1 - \text{RR}$$

Number needed to vaccinate (NNV):

$$\text{NNV} = \frac{1}{\text{ARR}}$$

Citation: Brown, R.B. Outcome Reporting Bias in COVID-19 mRNA Vaccine Clinical Trials. *Medicina* **2021**, *57*, 199. https://doi.org/10.3390/medicina57030199



Published by the Food and Drug Administration (FDA), US Department of Health and Human Services, August 2011.

Contributors to this compilation are past or current members or consultants of the FDA's Risk Communication Advisory Committee. For more information on the committee, see *http://www.fda.gov/AdvisoryCommittees/CommitteesMeetingMaterials/RiskCommunicationAdvisoryCommittee/default.htm*

FDA Disclaimer: The findings and conclusions in this compilation are those of the individual authors and do not necessarily represent the views of the Food and Drug Administration.

Communicating Risks and Benefits: An Evidence-Based User's Guide is available on FDA's Web site at *http://www.fda.gov/ScienceResearch/SpecialTopics/RiskCommunication/default.htm*

August 2011

US Department of Health and Human Services,
Food and Drug Administration
10903 New Hampshire Ave, Silver Spring, MD 20993

Cover photo: Nancy M. Ostrove, Rock formation, Valley of Fire State Park, 2009
Cover design: Erica Munoz, 2011

Provide numeric likelihoods of risks and benefits. Describing risks solely with words, such as *You have a low chance of experiencing a side effect* is ineffective. It does not provide patients with the details needed to make an informed decision; it increases risk perceptions, and patients vary in their interpretations of what low and high risks are. Thus, it is imperative to provide patients with numerical estimates of the risks and benefits associated with treatment options.

Provide absolute risks, not just relative risks. Patients are unduly influenced when risk information is presented using a relative risk approach; this can result in suboptimal decisions. Thus, an absolute risk format should be used.

Keep denominators constant for comparisons. It is difficult for patients to compare across treatments when different denominators are used. A single denominator should be chosen for comparisons (e.g., 1 in 10,000, 337 in 10,000). It is easier for patients to understand whole numbers (e.g., 1 in 10,000) rather than fractions or decimals (.01 in 100); thus, if risks are very small, larger denominators will be necessary.

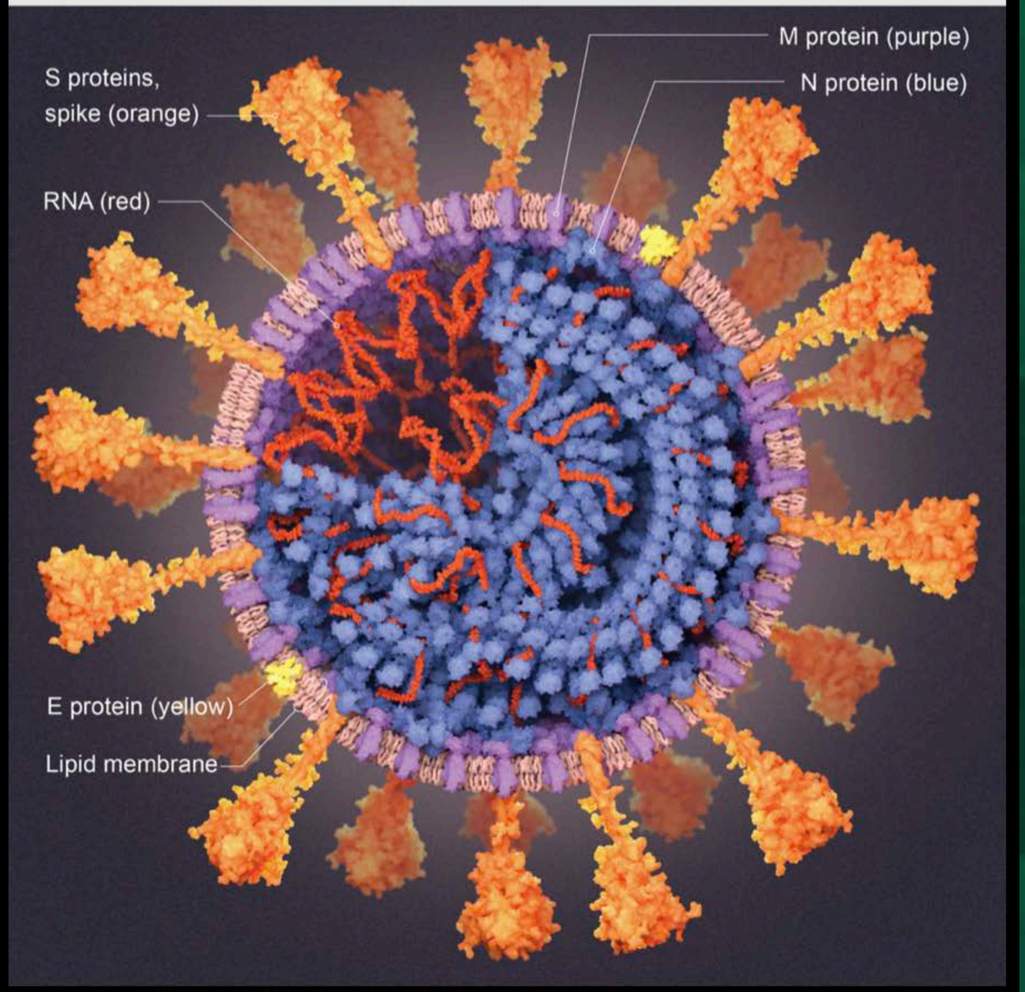
1, 2, 3 - for clarity and transparency of clinical trials reporting:

1) Control Group Event Rate (%)

2) Treatment Group Event Rate (%)

3) Absolute Risk Reduction (%)

A SARS-CoV-2 virus particle wafting into a person's nose or mouth is about 100 nanometers in diameter—visible only with an electron microscope. It is a near sphere of protein (cross section shown) inside a fatty membrane that protects a twisting strand of RNA—a molecule that holds the virus's genetic code. Proteins called "S" form spikes that extend from the surface and grab onto a human cell, hundreds of times larger, so the particle, or virion, can slip inside; the crown, or corona, appearance gives the virus its name. Structural proteins—N, M and E—move inside the cell, where they help new virions form.



A Visual Guide to the SARS-CoV-2 Coronavirus - *Scientific American* - July 2020

Infectious Disease

Transmissible

A thing of beauty is a joy forever:

Its loveliness increases; it will never

Pass into nothingness; but still will keep

A bower quiet for us, and a sleep

Full of sweet dreams, and health, and quiet breathing.

Endymion
- Keats

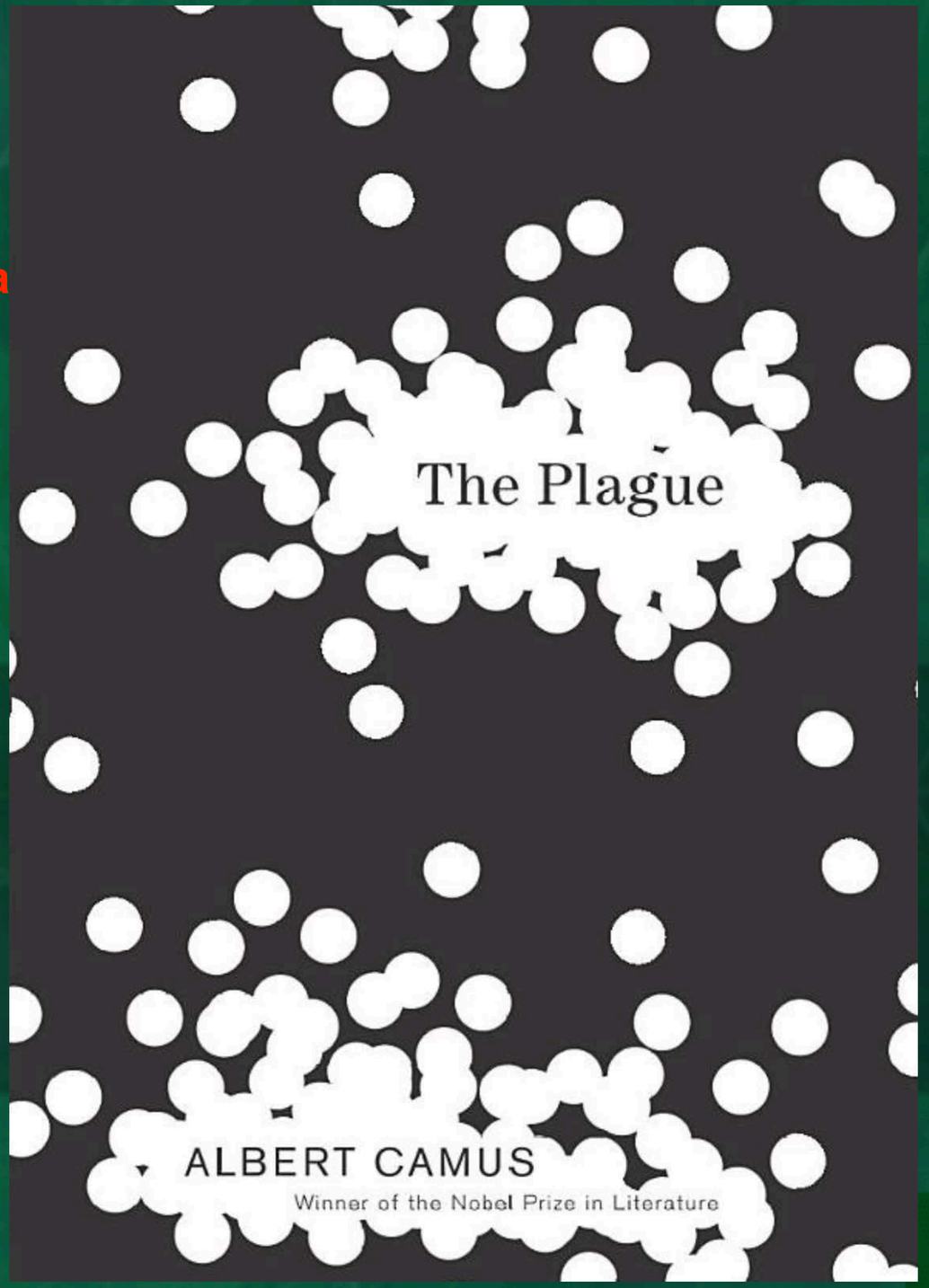
John Keats, physician > > > poet,
died at age 25 - in 1821 -
of an infectious, transmissible disease (tuberculosis),
as did his mother and two of his brothers.

Infectious Disease

Transmissible

The Plague (French: *La Peste*) is a novel by Albert Camus.

Published in 1947, it tells the story from the point of view of a narrator of a plague sweeping the French Algerian city of Oran.

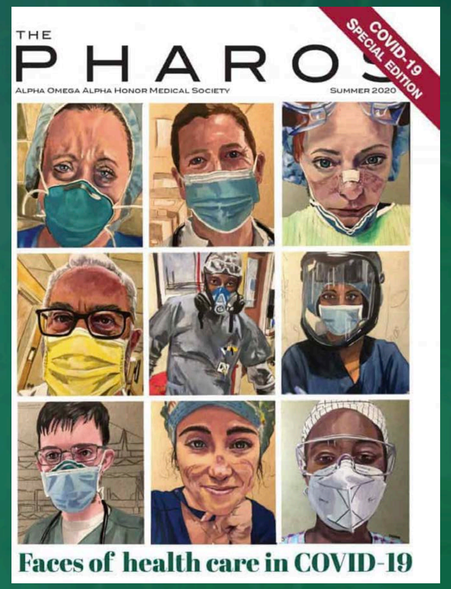


"Everybody knows that pestilences have a way of recurring in the world; yet somehow we find it hard to believe in ones that crash down on our heads from a blue sky.

There have been as many plagues as wars in history; yet always plagues and wars take people equally by surprise."

Infectious Disease

Transmissible



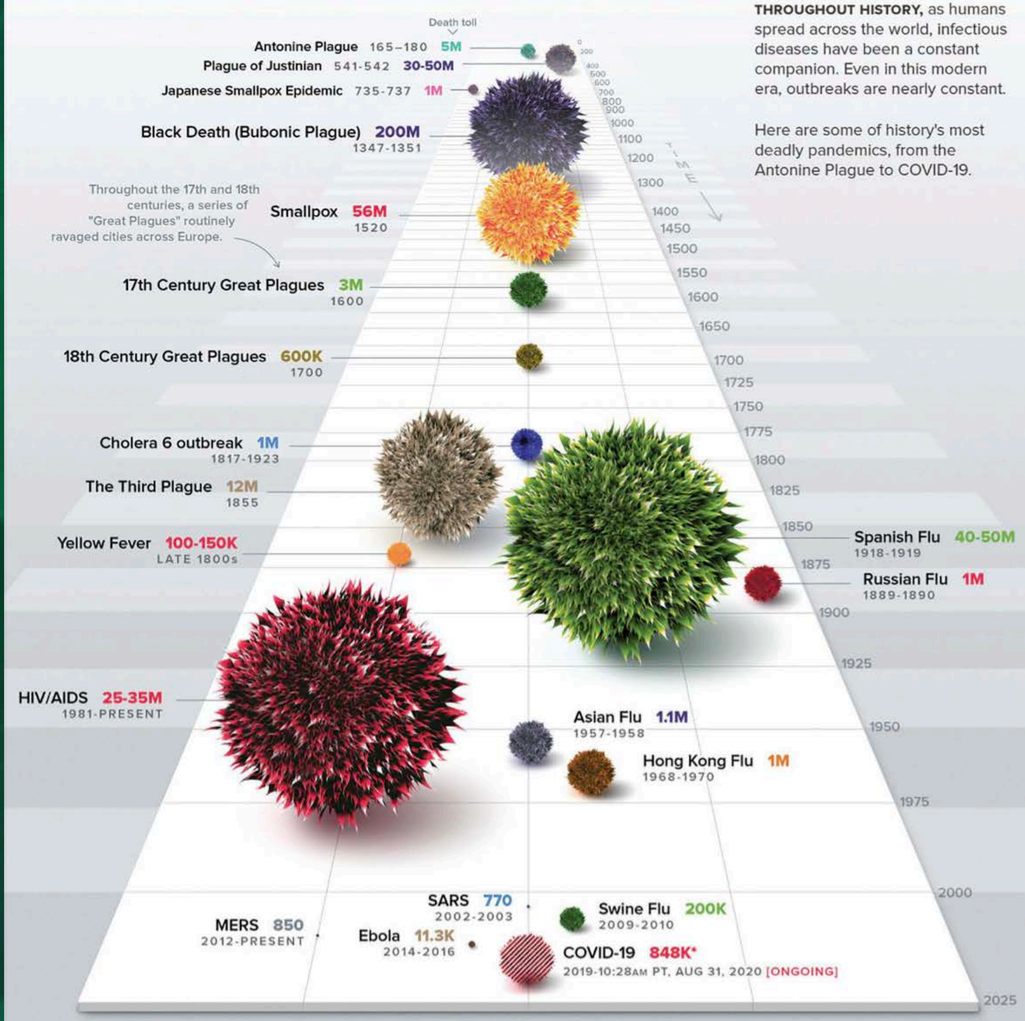
AOA - *The Pharos* - Summer 2020

HISTORY OF **PANDEMICS**

PAN·DEM·IC (of a disease) prevalent over a whole country or the world.

THROUGHOUT HISTORY, as humans spread across the world, infectious diseases have been a constant companion. Even in this modern era, outbreaks are nearly constant.

Here are some of history's most deadly pandemics, from the Antonine Plague to COVID-19.



These numbers are current as of press time.
Courtesy of Visual Capitalist.https://www.visualcapitalist.com/history-of-pandemics-deadliest/

WHO officially declared COVID-19 a pandemic on Mar 11, 2020.

It is hard to calculate and forecast the impact of COVID-19 because the disease is new to medicine, and data is still coming in.

*Johns Hopkins University estimates

Infectious Disease

Transmissible

Historian John Barry compares COVID-19 to the 1918 flu pandemic

October 6, 2020

People wait in line to get masks in San Francisco during the 1918 Spanish flu pandemic. John Barry '69 (MA), author of The Great Influenza, says that one of the greatest lessons from 1918 that can be applied to the COVID-19 pandemic is that "those in authority must retain the public's trust." (Photo by Wikimedia Commons)

#1 NEW YORK TIMES BESTSELLER

THE GREAT INFLUENZA

The Story of the Deadliest Pandemic in History

publication date: 2004

John Barry '69 (MA) says that the virulence of the 1918 flu made it a very different disease than COVID-19, but the lessons of that pandemic still resonate.

When the novel coronavirus went from epidemic to pandemic early this year, John Barry '69 (MA) found himself in rather familiar territory. Barry is the author of *The Great Influenza: The Epic Story of the Deadliest Plague in History*. When the book was first published, in 2004, the National Academy of Sciences named it the outstanding book of the year on science and medicine. In 2020, Barry's book has returned to bestseller status.

In *The Great Influenza*, he considers what became known as the Spanish flu—so called because the press in Spain, which stayed neutral in World War I, had not clamped down on coverage in the name of morale—from a broad range of angles: scientists' quest to understand a new pathogen, officials' efforts (or lack thereof) to contain the spread of infection, and communities' and families' horrifying experiences of a disease so contagious and lethal that it infected about a quarter of the US population and killed between 50 and 100 million people around the world, the equivalent of 220 to 440 million today.

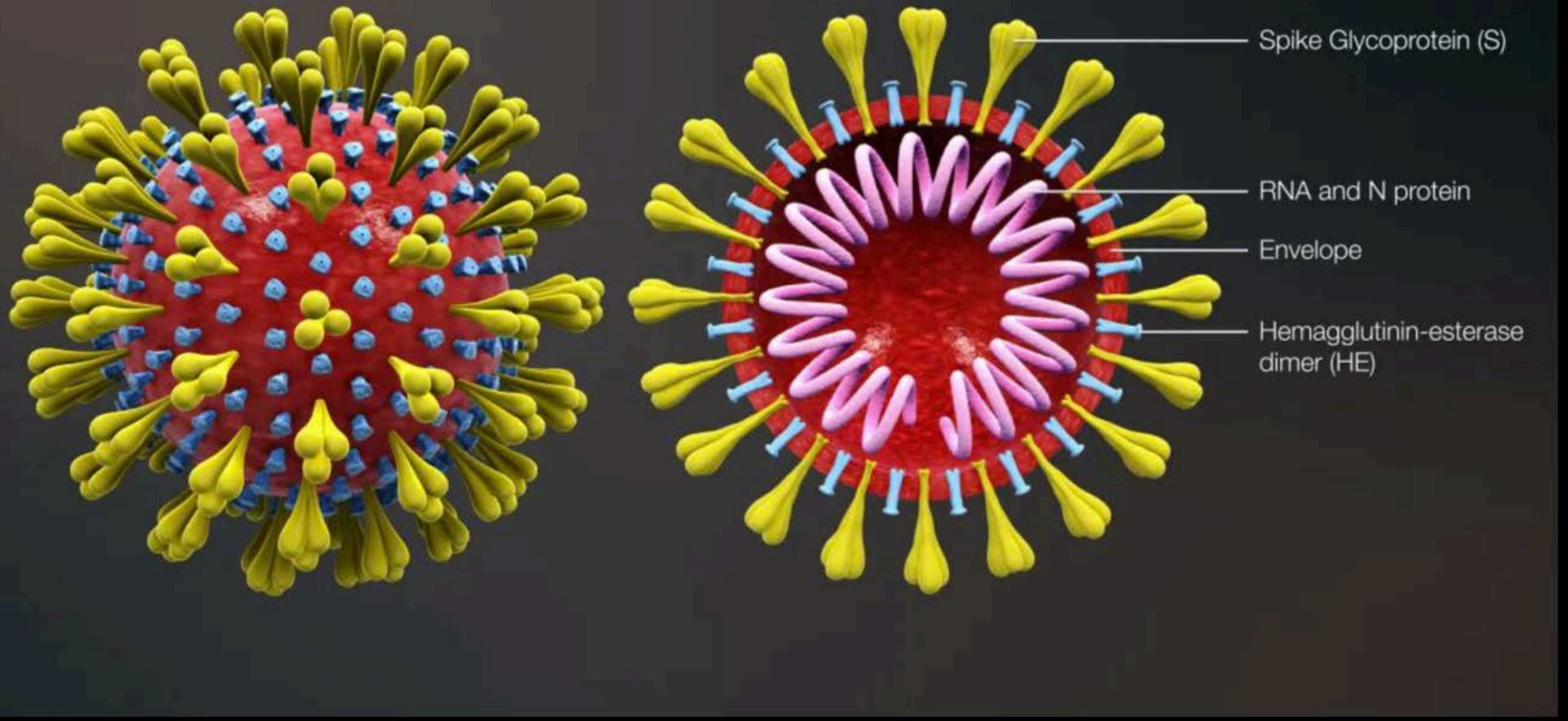
Anchoring *The Great Influenza* is Barry's consideration of leadership, science, and society. Trust, he argues, is crucial, because without trust in information people have no reliable knowledge of what is happening. In 1918, when leaders gave wartime morale priority over public health communication, terror overran society, so much so that some flu victims starved to death because others were too frightened to bring them food.

About John Barry

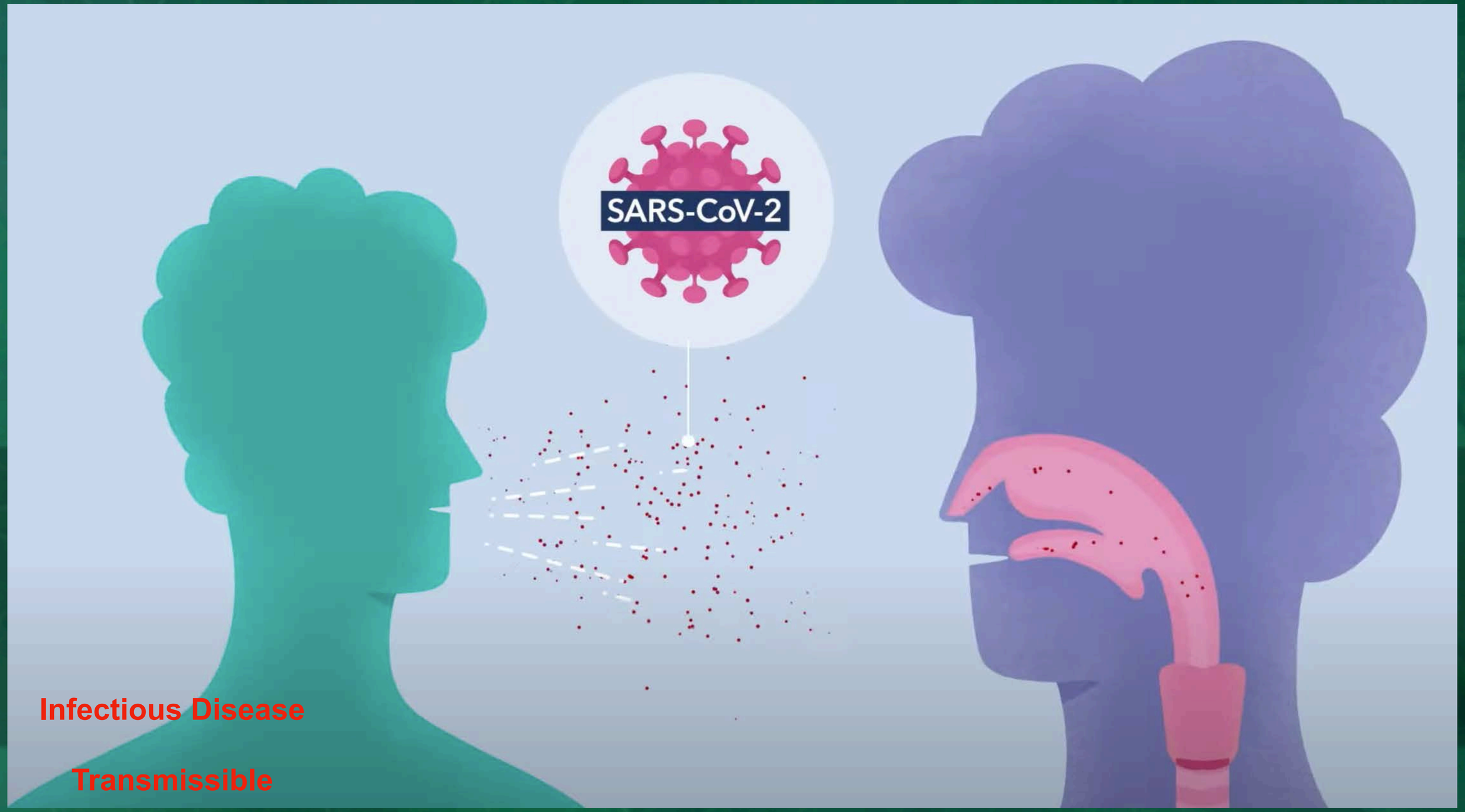
John Barry studied in the graduate program in history at the University of Rochester. He went on to work as a football coach and then as a journalist in Washington, DC, covering economics and national politics. He's now adjunct faculty at Tulane University's School of Public Health and Tropical Medicine and the author of books including The Great Influenza: The Epic Story of the Deadliest Plague in History, The Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America, and Roger Williams and the Creation of the American Soul: Church, State, and the Birth of Liberty.

Infectious Disease

Transmissible

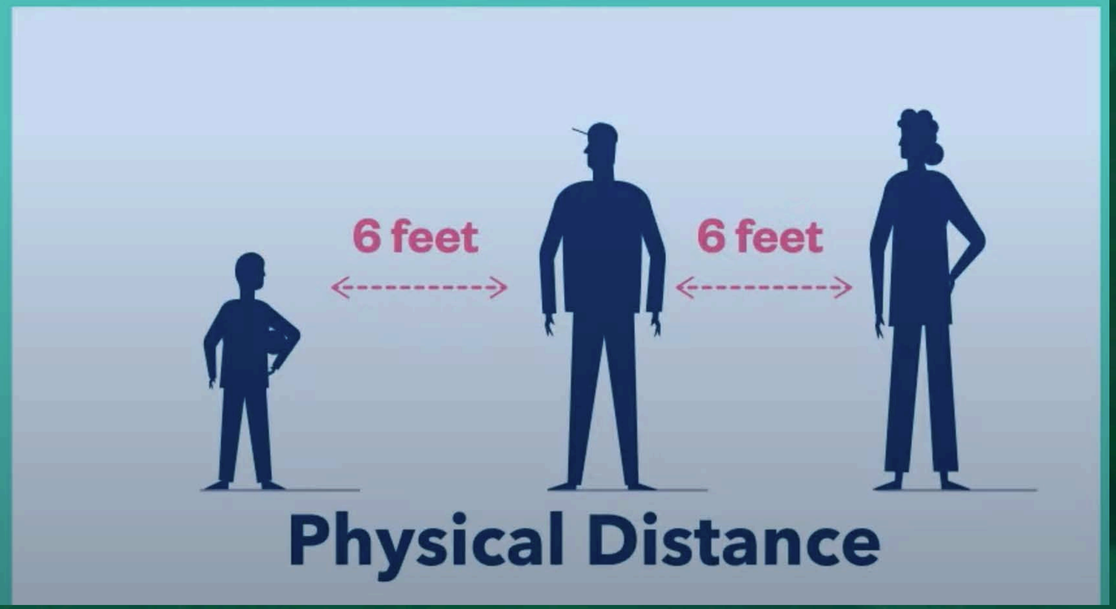


Nature is not cruel, only pitilessly indifferent. This is one of the hardest lessons for humans to learn. We cannot admit that things might be neither good nor evil, neither cruel nor kind, but simply callous - indifferent to all suffering, lacking all purpose.



Infectious Disease

Transmissible



Infectious Disease

Transmissible

"All this has been said before—but since nobody listened, it must be said again."

Infectious Disease

Transmissible

imagessays

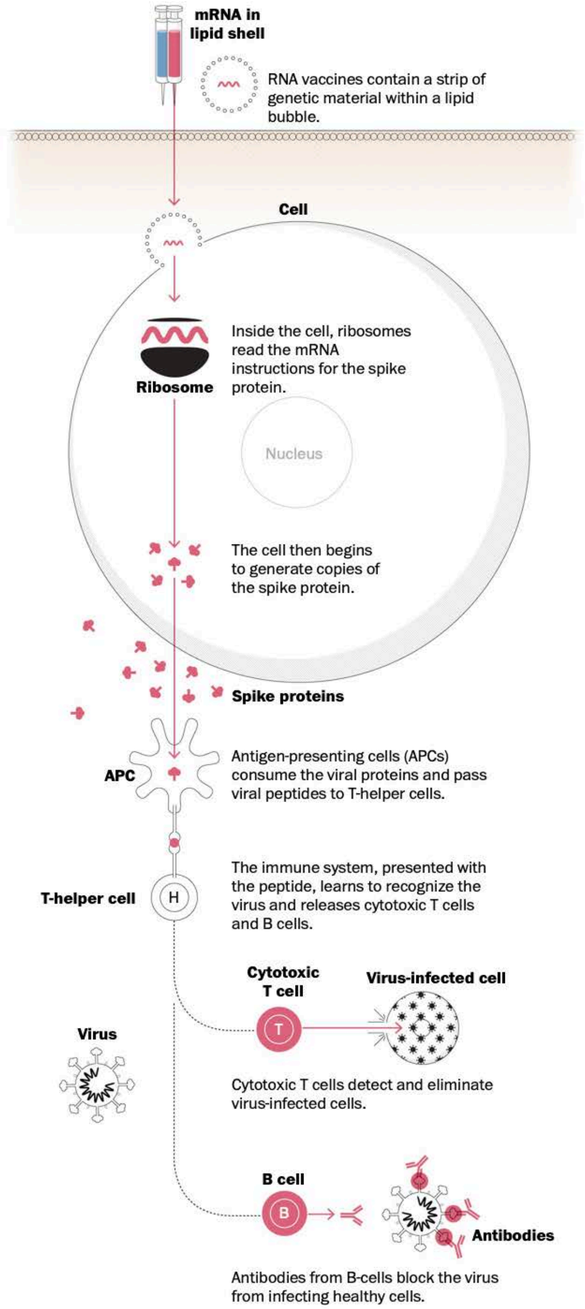
vaccines

COVID-19 vaccine distribution began January 2021

See:

vaccines

webpage
on
imagessays.com



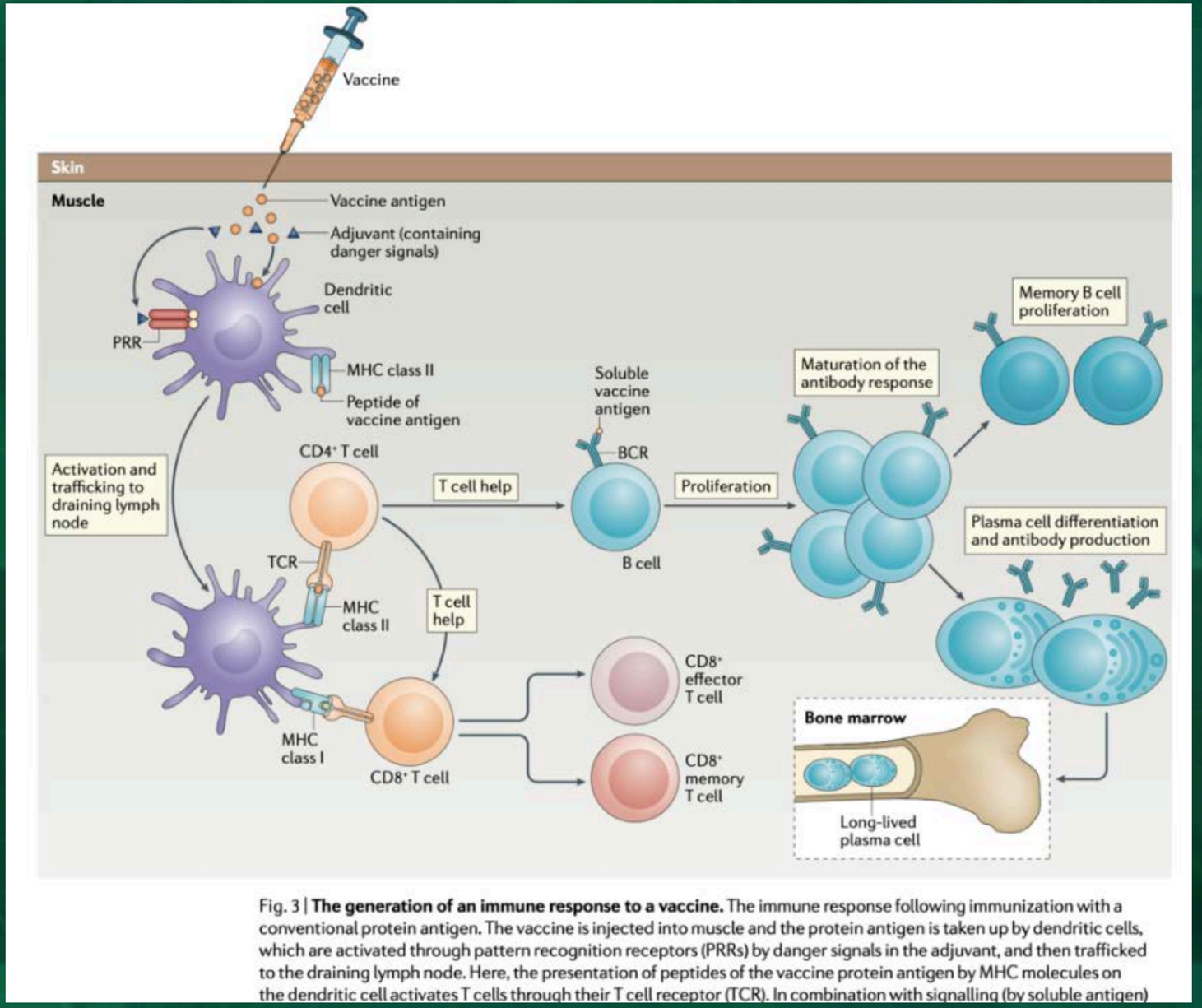


Fig. 3 | **The generation of an immune response to a vaccine.** The immune response following immunization with a conventional protein antigen. The vaccine is injected into muscle and the protein antigen is taken up by dendritic cells, which are activated through pattern recognition receptors (PRRs) by danger signals in the adjuvant, and then trafficked to the draining lymph node. Here, the presentation of peptides of the vaccine protein antigen by MHC molecules on the dendritic cell activates T cells through their T cell receptor (TCR). In combination with signalling (by soluble antigen)

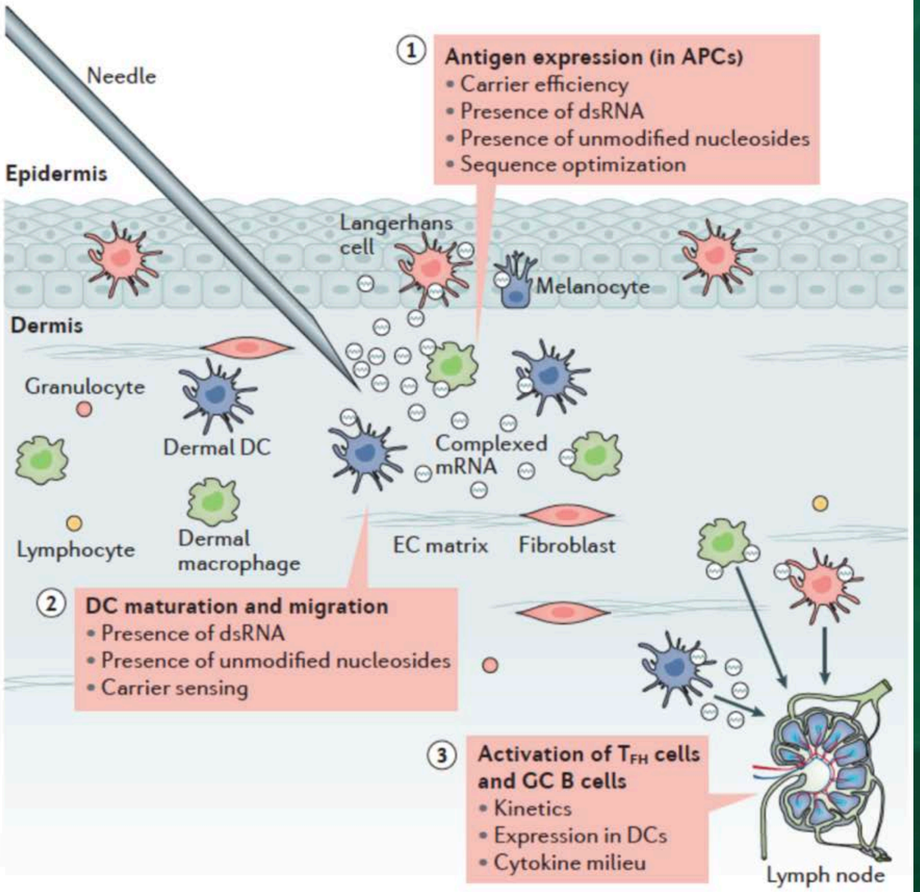


Figure 3 | **Considerations for effectiveness of a directly injected mRNA vaccine.** For an injected mRNA vaccine, major considerations for effectiveness include the following: the level of antigen expression in professional antigen-presenting cells (APCs), which is influenced by the efficiency of the carrier, by the presence of pathogen-associated molecular patterns (PAMPs) in the form of double-stranded RNA (dsRNA) or unmodified nucleosides and by the level of optimization of the RNA sequence (codon usage, G:C content, 5′ and 3′ untranslated regions (UTRs) and so on); dendritic cell (DC) maturation and migration to secondary lymphoid tissue, which is increased by PAMPs; and the ability of the vaccine to activate robust T follicular helper (T_{FH}) cell and germinal centre (GC) B cell responses — an area that remains poorly understood. An intradermal injection is shown as an example. EC, extracellular.

link to video

See link to video on *vaccines* webpage

UNITED STATES

JOHNS HOPKINS UNIVERSITY & MEDICINE | CORONAVIRUS RESOURCE CENTER

OVERVIEW

VACCINE TRACKER

Learn more about vaccines ›

Doses Administered	People Fully Vaccinated	% of Population Fully Vaccinated
589,231,370	221,506,997	67.23%

… as of 6/7/22

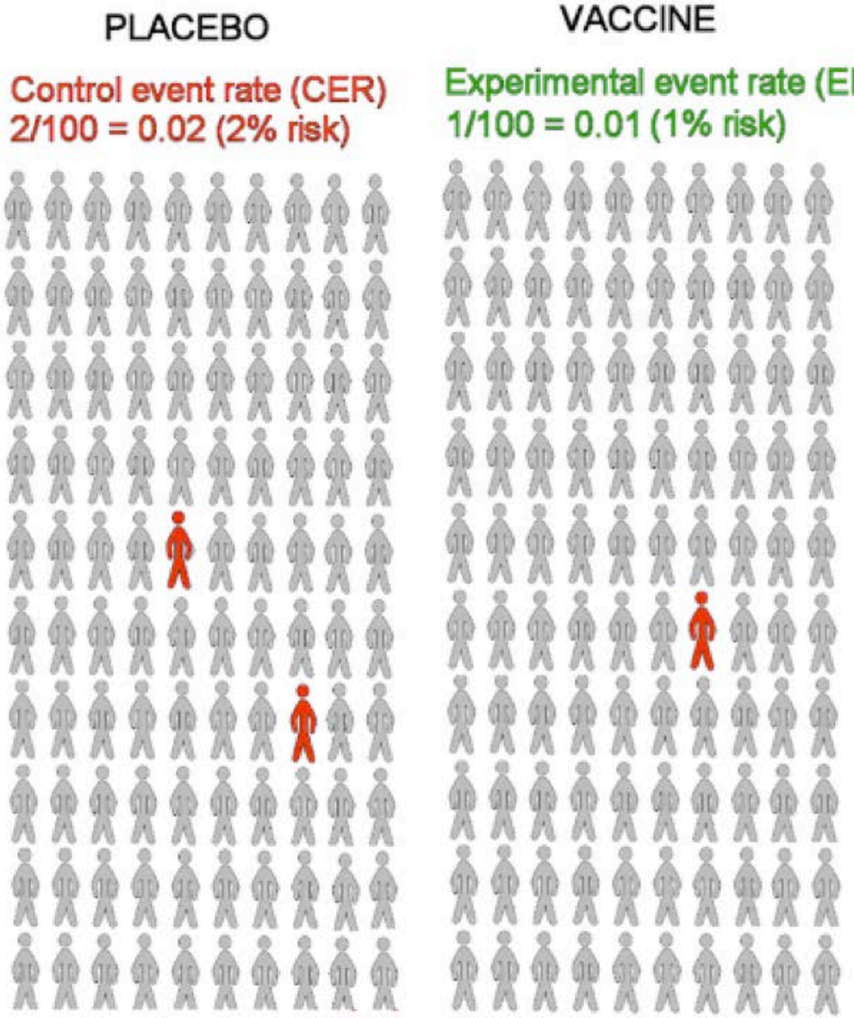
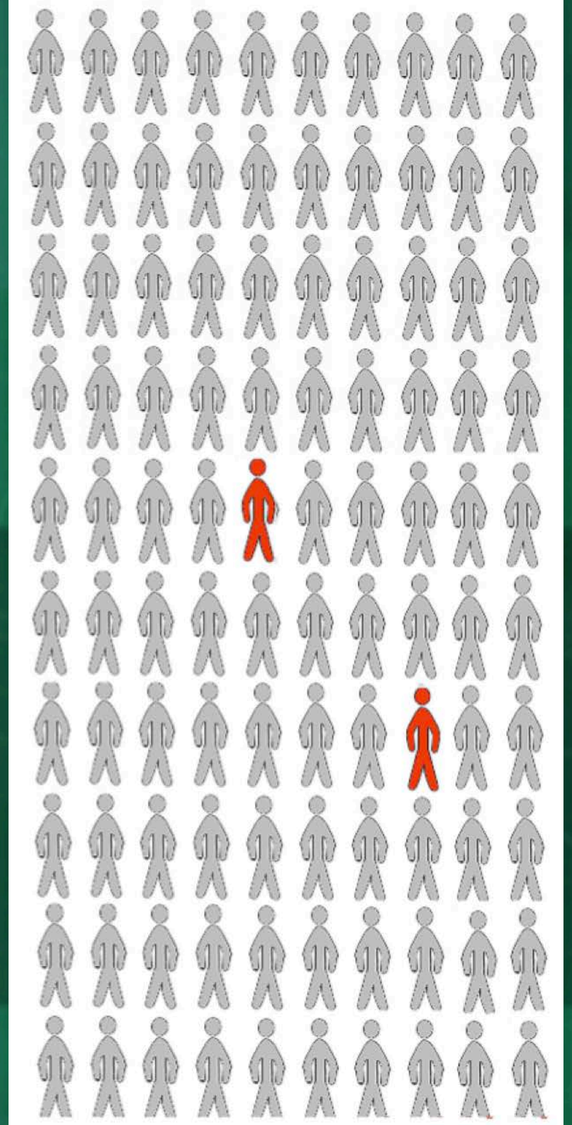


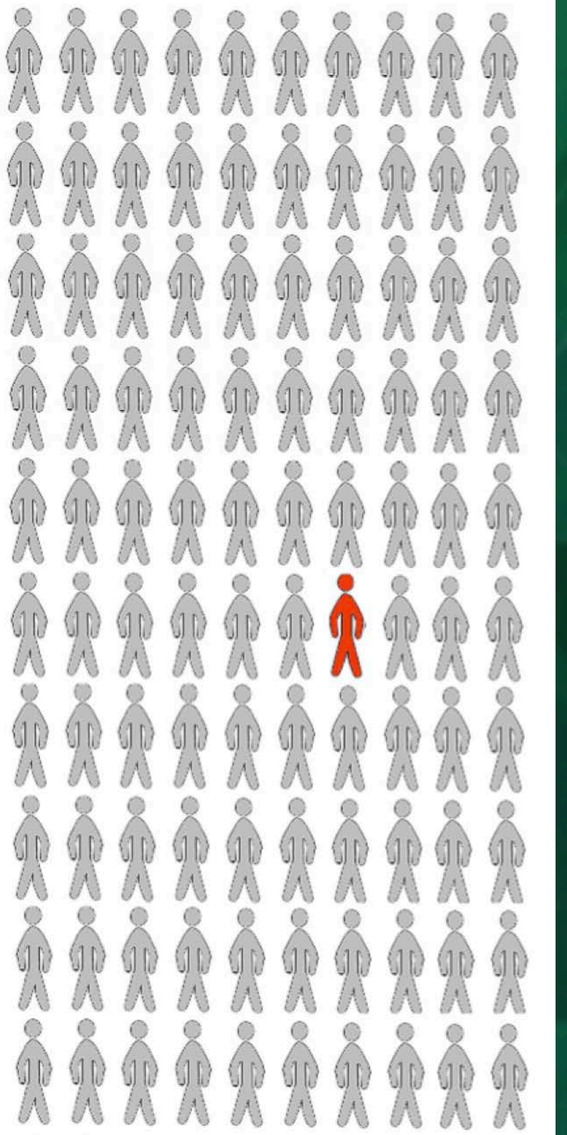
Figure 1. Example of a vaccine clinical trial for an infectious disease.

Citation: Brown, R.B. Outcome Reporting Bias in COVID-19 mRNA Vaccine Clinical Trials. *Medicina* **2021**, *57*, 199. https://doi.org/10.3390/medicina57030199

Control event rate (CER)
2/100 = 0.02 (2% risk)



Treatment Event Rate
1/100 = 0.01 (1% risk)



Absolute Risk Reduction = 1%

Relative Risk Reduction = 50%

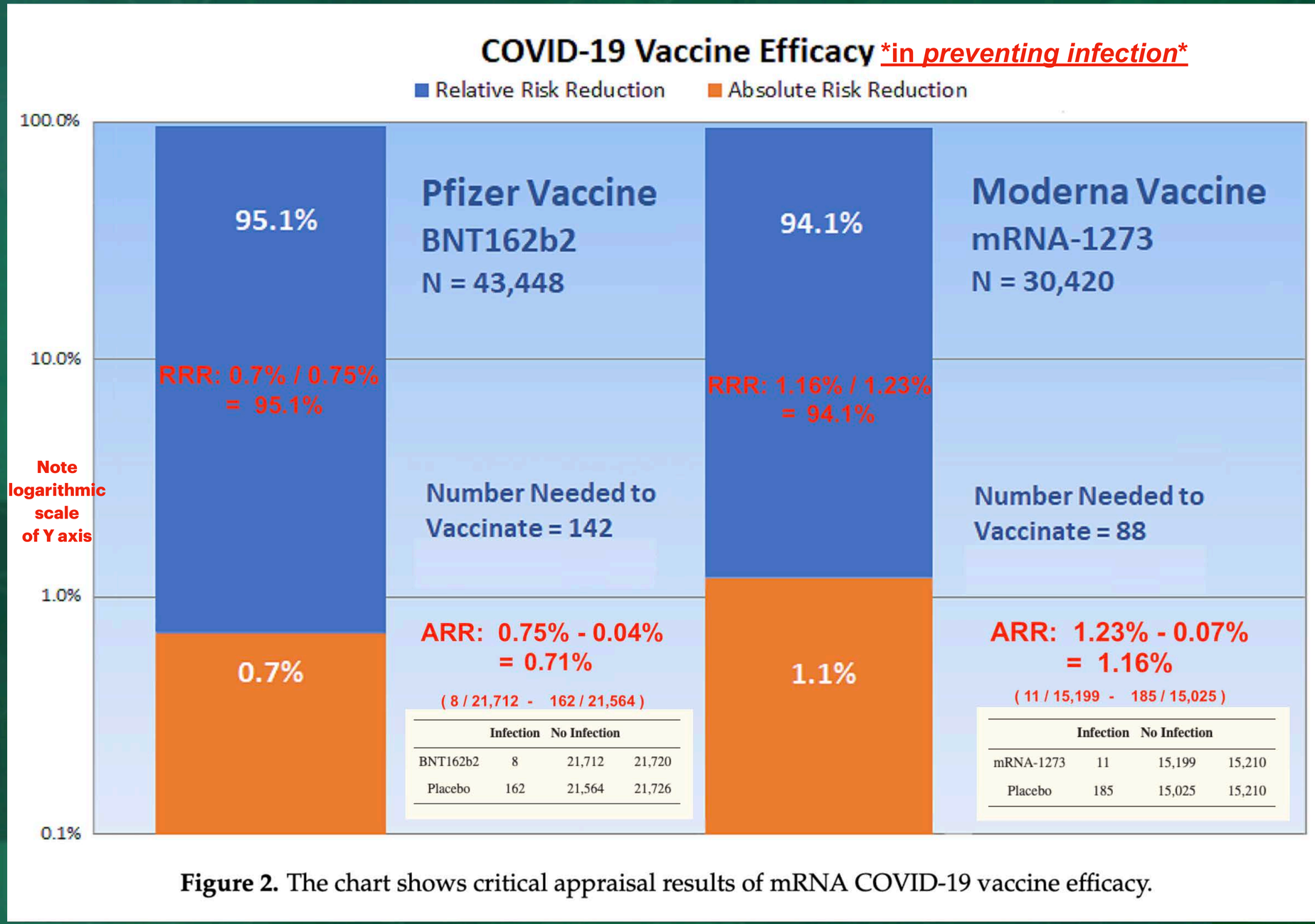


Figure 2. The chart shows critical appraisal results of mRNA COVID-19 vaccine efficacy.

Citation: Brown, R.B. Outcome Reporting Bias in COVID-19 mRNA Vaccine Clinical Trials. *Medicina* **2021**, *57*, 199. https://doi.org/10.3390/medicina57030199

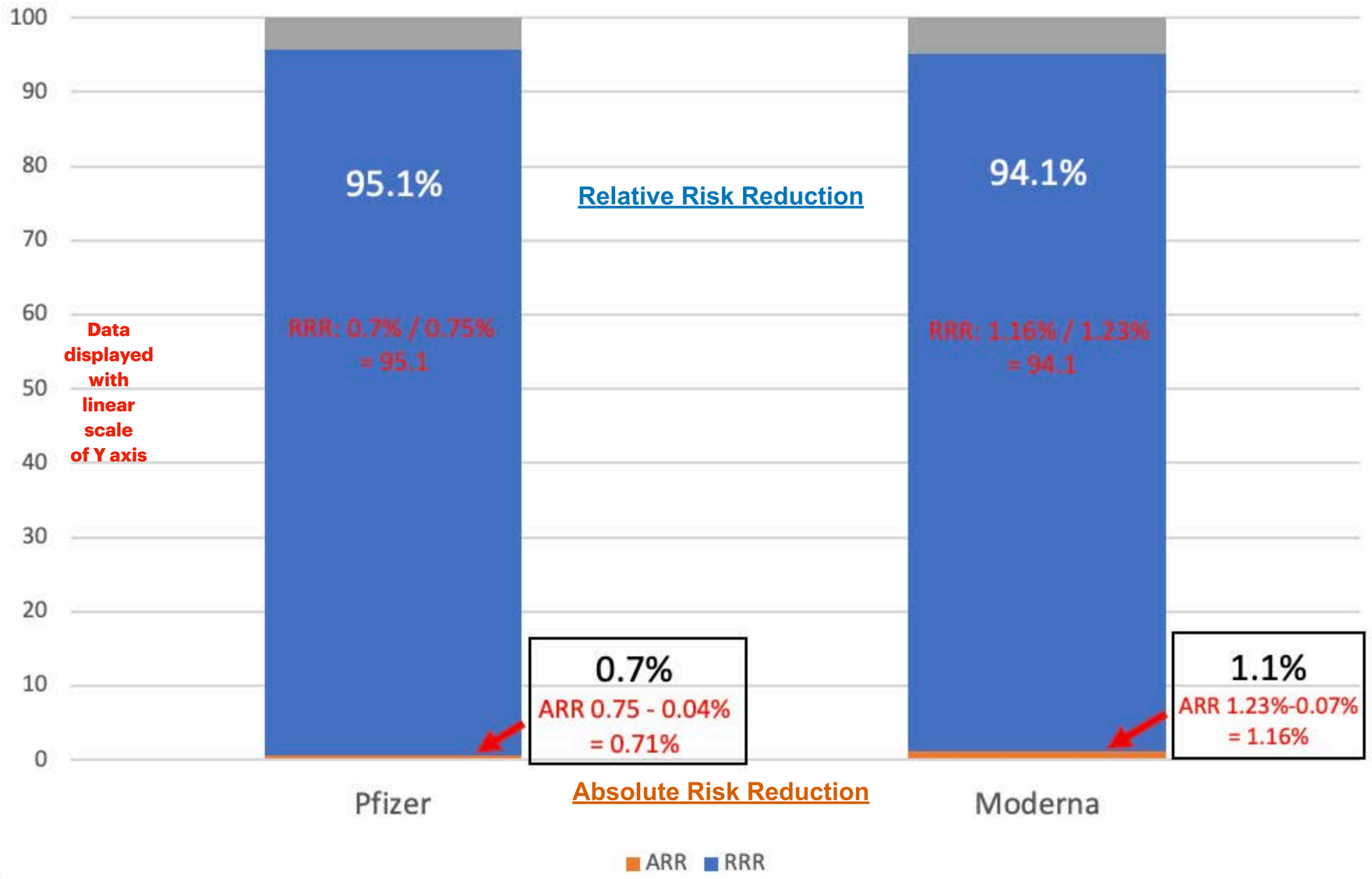
From the article:

"Unreported absolute risk reduction measures of 0.7% and 1.1% for the Pfizer and Moderna vaccines, respectively, are very much lower than the reported relative risk reduction measures."

in *preventing infection*

"Reporting absolute risk reduction measures is essential to prevent outcome reporting bias in evaluation of COVID-19 vaccine efficacy."

COVID-19 vaccine efficacy ***in *preventing infection****



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"Reporting absolute risk reduction measures is essential to prevent outcome reporting bias in evaluation of COVID-19 vaccine efficacy."

THE LANCET
Microbe

COMMENT | VOLUME 2, ISSUE 7, E279-E280, JULY 01, 2021

COVID-19 vaccine efficacy and effectiveness—the elephant (not) in the room

Piero Olliaro ✉ • Els Torreele • Michel Vaillant

Open Access • Published: April 20, 2021 •

Vaccine efficacy is generally reported as a Relative Risk Reduction (RRR), which is: 1 - Relative Risk

***** RR (relative risk) is the ratio of attack rates with and without a vaccine. *****

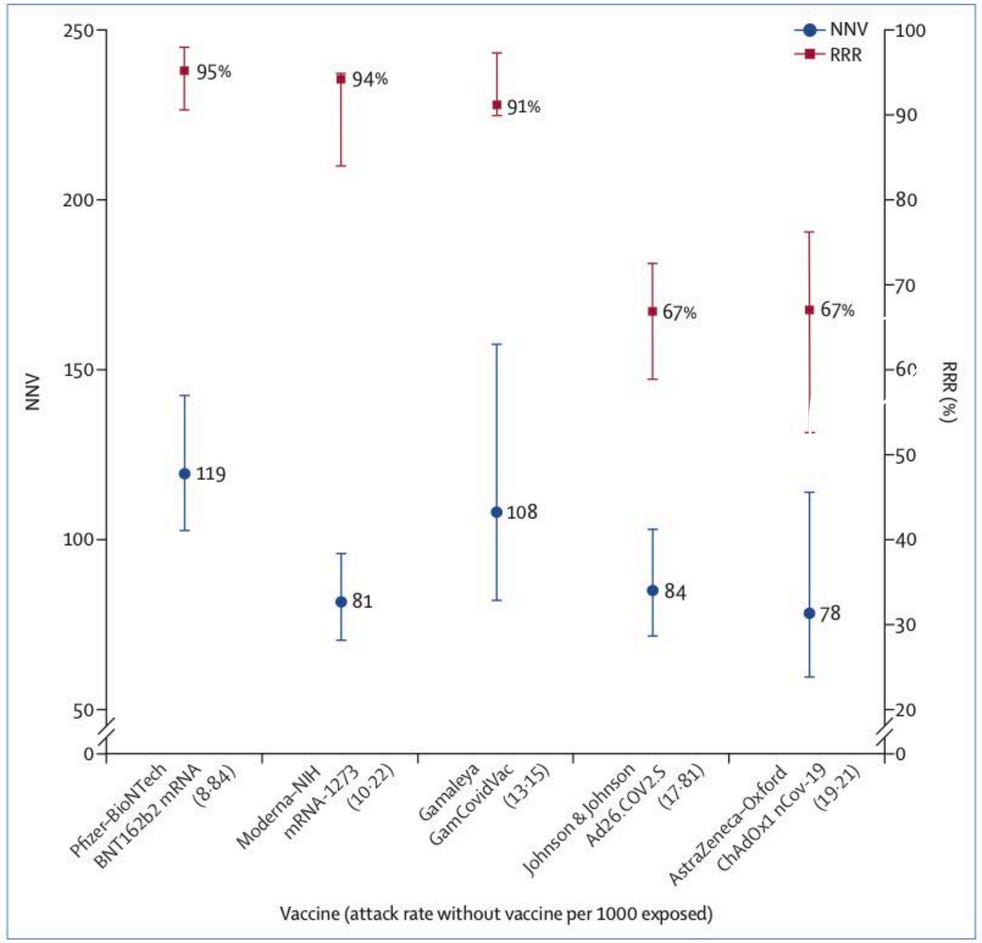


Figure: **RRR and NNV with 95% CI ranked by attack rate in the unvaccinated (placebo) group for five COVID-19 vaccines**
The lower the NNV and the higher the RRR, the better the vaccine efficacy. Details are in the appendix (p 3). RRR=relative risk reduction. NNV=numbers needed to vaccinate. NIH=US National Institutes of Health.

RRR should be seen against the background risk of being infected and becoming ill with COVID-19, which varies between populations and over time.

Although the RRR considers only participants who could benefit from the vaccine, the absolute risk reduction (ARR), which is the difference between attack rates with and without a vaccine, considers the whole population.

***ARRs tend to be ignored because they give a much less impressive effect size than RRRs*:**

1·2% for the Moderna–NIH, 0·84% for the Pfizer–BioNTech vaccines. ***in *preventing infection****

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

medicina February 26, 2021 MDPI

Perspective

Outcome Reporting Bias in COVID-19 mRNA Vaccine Clinical Trials

Ronald B. Brown

School of Public Health and Health Systems, University of Waterloo, Waterloo, ON N2L3G1, Canada; r26brown@uwaterloo.ca

Abstract: Relative risk reduction and absolute risk reduction measures in the evaluation of clinical trial data are poorly understood by health professionals and the public. The absence of reported absolute risk reduction in COVID-19 vaccine clinical trials can lead to outcome reporting bias that affects the interpretation of vaccine efficacy. The present article uses clinical epidemiologic tools to critically appraise reports of efficacy in Pfzier/BioNTech and Moderna COVID-19 mRNA vaccine clinical trials. Based on data reported by the manufacturer for Pfzier/BioNTech vaccine BNT162b2,

Ironically, the omission of absolute risk reduction measures in data reviewed by the VRBPAC overlooks FDA guidelines for communicating evidence-based risks and benefits to the public [11]. The FDA's advice for information providers includes:

> "Provide absolute risks, not just relative risks. Patients are unduly influenced when risk information is presented using a relative risk approach; this can result in suboptimal decisions. Thus, an absolute risk format should be used."

The *New England Journal of Medicine* also published clinical trial data on safety and efficacy for the BNT162b2 vaccine [12] and the mRNA-1273 vaccine [13], but with no mention of absolute risk reduction measures.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Effectiveness of Covid-19 Vaccines over a 9-Month Period in North Carolina

Dan-Yu Lin, Ph.D., Yu Gu, B.S., Bradford Wheeler, M.P.H., Hayley Young, M.P.H., Shannon Holloway, Ph.D., Shadia-Khan Sunny, M.D., Ph.D., M.P.H., Zack Moore, M.D., M.P.H., and Donglin Zeng, Ph.D.

March 10, 2022

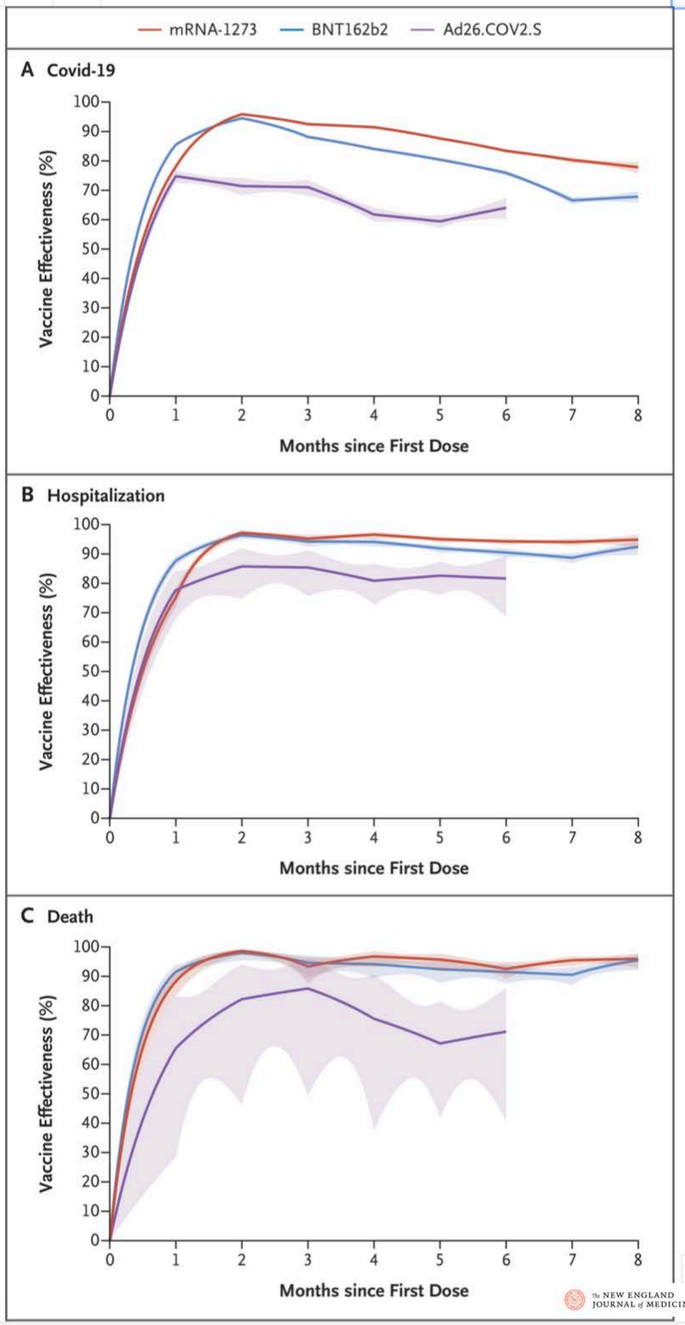


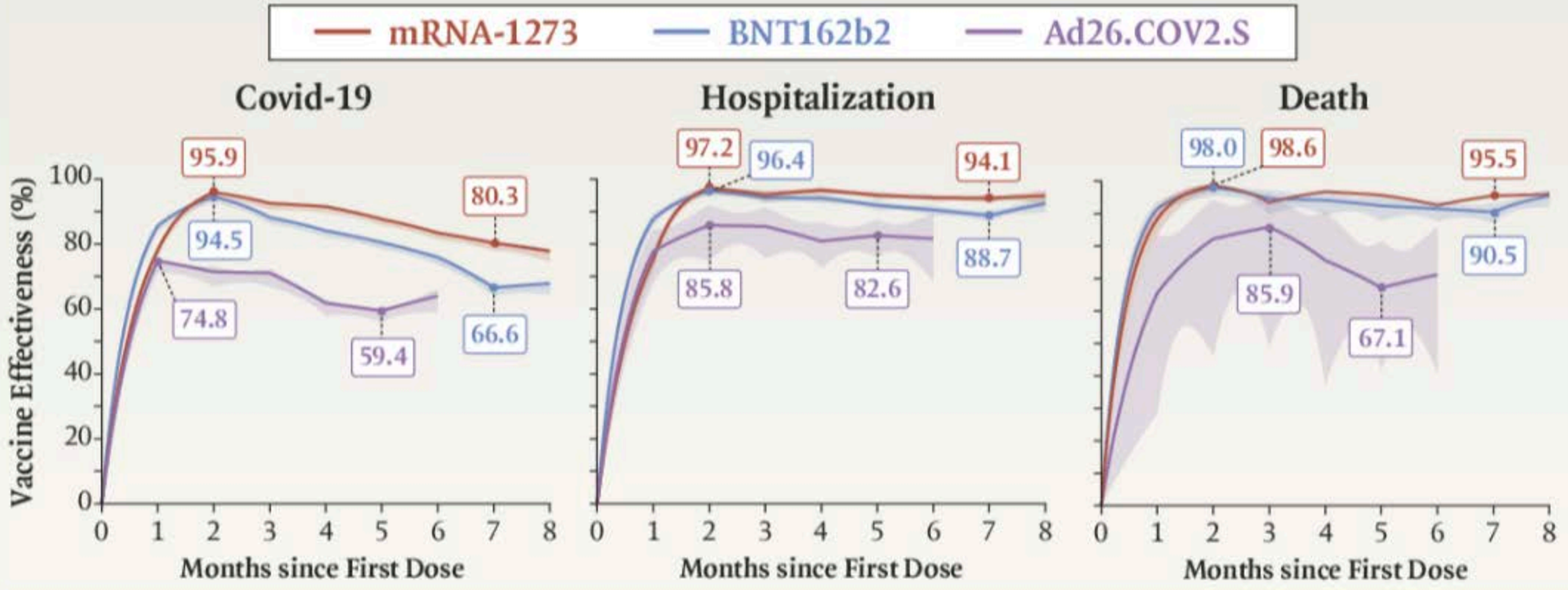
Figure 1. Effectiveness of the BNT162b2, mRNA-1273, and Ad26.COV2.S Vaccines against Covid-19, Hospitalization, and Death.

The NEW ENGLAND JOURNAL of MEDICINE

Effectiveness of Covid-19 Vaccines over a 9-Month Period

OBSERVATIONAL STUDY USING SURVEILLANCE DATA FROM NORTH CAROLINA

Residents vaccinated between December 11, 2020, and September 8, 2021



All three vaccines reduced risks of hospitalization and death;
protection against infection waned with declining immunity and emergence of the delta variant.

D.-Y. Lin et al. 10.1056/NEJMoa2117128

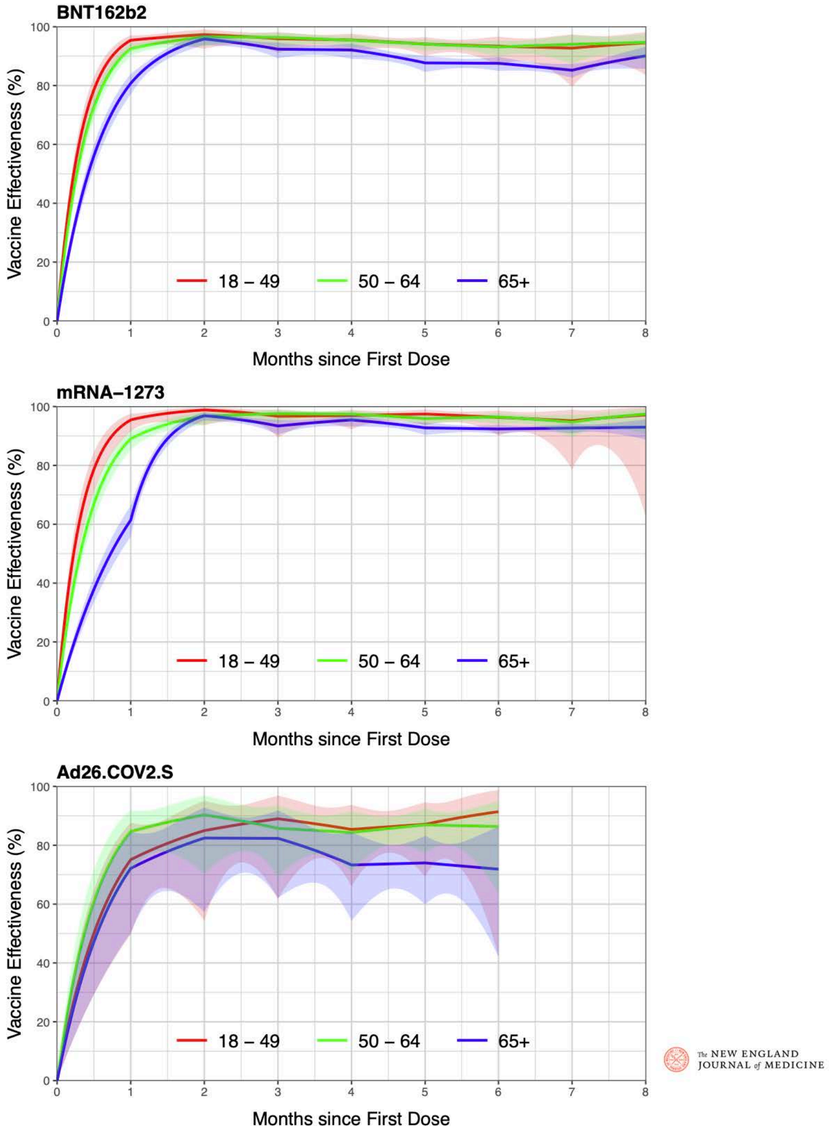


Figure S8. Vaccine effectiveness in reducing the risk of hospitalization by age group. Estimates are shown by solid curves, and 95% confidence intervals are shown by shaded bands. Results are based on 50 imputations.

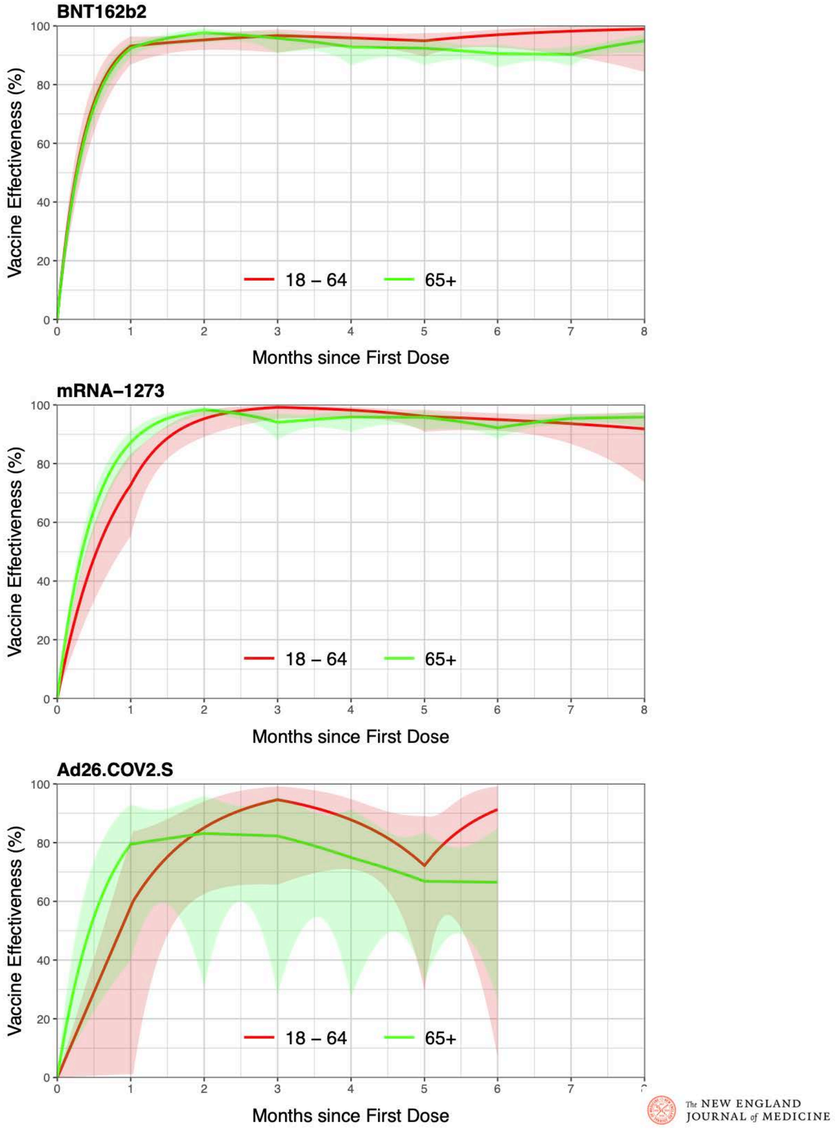


Figure S14. Vaccine effectiveness in reducing the risk of death by age group. Estimates are shown by solid curves, and 95% confidence intervals are shown by shaded bands. Results are based on 50 imputations.

Morbidity and Mortality Weekly Report

US Department of Health and Human Services/Centers for Disease Control and Prevention MMWR / March 25, 2022 / Vol. 71 / No. 12 459

Effectiveness of mRNA Vaccination in Preventing COVID-19–Associated Invasive Mechanical Ventilation and Death — United States, March 2021–January 2022

TABLE 2. Effectiveness of COVID-19 mRNA vaccines against COVID-19–associated invasive mechanical ventilation or in-hospital death — 21 hospitals, 18 states,*,† March 2021–January 2022

Group/Characteristic	No. of vaccinated case-patients with IMV or death/ total no. of case-patients (%)	No. of vaccinated control-patients/ total no. of control-patients (%)	Vaccine effectiveness, % (95% CI)
All variant periods§	307/1,440 (21.3)	4,020/6,104 (65.9)	90 (88–91)
No. of mRNA vaccine doses received			
2	277/1,410 (19.6)	3,488/5,572 (62.6)	88 (86–90)
14–150 days after dose 2	92/1,225 (7.5)	2,039/4,123 (49.5)	92 (90–94)
>150 days after dose 2	185/1,318 (14.0)	1,449/3,533 (41.0)	84 (80–87)
3	30/1,163 (2.6)	532/2,616 (20.3)	94 (91–96)
Age group, yrs			
18–64	115/931 (12.4)	1,807/3,326 (54.3)	91 (89–93)
≥65	192/509 (37.7)	2,213/2,778 (79.7)	88 (84–90)
Health status			
Immunocompromised	123/232 (53.0)	1,090/1,504 (72.5)	74 (64–81)
Immunocompetent	184/1,208 (15.2)	2,930/4,600 (63.7)	92 (91–94)
No. of chronic conditions among immunocompetent			
None	12/368 (3.3)	322/642 (50.2)	98 (97–99)
1	34/337 (10.1)	647/1,094 (59.1)	95 (92–96)
2	60/264 (22.7)	886/1,320 (67.1)	89 (85–93)
≥3	78/239 (32.6)	1,075/1,544 (69.6)	84 (78–89)
Variant period,¶ no. of doses			
Pre-Delta, 2 doses	13/259 (5.0)	893/1,738 (51.4)	95 (90–97)
Delta, 2 or 3 doses	235/1,027 (22.9)	2,741/3,865 (70.9)	89 (87–91)
2 doses, median = 159 days after dose 2	218/1,010 (21.6)	2,402/3,526 (68.1)	88 (86–90)
3 doses, median = 35 days after dose 3	17/809 (2.1)	339/1,463 (23.2)	95 (91–97)
Omicron, 2 or 3 doses	59/154 (38.3)	386/501 (77.0)	86 (79–91)
2 doses, median = 256 days after dose 2	46/141 (32.6)	193/308 (62.7)	79 (66–87)
3 doses, median = 60 days after dose 3	13/108 (12.0)	193/308 (62.7)	94 (88–97)

Abbreviations: IMV = invasive mechanical ventilation; VE = vaccine effectiveness.

Summary

What is already known about this topic?

COVID-19 mRNA vaccines provide protection against COVID-19 hospitalization among adults. However, how well mRNA vaccines protect against the most severe outcomes of COVID-19–related illness, including use of invasive mechanical ventilation (IMV) or death, is uncertain.

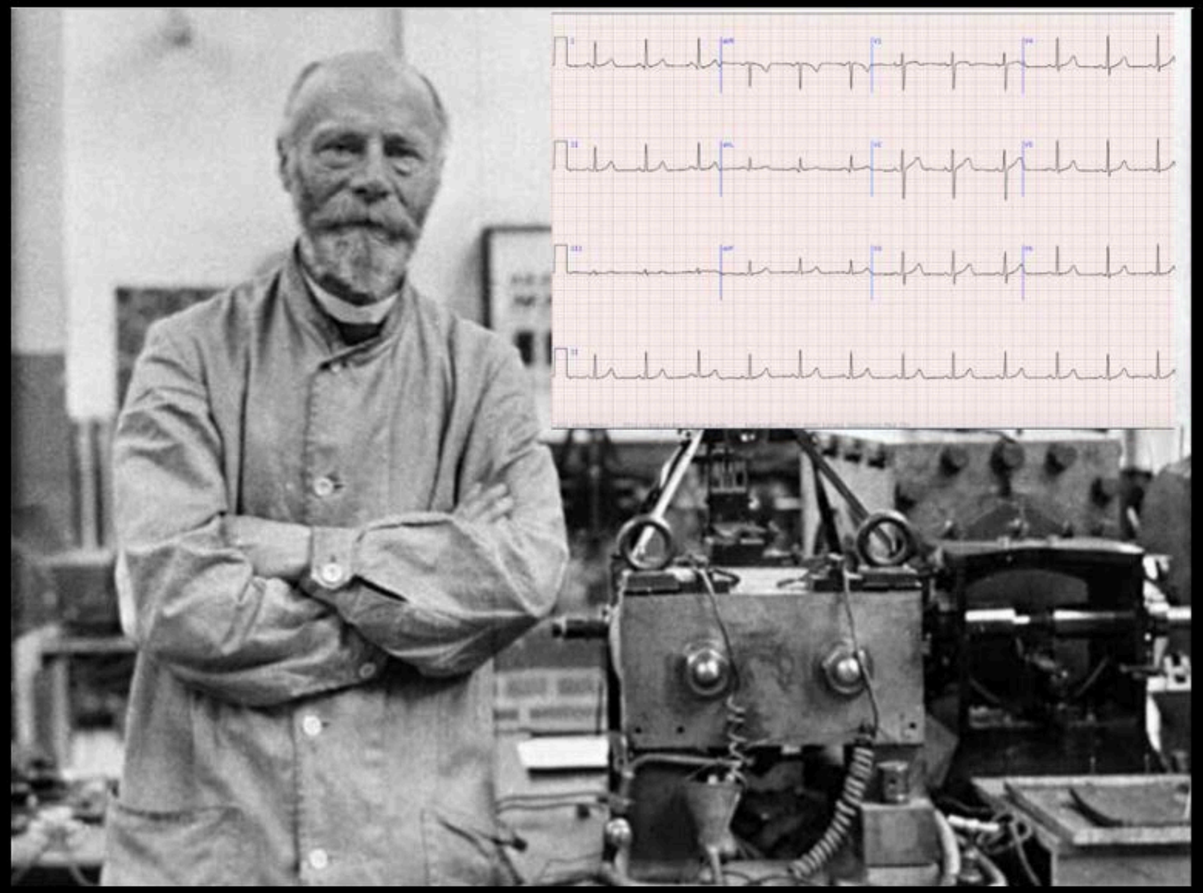
What is added by this report?

Receiving 2 or 3 doses of an mRNA COVID-19 vaccine was associated with a 90% reduction in risk for COVID-19–associated IMV or death. Protection of 3 mRNA vaccine doses during the period of Omicron predominance was 94%.

What are the implications for public health practice?

COVID-19 mRNA vaccines are highly effective in preventing the most severe forms of COVID-19. CDC recommends that all persons eligible for vaccination get vaccinated and stay up to date with COVID-19 vaccination.

imagessays

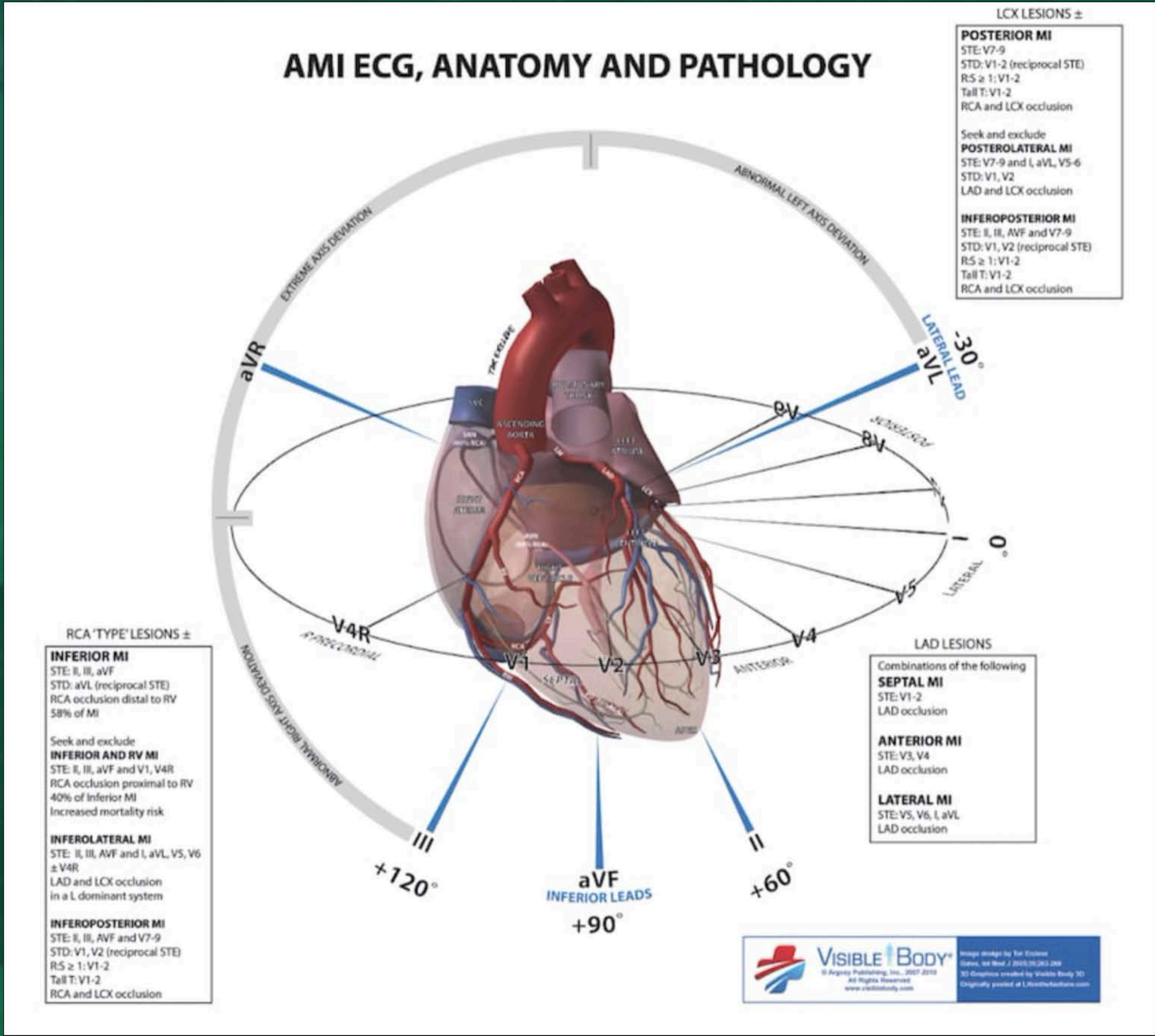


ECG

See:

ECG

webpage
on
imagessays.com



See: ECG Library - LITFL - ECG Library Basics - excellent interactive website

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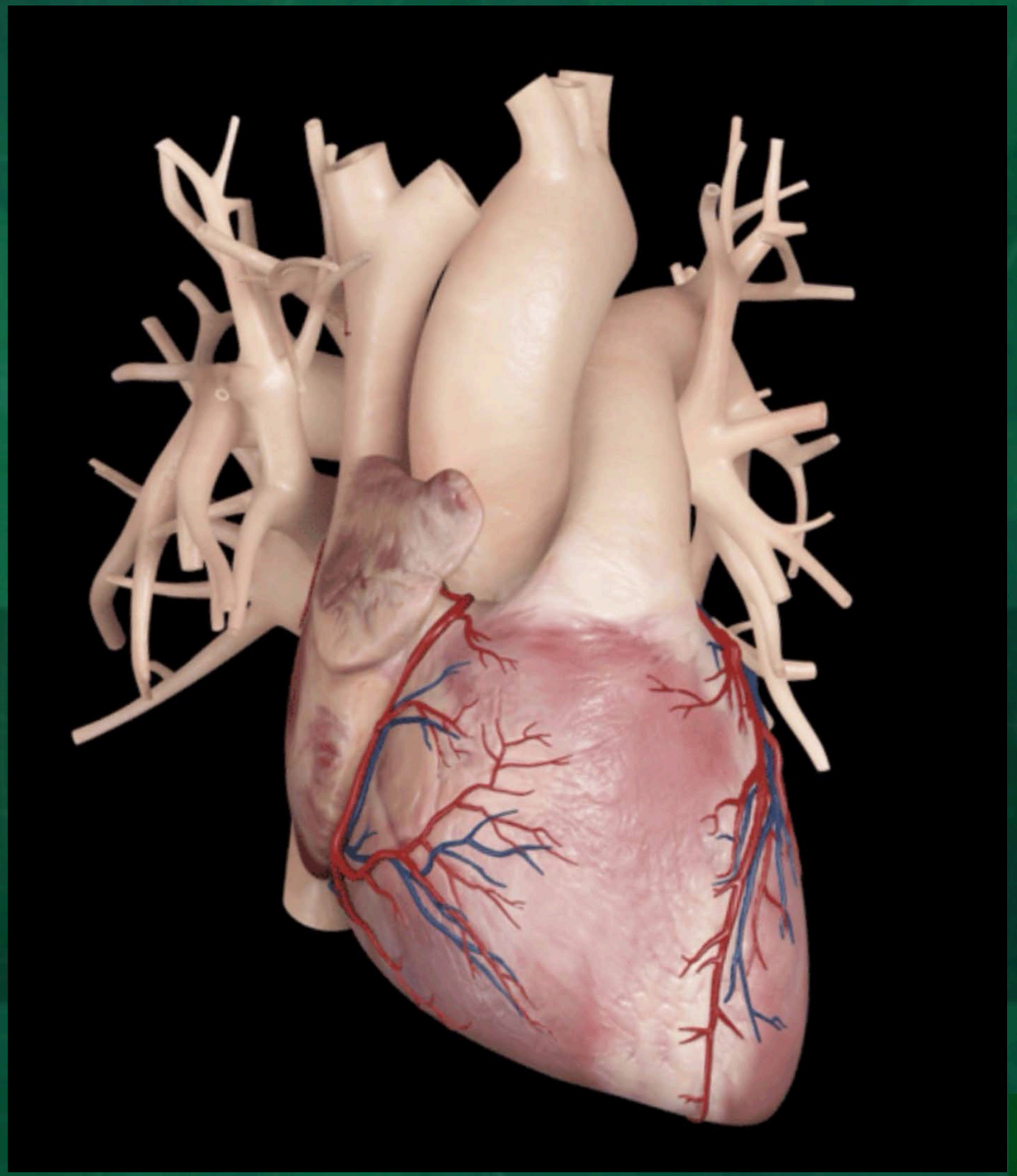
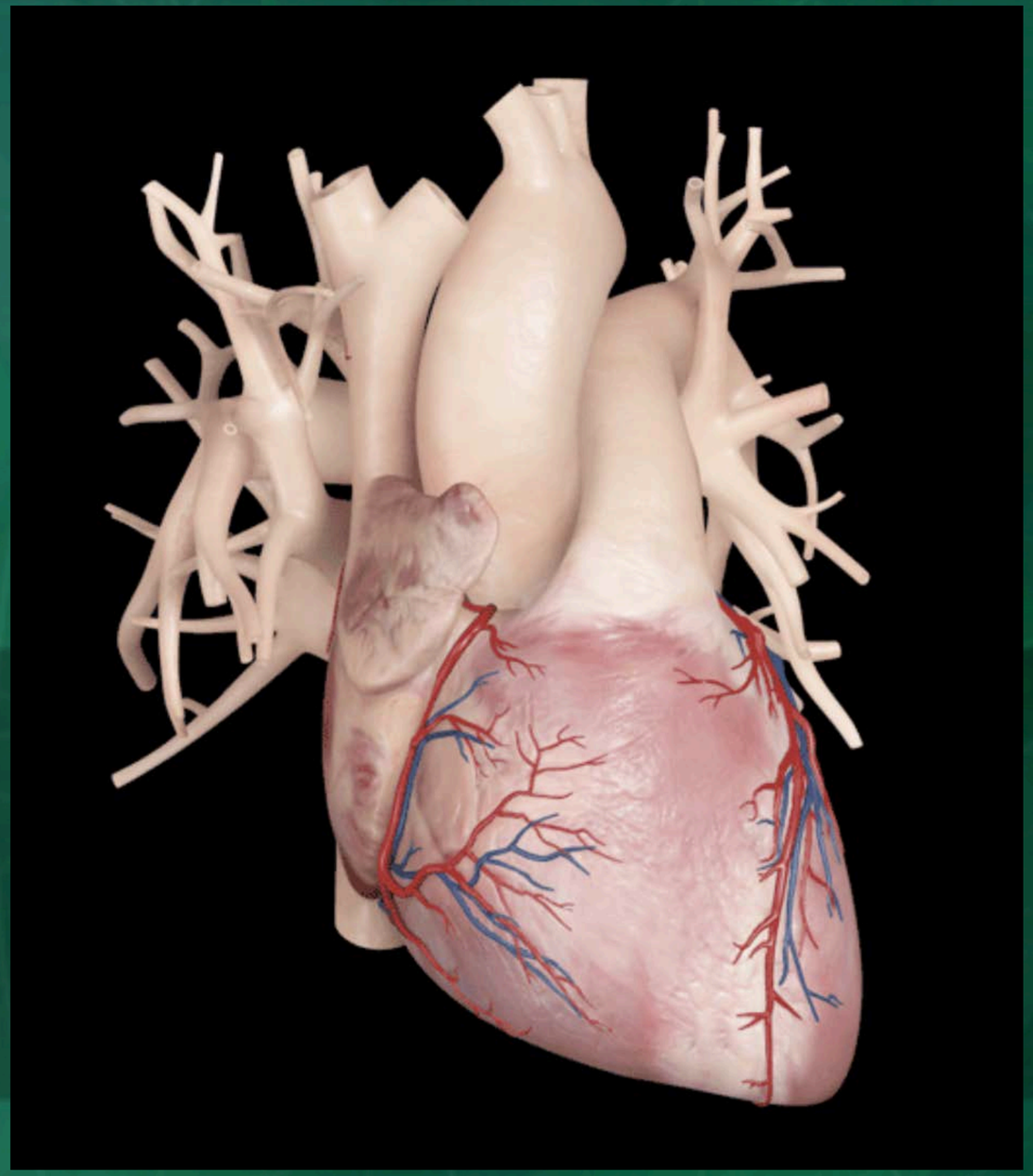
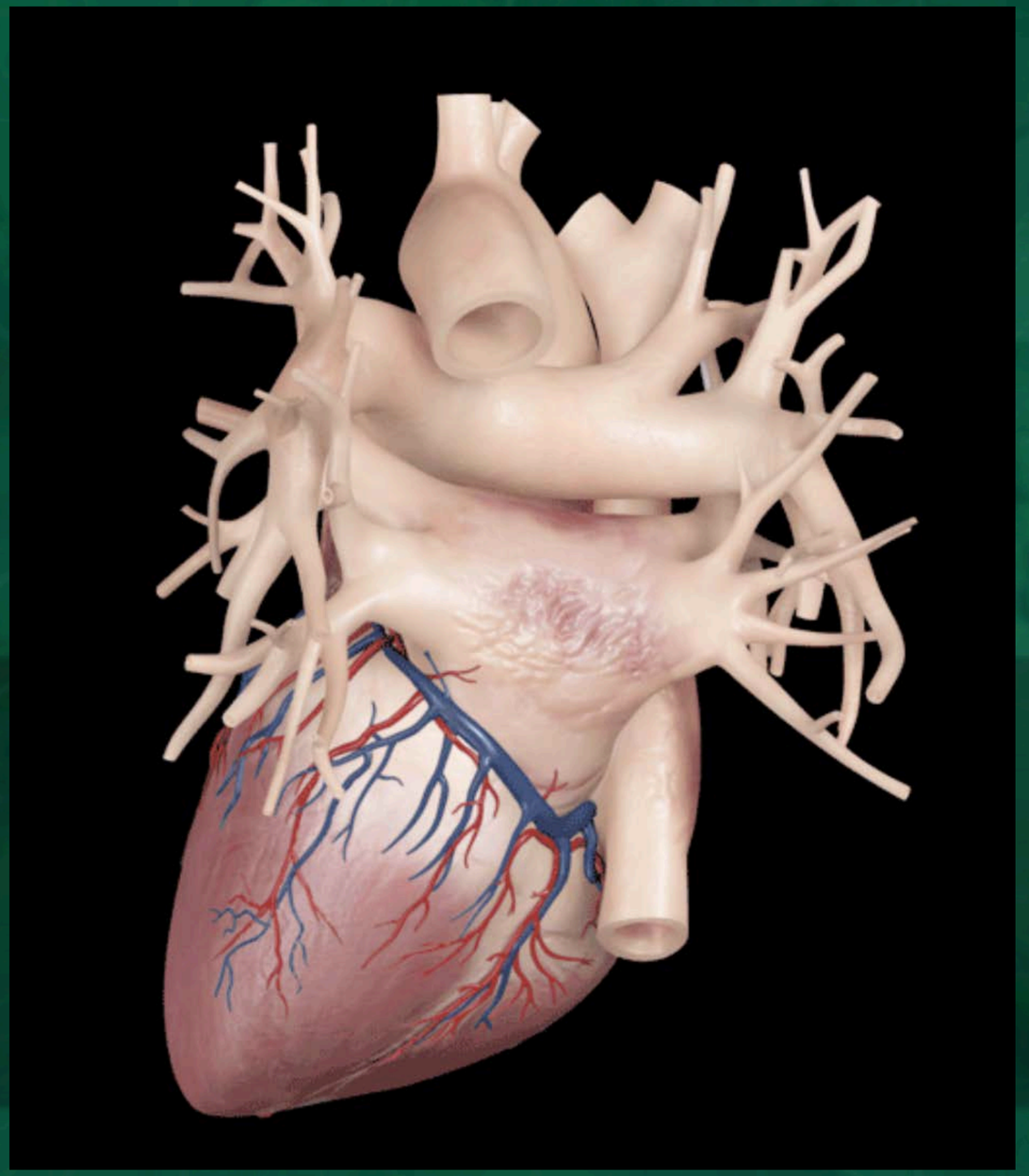
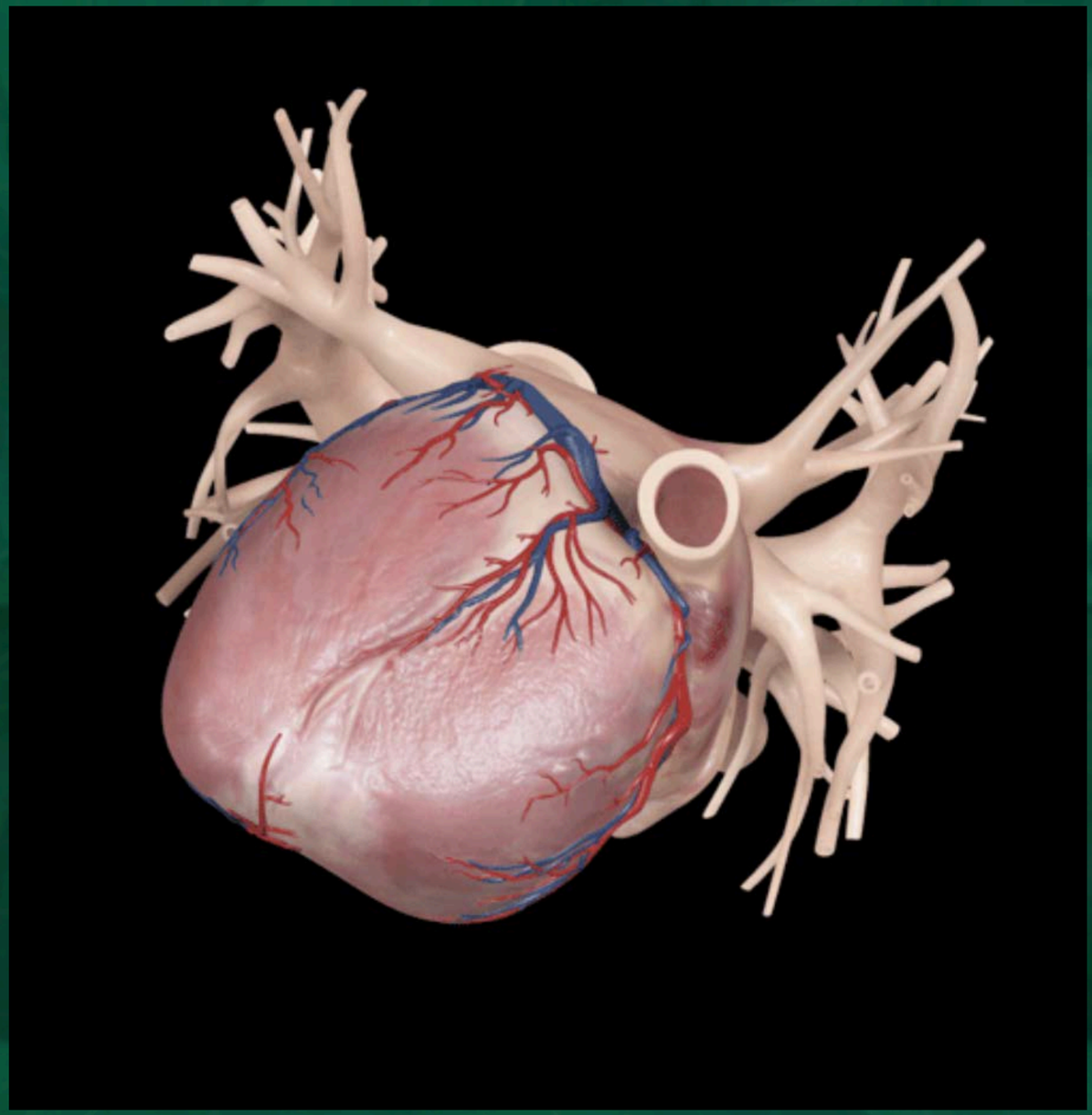






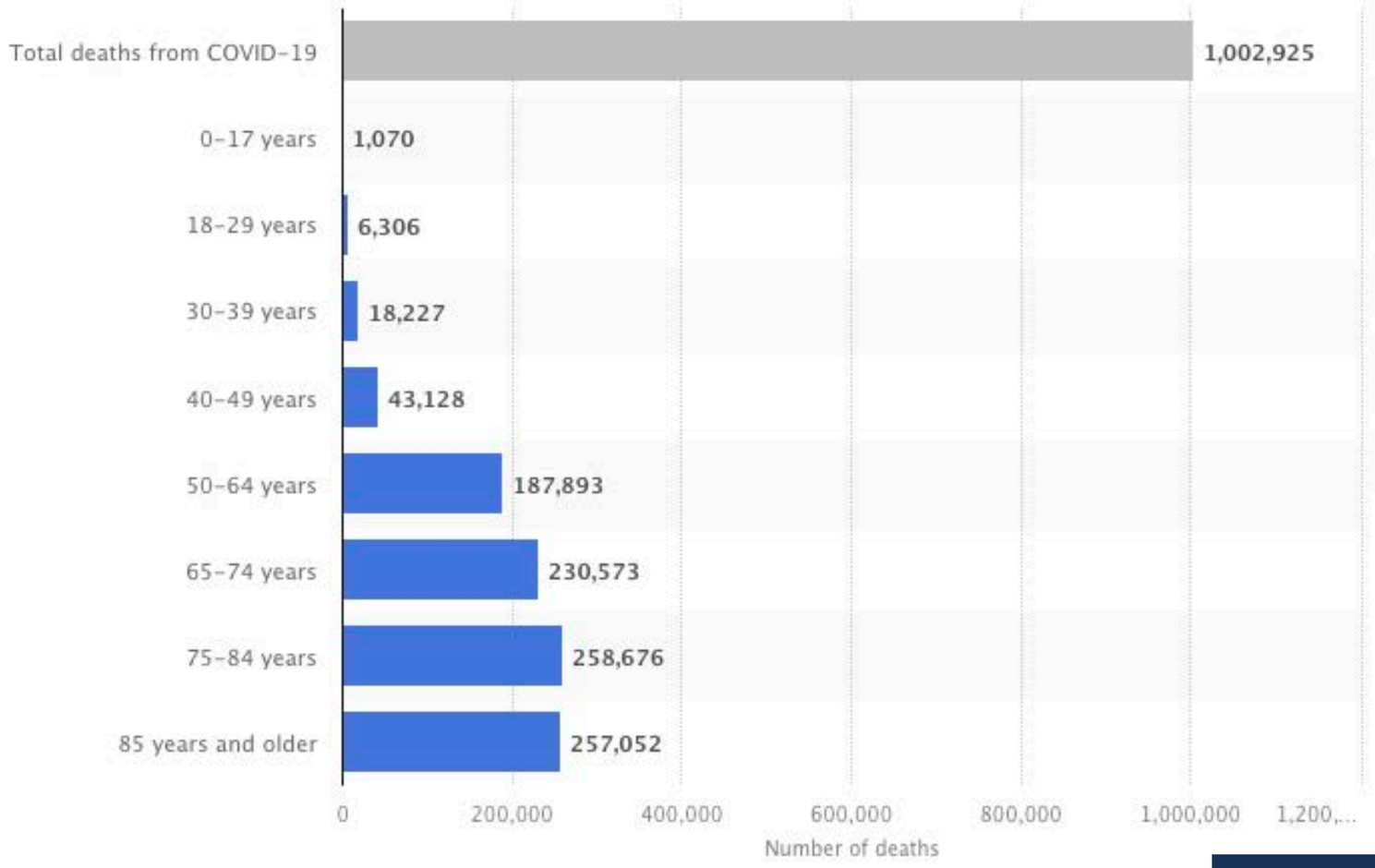


2 ways of thinking about the ongoing COVID-19 pandemic

Personal Health … Me

Public Health … Us

Number of coronavirus disease 2019 (COVID-19) deaths in the U.S. as of May 25, 2022, by age*



statista

Risk for COVID-19 Infection, Hospitalization, and Death By Age Group

Updated June 2, 2022

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Age group rate ratios compared to ages 18 to 29 years[1]

Rate compared to 18-29 years old[1]	0-4 years old	5-17 years old	18-29 years old	30-39 years old	40-49 years old	50-64 years old	65-74 years old	75-84 years old	85+ years old
Cases[2]	<1x	1x	Reference group	1x	1x	1x	1x	1x	1x
Hospitalization[3]	1x	<1x	Reference group	2x	2x	3x	5x	8x	10x
Death[4]	<1x	<1x	Reference group	4x	10x	25x	65x	140x	330x

All rates are relative to the 18 to 29 years age group. This group was selected as the reference group because it has accounted for the largest cumulative number of COVID-19 cases compared to other age groups. Sample interpretation: Compared with ages 18 to 29 years, the rate of death is four times higher in ages 30 to 39 years, and 330 times higher in those who are ages 85 years and older. (In the table, a rate of 1x indicates no difference compared to the 18 to 29 years age group.)

Infectious Disease

Transmissible

2 ways of thinking about the ongoing COVID-19 pandemic

Personal Health … Me

Public Health … Us

As an example of an infected (and infectious) person who was not allowed to "do what she wanted to do", Mary Mallon was an asymptomatic carrier (in her gallbladder) of *Salmonella typhi*, which is infectious and causes typhoid fever. She *chose and preferred* to continue to work in her job as a cook (and to continue to spread typhoid fever to others who could become sick and die). She was not permitted to do so, however, because of the ***public health*** implications of this.

Mary Mallon, also called Typhoid Mary THE NEW YORK AMERICAN

The **COVID-19** pandemic is a ***public health*** issue in addition to being a "*personal choice*", "*freedom*", "*my decision*" issue.

Mary Mallon (September 23, 1869 – November 11, 1938), commonly known as **Typhoid Mary**, was an Irish-born American cook believed to have infected between 51 to 122 people with typhoid fever. The infections caused three confirmed deaths, with unconfirmed estimates of up to 50. She was the first person in the United States identified as an asymptomatic carrier of the pathogenic bacteria *Salmonella typhi*.[1][2] She persisted in working as a cook and thereby exposed others to the disease. Because of that, she was twice forcibly quarantined by authorities, eventually for the final two decades of her life. Mallon died after a total of nearly 30 years in isolation.[3][4] Her popular nickname has since gained currency as a term for persons who spread disease or other misfortune, not always aware that they are doing so.

In 1909, Mary unsuccessfully sued the health department. During her two-year period of confinement, she had 120/163 stool samples test positive. No one ever attempted to explain to Mary the significance of being a "carrier", instead they had offered to remove her gallbladder, something she had denied. She was unsuccessfully treated with Hexamethylenamin, laxatives, Urotropin, and brewer's yeast. In 1910, a new health commissioner vowed to free Mary and assist her with finding suitable employment as a domestic but not as a cook. Mary was released but never intended to abide by the agreement. She started working again in the cuisines of her unsuspecting employers, threatening public health once more [4].

As a cook of Sloane Maternity in Manhattan, she contaminated, in three months, at least 25 people, doctors, nurses and staff. Two of them died. She had managed to be hired as "Mary Brown" [8]. Since then she was stigmatized as "Typhoid Mary"

The health technology of the era did not have a completely effective solution: there were no antibiotics to fight the infection, and gallbladder removal was a dangerous, sometimes fatal operation. Some modern specialists claim that the typhoid bacteria can become integrated in macrophages and then reside in intestinal lymph nodes or the spleen.[50][51]

Jun 07, 2022 16:26 UTC (Eastern+5)

Learn More | Download and Share

U.S. Population

332,749,749

World Population

7,900,634,465

Components of Population Change

16:26:51 UTC

- One birth every **9 seconds**
- One death every **13 seconds**
- One international migrant (net) every **126 seconds**
- Net gain of one person every **23 seconds**

TOP 10 MOST POPULOUS COUNTRIES (July 1, 2022)

1. China	1,410,539,758	6. Nigeria	225,082,083
2. India	1,389,637,446	7. Brazil	217,240,060
3. United States	332,838,183	8. Bangladesh	165,650,475
4. Indonesia	277,329,163	9. Russia	142,021,981
5. Pakistan	242,923,845	10. Mexico	129,150,971

Select a Date

The United States population on June 6, 2022 was: 332,744,033

Select a Date

Learn More | Download and Share

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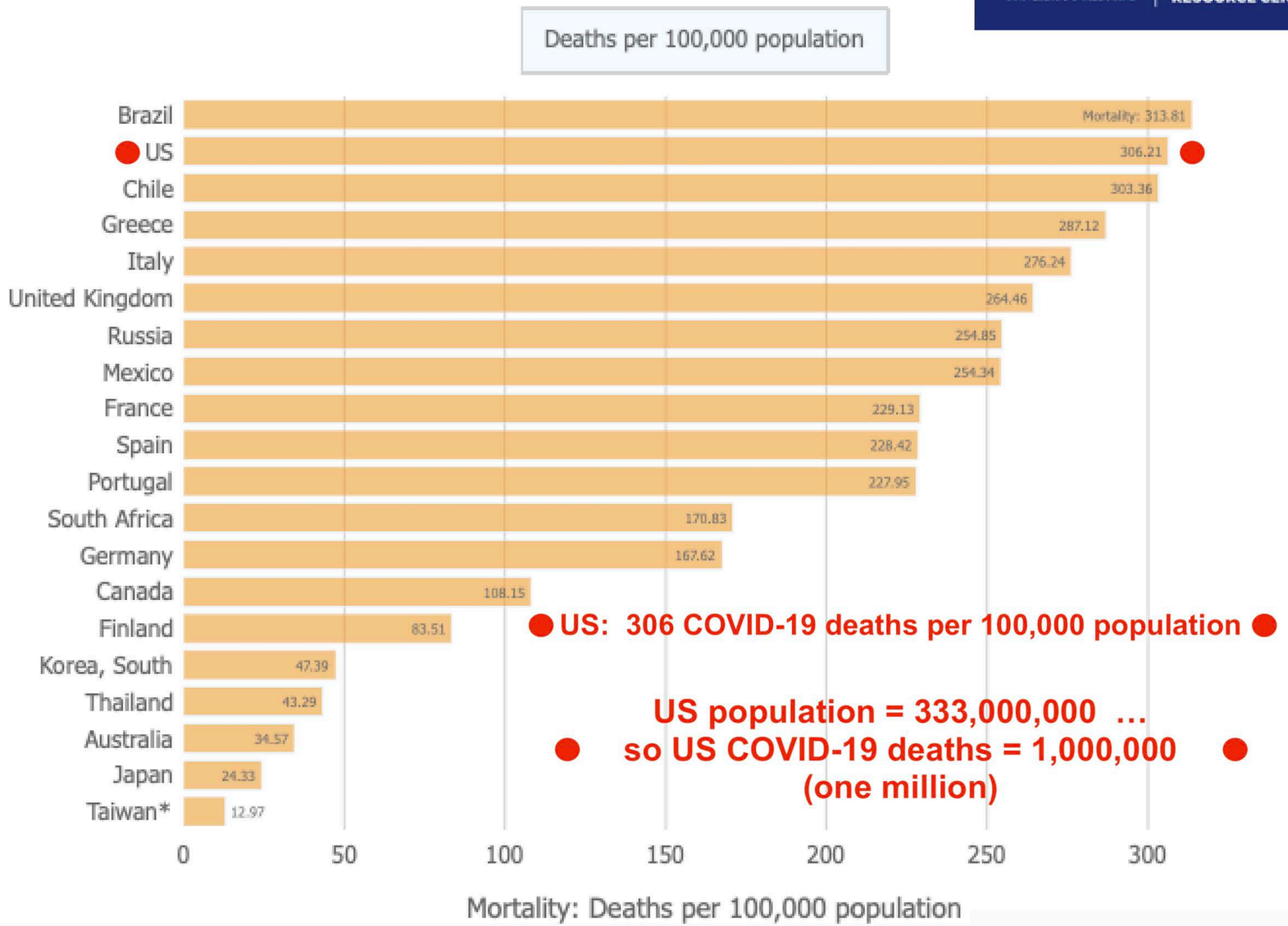


US: 306 COVID-19 deaths per 100,000 population

US population = 333,000,000 …
so US COVID-19 deaths = 1,000,000
(one million)

UNITED STATES

JOHNS HOPKINS UNIVERSITY & MEDICINE | CORONAVIRUS RESOURCE CENTER

OVERVIEW

All Time | Past Day | Past Week | Past Month

Confirmed Cases
84,882,287

Deaths
1,008,857

... as of 6/7/22

Deaths Attributed to COVID-19 on Death Certificates

Data as of 6/3/2022

Total | 2022 | 2021 | 2020

Deaths through week ending 5/28/2022

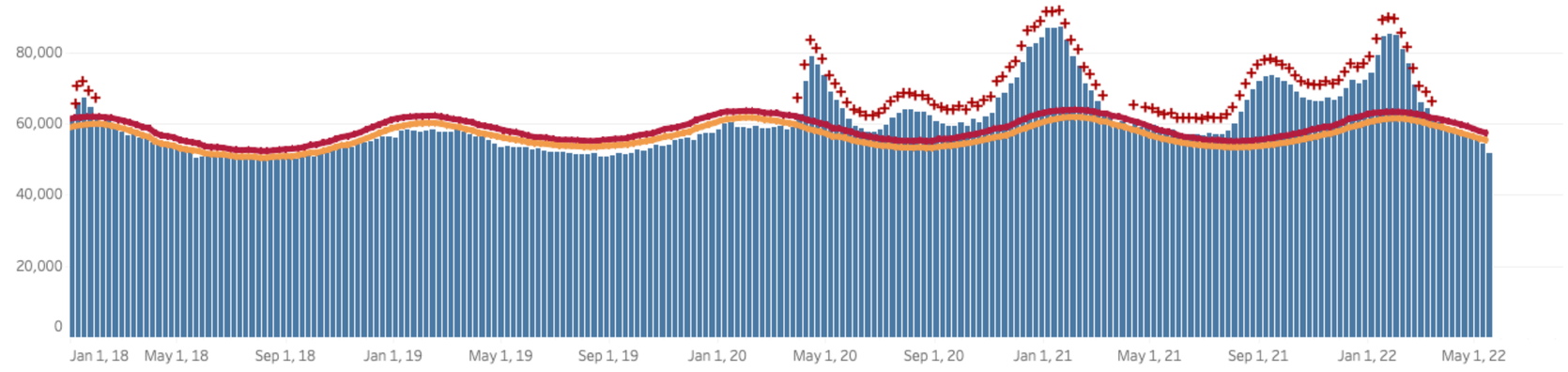
1,005,633

In at least 90% of these deaths, COVID-19 was listed as the underlying cause of death. For the remaining deaths, COVID-19 was listed as a contributing cause of death.

US deaths

+ indicates observed count above threshold
Predicted number of deaths from all causes
average expected number of deaths
upper bound threshold for excess deaths

Weekly number of deaths (from all causes)



Total Excess Deaths

Total Excess Deaths from 2/1/2020 to 5/14/2022

1,125,080

This number reflects the total estimated number of excess deaths occurring since February 1, 2020.

Refer to "Number of Excess Deaths" dashboard listed under "Options."

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

National Center for Health Statistics

COVID-19 DEATHS

Death by Age Group

Data as of 6/2/2022 | Total | 2022 | 2021 | 2020

65-and-over age group	45-64 age group	Under 45 age group
74.4% (748,084 deaths)	21.3% (214,550 deaths)	4.2% (42,602 deaths)

Death by Age Group

Data as of 6/2/2022 | Total | 2022 | 2021 | 2020

65-and-over age group	45-64 age group	Under 45 age group
75.9% (119,085 deaths)	20.3% (31,851 deaths)	3.7% (5,865 deaths)

Death by Age Group

Data as of 6/2/2022 | Total | 2022 | 2021 | 2020

65-and-over age group	45-64 age group	Under 45 age group
68.6% (317,453 deaths)	25.7% (118,762 deaths)	5.7% (26,554 deaths)

Death by Age Group

Data as of 6/2/2022 | Total | 2022 | 2021 | 2020

65-and-over age group	45-64 age group	Under 45 age group
80.8% (311,546 deaths)	16.6% (63,937 deaths)	2.6% (10,183 deaths)

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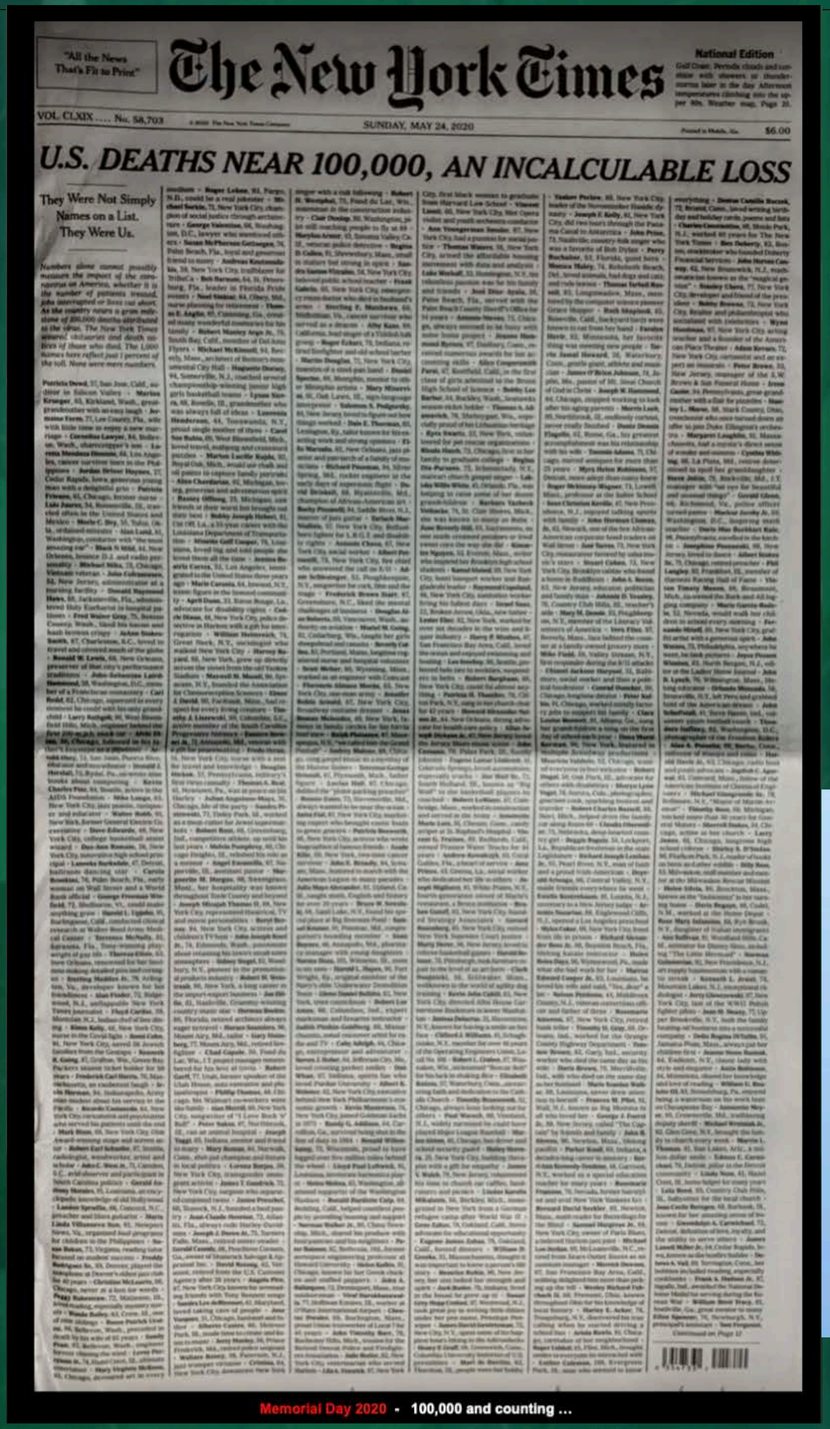
May 24, 2020



"All the News That's Fit to Print"

The New York Times

National Edition

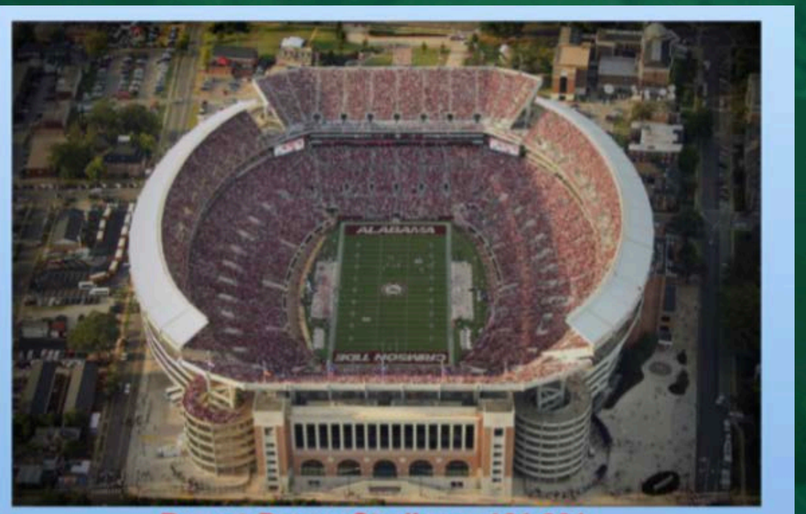
VOL. CLXIX .... No. 58,703 SUNDAY, MAY 24, 2020 $6.00

U.S. DEATHS NEAR 100,000, AN INCALCULABLE LOSS

They Were Not Simply Names on a List. They Were Us.

Memorial Day 2020 - 100,000 and counting ...

100,000



Bryant-Denny Stadium: 101,821

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1 million … how to conceptualize that number

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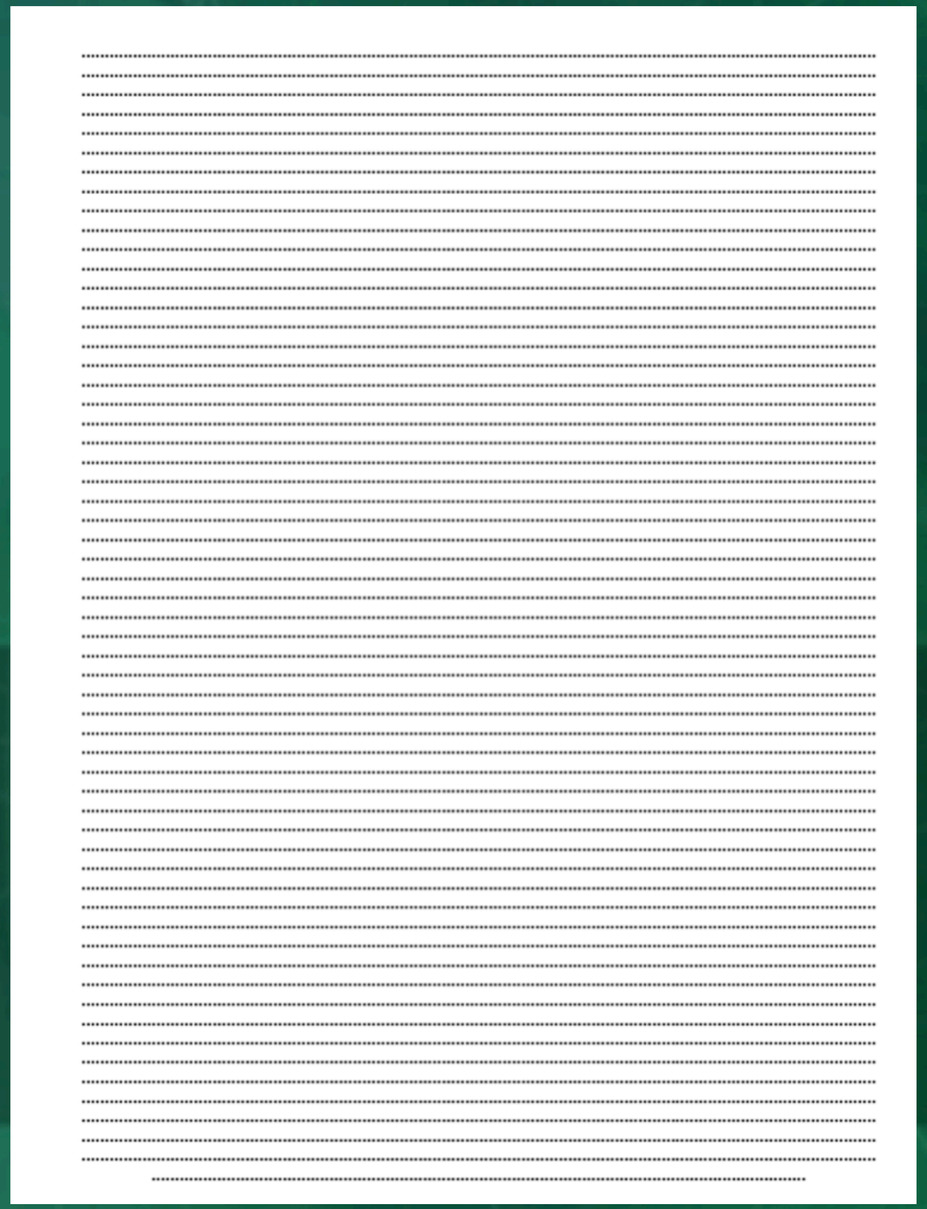
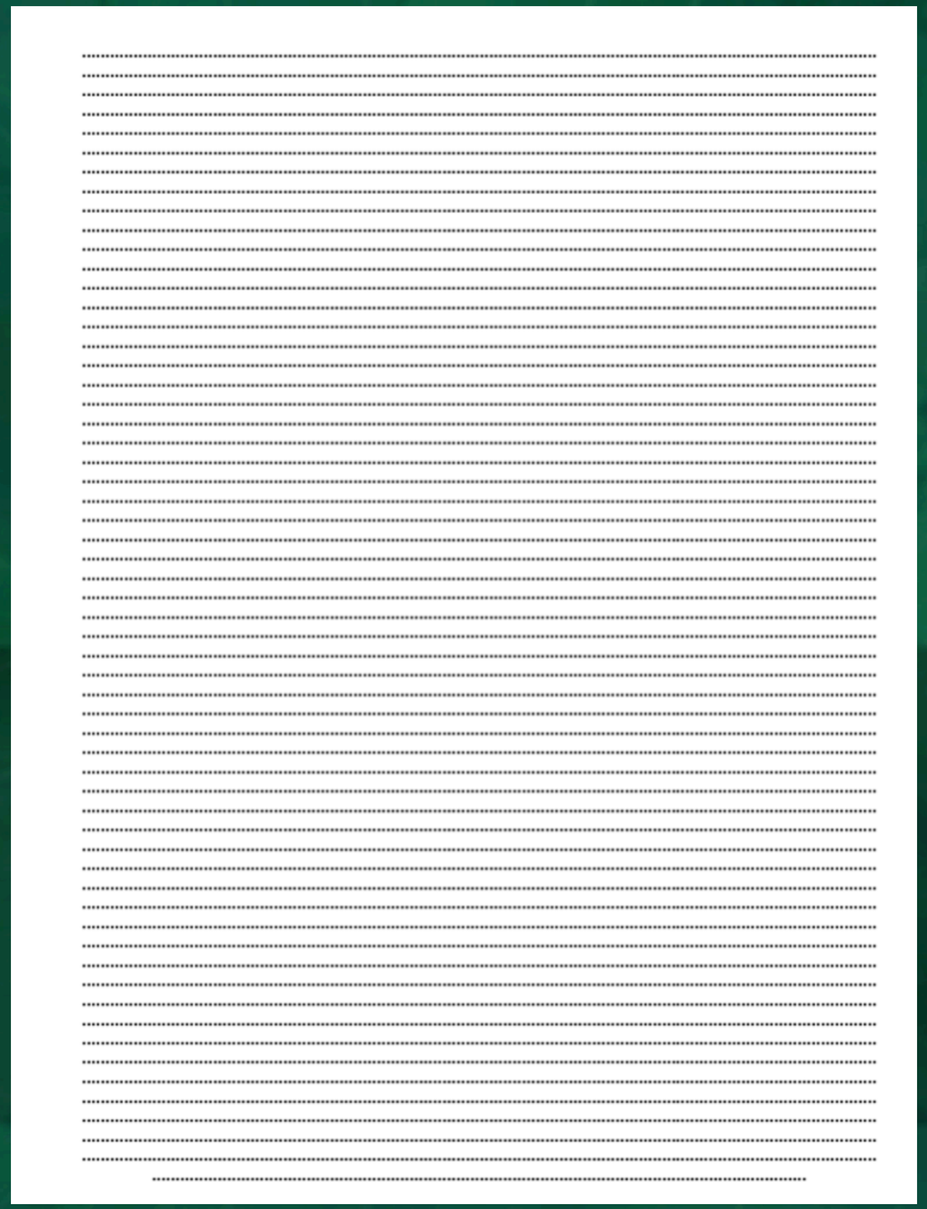
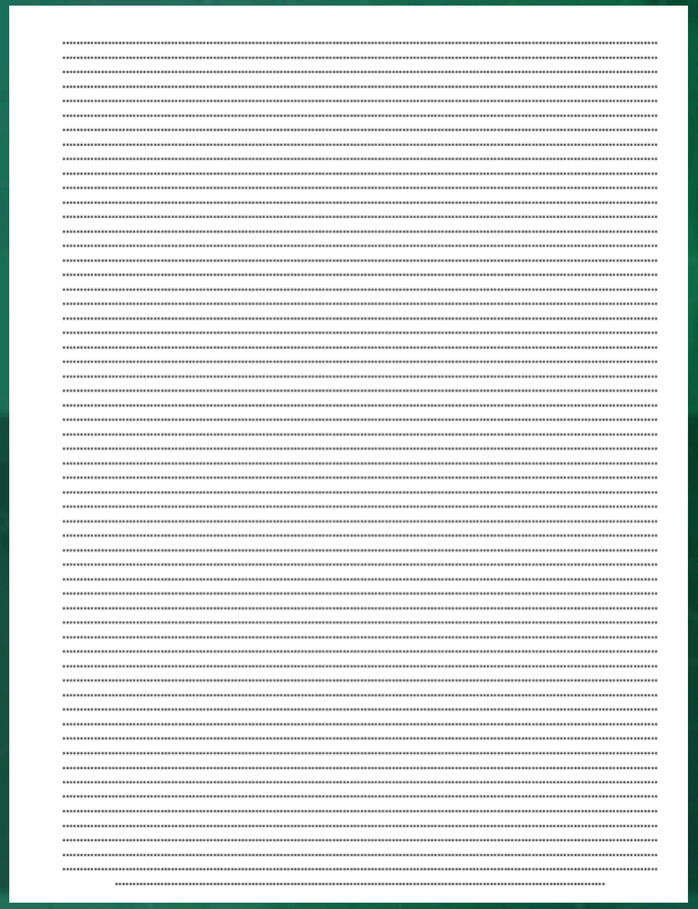
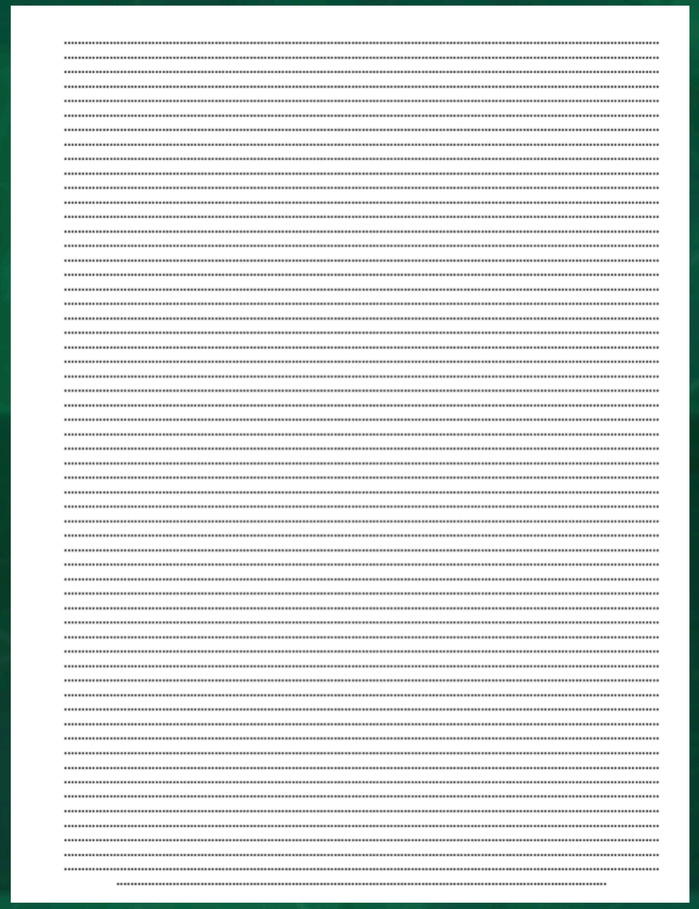
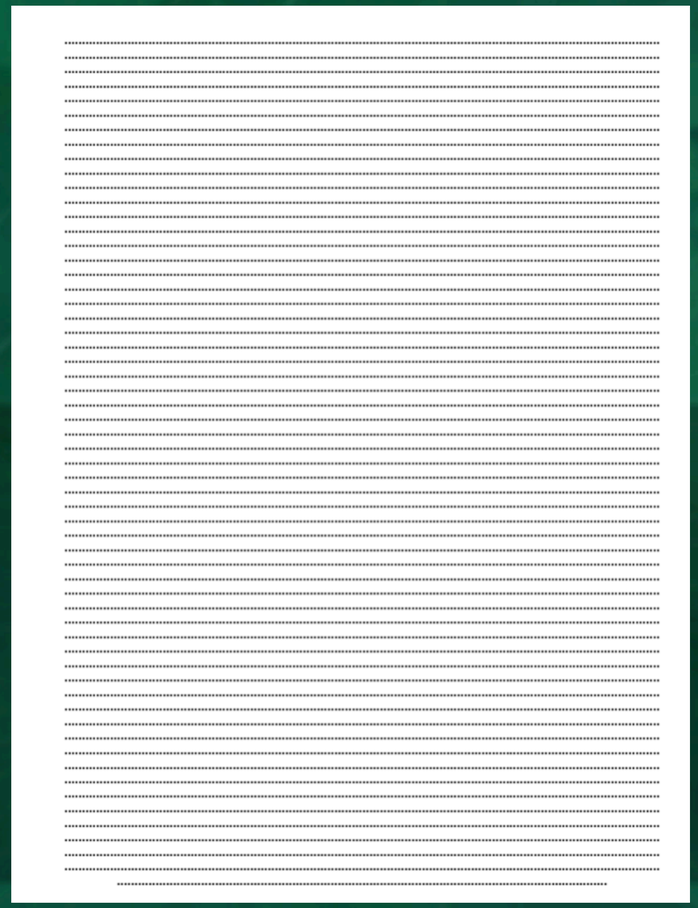




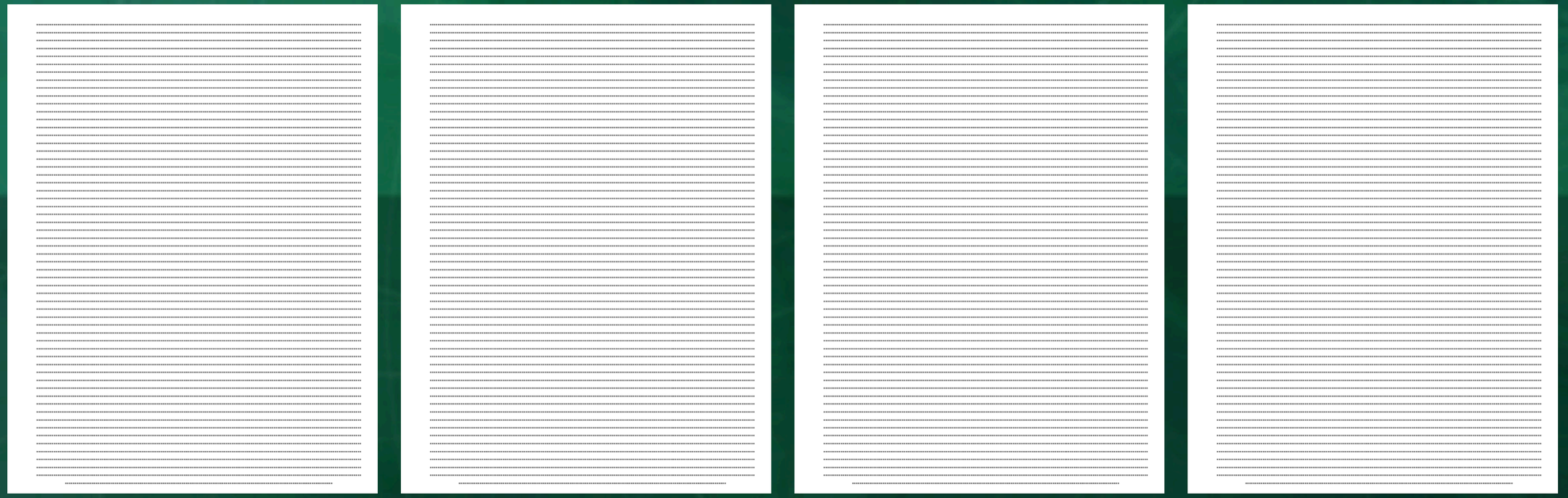
20,000







30,000



40,000

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50,000






60,000

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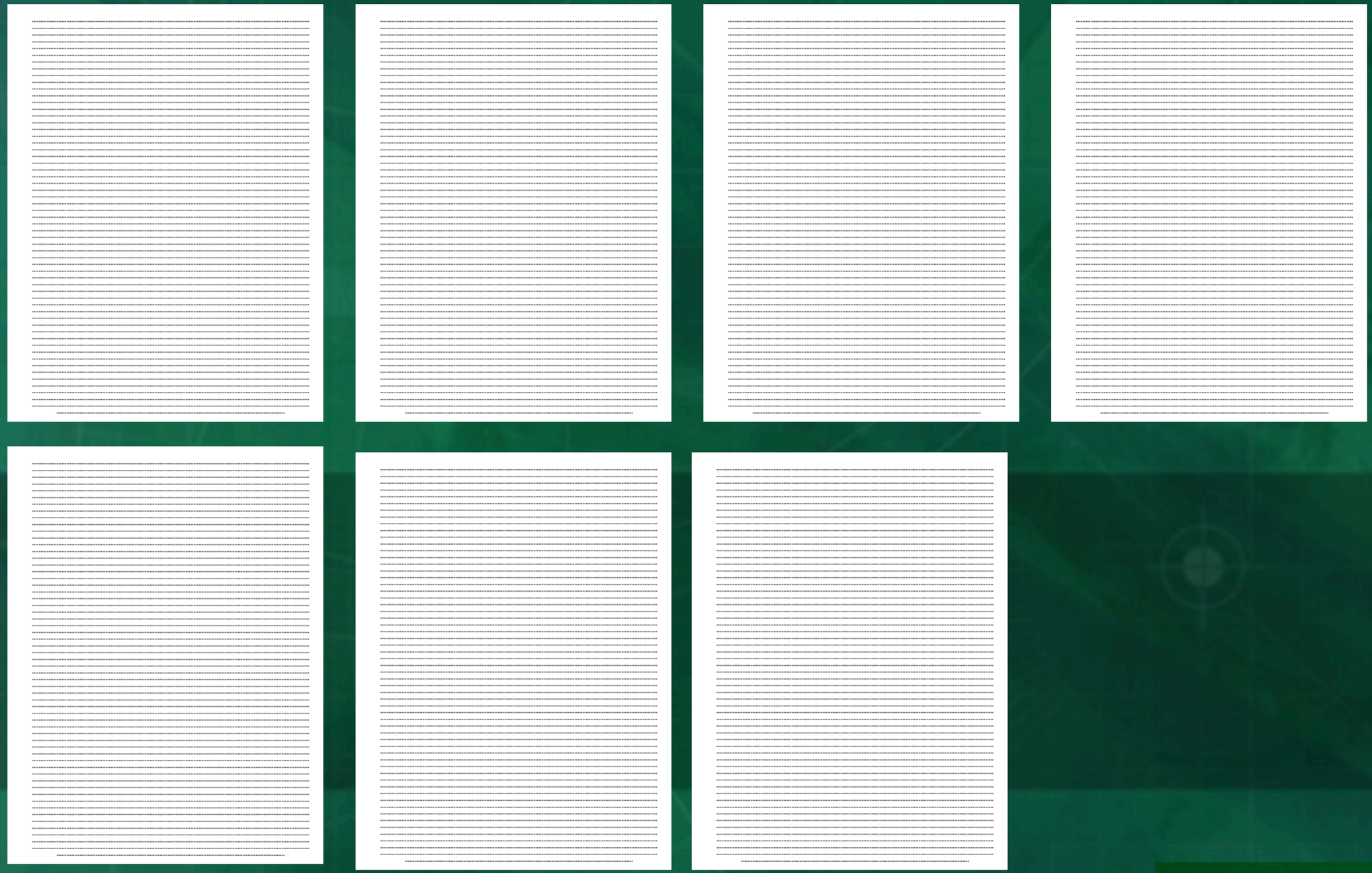

70,000

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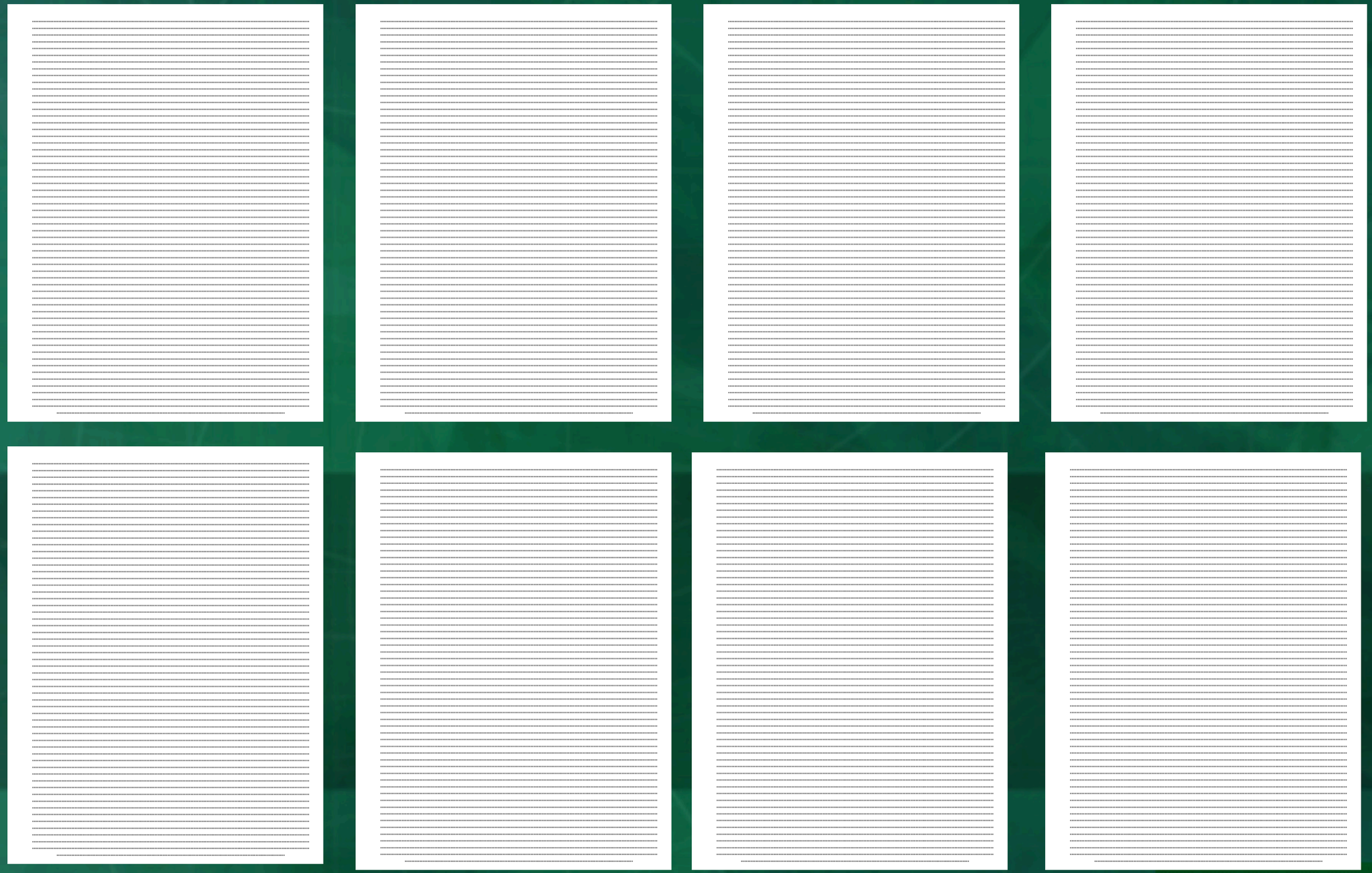

80,000

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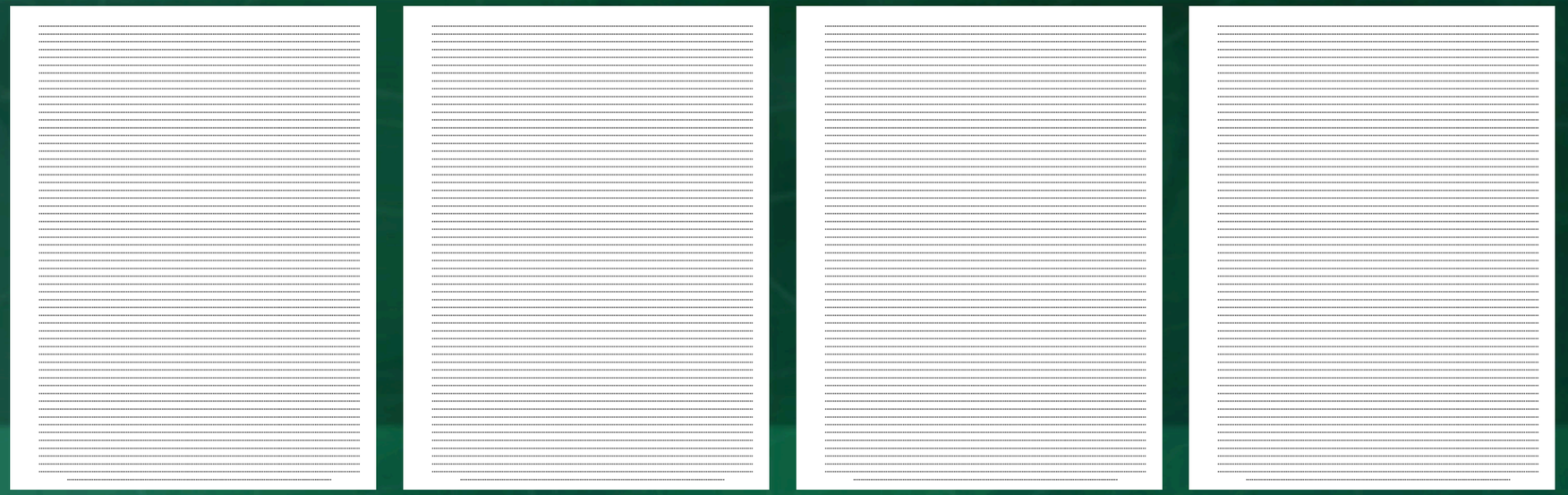
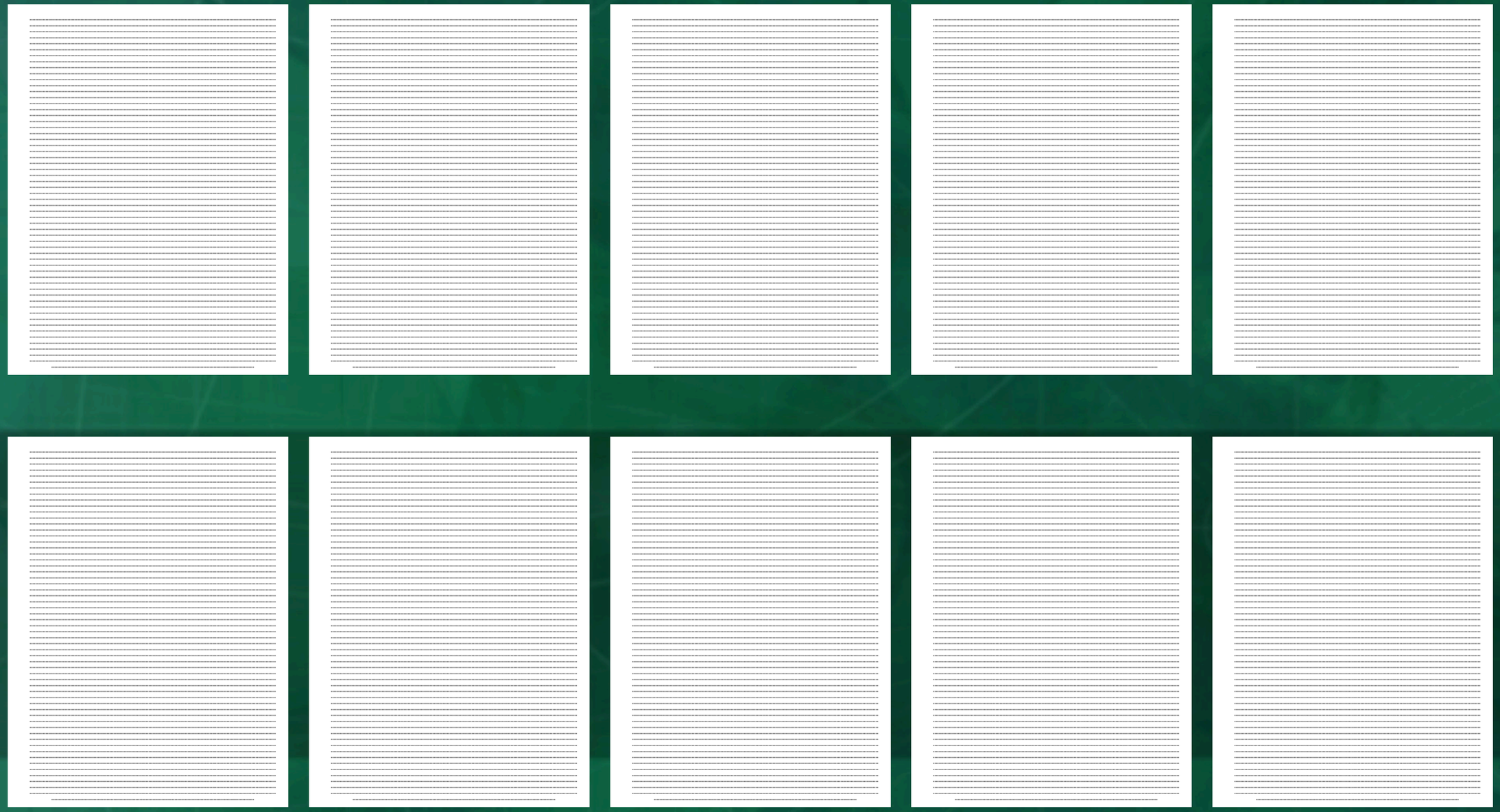
90,000





100,000

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million dot project **:**

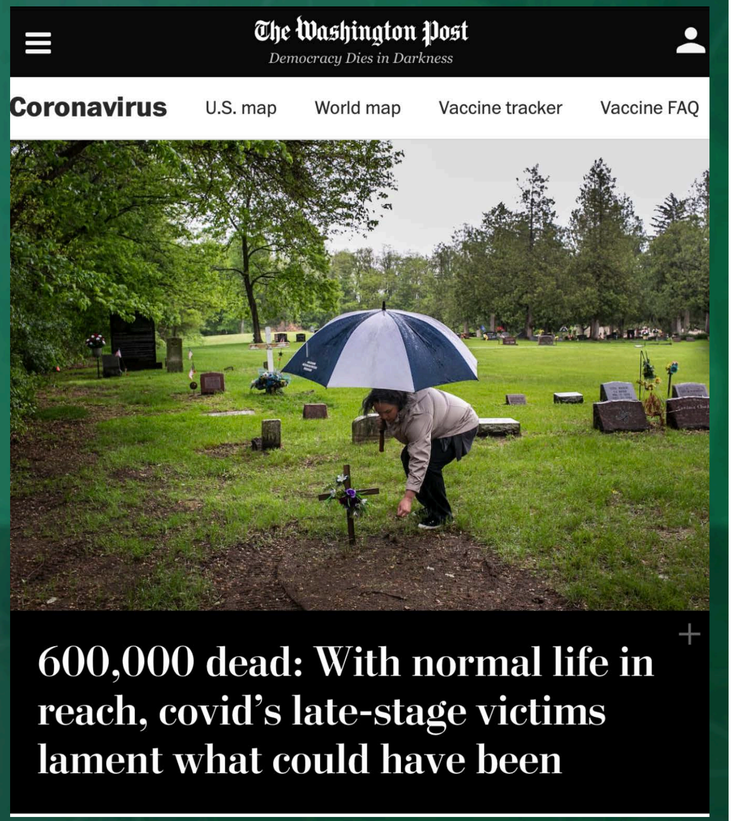
0pen a *Word* document and use *size 11 font* to apply **10,000 periods (dots)** to a **8-1/2” x 11”** page.

Print 100 copies to generate ***100 pages*** then place all **100 pages** side-by-side in a hallway: ***71 feet long***.

Walk along the pages and observe **1 million dots**.

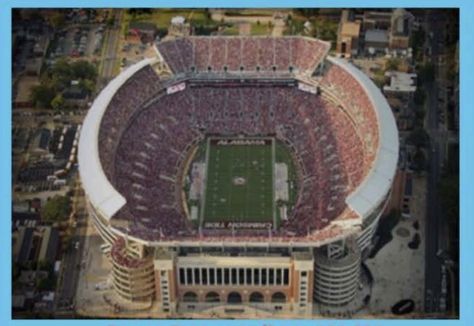
100,000

600,000



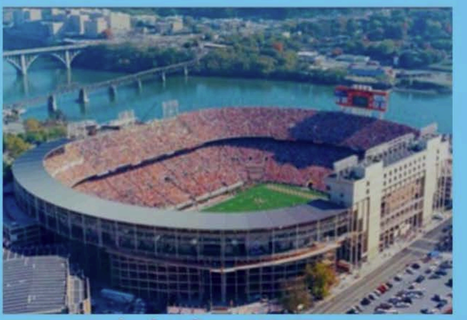
June 11, 2021

600,000 ... displayed as 10,000 dots / page <<<< *click here to view all 60 pages

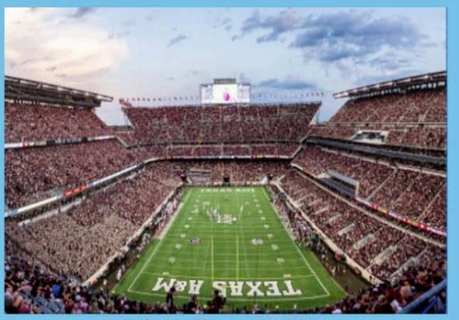

Bryant-Denny stadium: 101,821


Jordan-Hare stadium: 87,451

Tiger stadium: 102,231


Neyland stadium: 102,455

Sanford stadium: 92,746



Kyle stadium: 102,733

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US set to pass 800,000 COVID-19 deaths by late December

Deaths in 2021 greater than in 2020

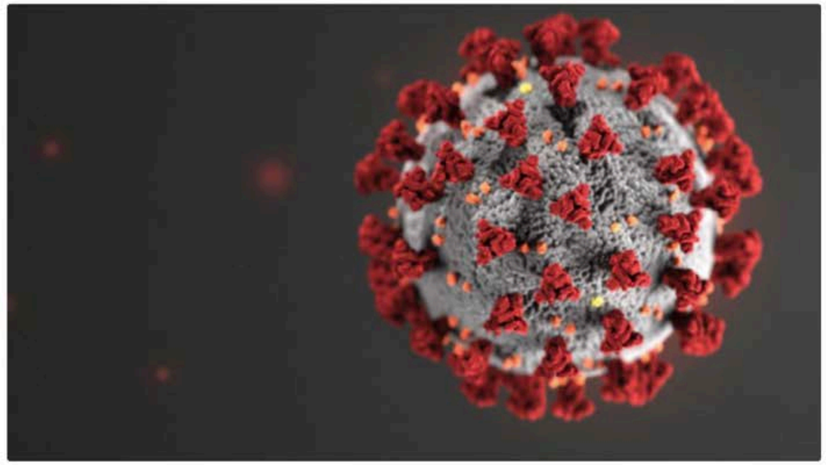

Photo by: Centers for Disease Control and Prevention (CDC)

COVID-19

By: Tim Kephart

Posted at 11:41 AM, Nov 22, 2021 and last updated 10:41 AM, Nov 22, 2021

TAMPA, Fla. — The full picture of the COVID-19 pandemic will take decades to fully sort out, but we can see the grim number of deaths in real-time and it's about to cross over another threshold once thought too high to reach.

Covid's toll in the U.S. reaches a once unfathomable number: 1 million deaths

PUBLISHED WED, MAY 4 2022•4:37 PM EDT UPDATED WED, MAY 4 2022•6:20 PM EDT

NBC NEWS | Elizabeth Chuck and Corky Siemaszko

WATCH LIVE

A white flag with a memorial written on it is one of the thousands of white flags representing Americans who have died of the coronavirus disease (COVID-19) placed over 20 acres of the National Mall in Washington, September 26, 2021.

Joshua Roberts | Reuters

The United States on Wednesday surpassed 1 million Covid-19 deaths, according to data compiled by NBC News — a once unthinkable scale of loss even for the country with the world's highest recorded toll from the virus.

The number — equivalent to the population of San Jose, California, the 10th largest city in the U.S. — was reached at stunning speed: 27 months after the country confirmed its first case of the virus.

1,000,000

The New York Times

Zhou Youguang, Who Made Writing Chinese as Simple as ABC, Dies at 111

Give this article

Zhou Youguang in Beijing in 2011. Late in life, he became an outspoken critic of the Chinese government. Shiho Fukada for The New York Times

By Margalit Fox
Jan. 14, 2017

When you encounter difficulties, you need to be optimistic.

The pessimists tend to die.

… quote from **Zhou Yougang** - father of **Pinyin** writing,
who died at 111 (from 1/14/17 ***NYT*** obit)

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What was covered:

3 numbers to consider when evaluating results of a clinical trial:

* adverse event rate in untreated individuals (%)
* adverse event rate in treated individuals (%)
* absolute reduction in adverse event rate due to treatment (%)

2 ways of thinking about the ongoing COVID-19 pandemic:

* personal health … me
* public health … us

1 million … how to conceptualize that number


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