

Multi-dimensional factors driving the pandemic and how their impact decides any return to the pre- COVID-19 world!

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Full Length Article Multi-dimensional factors driving the pandemic and how their impact decides any re-turn to the pre- COVID-19 world!

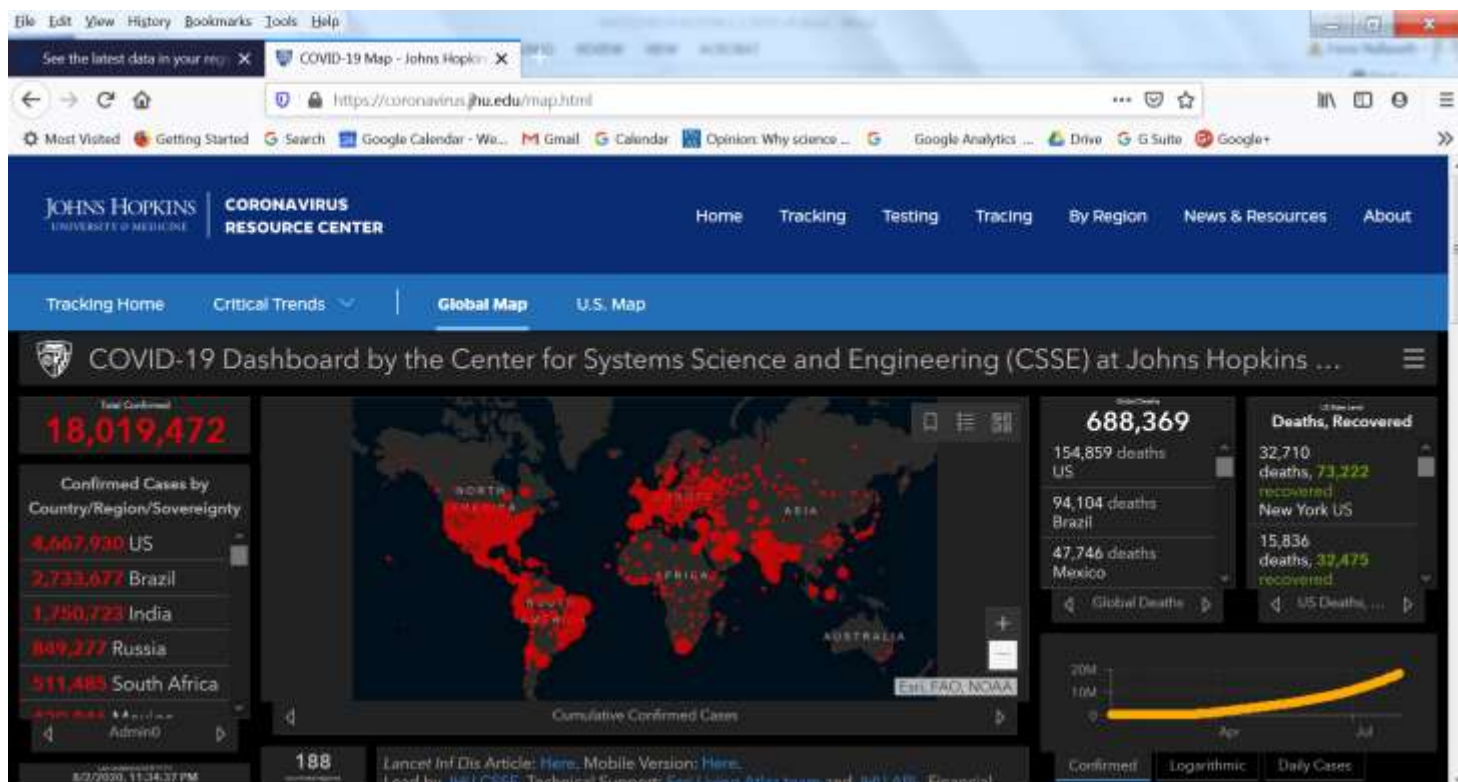
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https://drive.google.com/file/d/1hRp-7x05Y_wYVRnu5UA_n5rmIAvu8xAj/view?usp=sharing

Snapshots of relevant developments in the laboratory and the field that are driving the COVID-19 Pandemic and its containment (Page numbers 1-5):

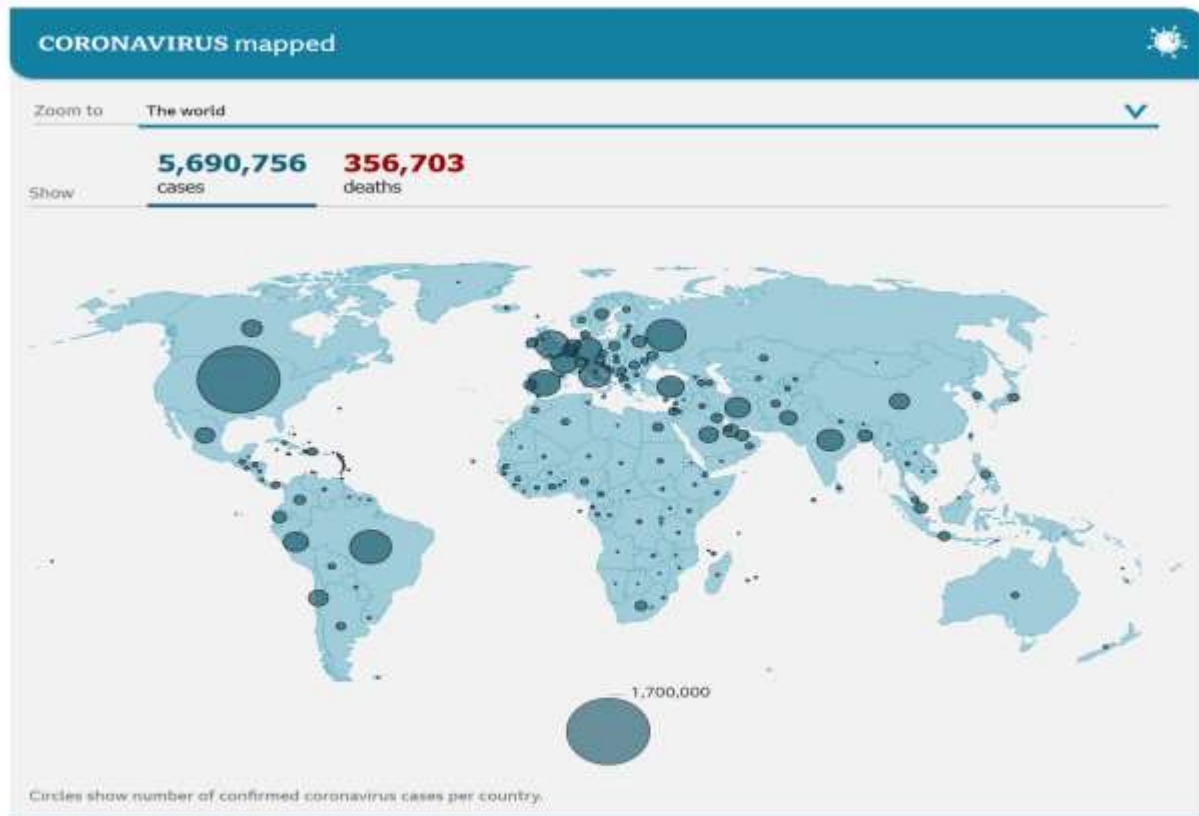
The virus, which causes the respiratory infection Covid-19, was first detected in the city of Wuhan, China, in late 2019. It then spread quickly across the globe in the first months of 2020. Listed are 3 data snapshots of the magnitude, rate and extent of its global impact as well as international effort(s) at containment.

Figures last updated on 02 August 2020, 18:46 BST:



<https://coronavirus.jhu.edu/map.html>

Figures last updated on 17 May 2020, 18:46 BST:



Source: Johns Hopkins University, national public health agencies.
Figures last updated 28 May 2020, 17:23 BST

Note: The map and table in this page use a different source for figures for France from that used by Johns Hopkins University, which results in a slightly lower overall total.

Source: Johns Hopkins University, national public health agencies

Figures last updated 17 May 2020, 18:46 BST

Highlights from 40 COVID-19 Research Papers Published in July 2020

By Margaretta Colangelo, B.A., Co-Founder & Managing Director at Deep Knowledge Ventures

LinkedIn Pulse Post Article published on August 2, 2020

Between January and July 2020, an [estimated](#) 67,753 research papers and 19,789 preprints have been published on COVID-19.



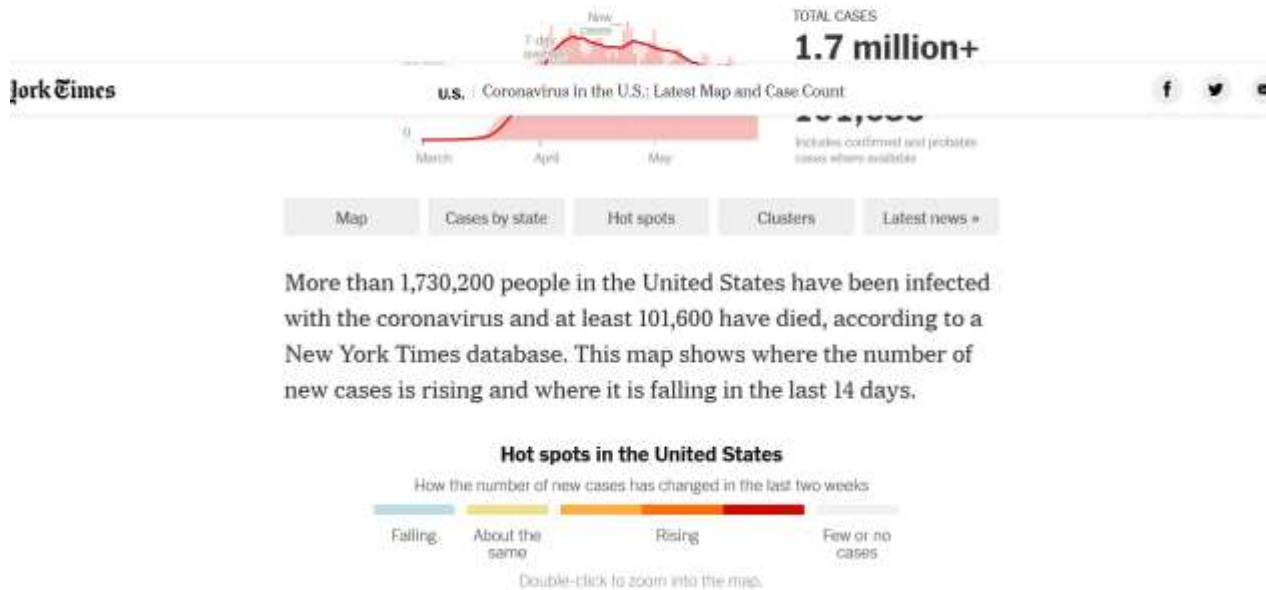
- (1) <https://www.linkedin.com/pulse/highlights-from-40-covid-19-research-papers-preprints-colangelo/> ;
- (2) <https://www.sciencemag.org/news/2020/05/scientists-are-drowning-covid-19-papers-can-new-tools-keep-them-afloat>

Reported by New York Times, Coronavirus in the U.S.: Latest Map and Case Count

March 3, 2020

Coronavirus in the U.S.: Latest Map and Case Count

By The New York Times Updated May 29, 2020, 4:15 A.M. E.T.



<https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html>

Abstract

There are many and continuously emerging dimensions to the SARS-CoV-2 virus and the COVID - 19 Pandemic that it has caused. They go far beyond the boundaries of Health, Medical and Economic causes and consequences. No human activity, which includes Squash, is carried out in isolation and so remains unaffected by these dimensions driving the Pandemic. Breaking minimal constraints and crossing basic boundaries has societal consequences, but particularly so for personnel in the Essential and Health Services who risk their lives to ensure the safety and well-being of their fellow humans – every hour and every day! We review a small and representative segment of all these dimensions included as links from a diversity of sources that document the progression as well as the consequences of the COVID – 19 Pandemic for Humankind.

Introduction (Page numbers 5 - 7):

Government responses, responses of private citizens, nations and populations, virology, epidemiology, containment options ('flattening the curve'), lack of healthcare infrastructure (pandemic management labs and resources, vaccines, and pharmaceuticals), shortages and delayed delivery of personal protective equipment (PPE) and equipment (ventilators) have put Patients, Healthcare and other Essential Workers either at risk or cost them their lives. Like all viruses the SARS - CoV - 2 virus that causes the COVID-19 Pandemic is an inert particle armed with a genetic code which can be activated under a range of appropriate environmental and health conditions. The difference between SARS - CoV - 2 and other virions is the extremely wide spectrum of conditions under which it can unleash Armageddon. On August 2nd 2020 at 18.46 BST the global attributions of COVID-19 to infections and fatalities stood at 18,019,472 cases while the numbers of fatalities stood at 688,369 respectively (Johns Hopkins University of Medicine, COVID - 19 Case Tracker - screen print posted above). These figures were elevated from global attributions of COVID-19 to infections and fatalities at 5,690,756 cases with the numbers of fatalities registering at 356,703 on May 17th 2020 at 18.46 BST (Johns Hopkins University of Medicine, COVID - 19 Case Tracker - screen print posted above). Over a mere 2.5 months these global figures had magnified 3.2x and 1.9x respectively. Others are coping with the variables in an effort to find an answer in research labs, in vaccine and pharmacological reagent production.

Yet in actions representative of the best in humans, essential support for those at risk, range from an internationally coordinated and defiant emotional outpouring at dusk time to financial and material resources which have flowed from Private Citizen to Billionaires, Musicians and Orchestras. In this highly fluid situation, there are facts that can be and are being double checked by professionals, scientists, news media, health personnel and government or civil servants all the way up to Prime Ministers and Presidents. Whereas their actions are part of the process of variable scrutiny to which any Public Servant is subject, ultimately they do not have the luxury of time for controlled measurements vetted for contradictions and inconsistencies in meeting an ongoing crisis. They have to work and risk their lives in an atmosphere where some, with a nihilistic mentality, willfully spew factually unfounded contradictions, rumors, disinformation and even fear among those who are trusting. No one is spared infection and or fatality in COVID - 19 although those at the low end of the socioeconomic spectrum are most vulnerable to its impact! The current situation poses an existential threat and we have to rely on the Judgement and Leadership of the Health and Political community. This is preferable to triaging and making false choices being currently debated, such as that between the economy and survival. The effects of the Pandemic could have been mitigated by foresight.

In this long article we are merely cataloging links from various news and social media, opinion pieces and data papers from scientific journals and magazines, under specific segments of topics. These segments include many if not all dimensions related to the COVID-19 Pandemic, as they have progressed from January to August 2020.

The aim of this article is to provide a representative, relevant, unbiased resource that captures the progression of the Pandemic in assisting the Squash (or for that matter any) Community in making informed decisions. Some articles are now factually superseded or subsumed e.g. by the advent of the antiviral drug Remdisivir and new more reliable tests for detecting the virus. Others include new results qualifying usefulness of concepts and containment methods such as 'Herd Immunity.' All of them continue to be included in the article along with the new results for reasons of Historical perspective since the advent of the virus and its initiation of the Pandemic is driven by a multitude of interdependent factors. This inclusion reveals the complexity, fluidity and progression of the COVID-19 Pandemic and underscores the incremental process of the maturation of the measures that will be required for bringing containment of the causal SARS-CoV-2 virus.

Extracts of exceptional articles are included to greater and even complete lengths while other articles are limited to titles, links and common descriptions. As some links have relevance under more than one topic, for convenience they are included under all those topics.

A simple cautionary note, this article is neither a formal scientific paper nor a review nor a policy manual! The reasons for these qualifications are the simple constraint provided by keeping up with the relevance, standards and sheer volume of publications! Between January and July 2020, an [estimated](#) 67,753 research papers and 19,789 preprints have been published on COVID-19. <https://www.linkedin.com/pulse/highlights-from-40-covid-19-research-papers-preprints-colangelo/> ; <https://www.sciencemag.org/news/2020/05/scientists-are-drowning-covid-19-papers-can-new-tools-keep-them-afloat>) (Via Co-Founder & Managing Director at Deep Knowledge Ventures Margaretta Colangelo, B.A.). New Artificial Intelligence tools are being developed to cope with this problem.

For want of a better choice the article is presented under the following 8 major segments and 2 ancillary segments. Some sub-segments, along with standard abstracts, introductions, summary and conclusions are also included.

(However, as the COVID – 19 Pandemic is predicted to continue building, we begin with a section on simple 'frequently asked questions addressed by the New York Times' with relevant advice emerging from the BBC, US CDC and the JHU Coronavirus Resource Center).

The Pandemic in 10 Representative Segments - Table of Contents: (Page numbers 7 - 10)

(1) Frequently asked 'how to' questions (Page numbers 10 - 15):

(a) New York Times Article: The Corona Outbreak: Frequently asked questions and advice, and [The Coronavirus Outbreak](#) (b) from the BBC (<https://www.bbc.com/news/health-51048366>), (c) the US Centers for Disease Control (<https://www.cdc.gov/>) or US Healthcare www.Healthcare.gov and (d)

The Johns Hopkins University School of Medicine Coronavirus Resource Center (<https://coronavirus.jhu.edu/map.html>) (e) Coronavirus: How exposed is your job? (<https://www.bbc.com/news/uk-52637008>), (f) Johns Hopkins UHM : BBC Informatic on Coronavirus Global Spread: https://www.bbc.com/news/world-51235105?intlink_from_url=https://www.bbc.com/news/world/asia&link_location=live-reporting-story).

(2) Examples of exceptional Human Spirit: emerges as support for and defiance for those who are endangered, (Page numbers 15 - 36): (a) Conversations on multiple dimensions of the Pandemic from Town Hall to Intercontinental Governance; (b) Specific sub-topics: (i) Health and Essential services personnel risking lives for patients and ‘flattening the curve’, (ii) Self- Isolated populations in Europe and USA breaking out in evening shows of support – as did Orchestras and Musicians.

(3) Squash and the (SARS-CoV-2) virus induced COVID – 19 Pandemic (2020), (How and when should we begin playing Squash? As with everything in the post COVID-19 world - considering the stakes – very slowly and carefully!)(Page numbers 36 - 44): (i) Roundup of select articles (and/or comments) covering the relevant news and issues on the courts, by Alan Thatcher, Ferez S. Nallaseth, James Roberts, Richard Millman, Harry Leitch, Amanda Sobhy, Jahangir Khan, Sourav Ghosal, Jerome Elhaik, Maria Toor Pakai, Rod Bannister, Nick Matthew, Daryl Selby, Laura Massaro, Danny Lee, Alex Wall, Tony Griffin, Alexia Clonda, Alex Wan, (ii) Economic Impact of Pandemic (Specific topic # 6), (iii) Comments on a proposal offsetting the economic impact of the pandemic on Squash (comments extracted from article in Squash Mad entitled ‘How we can approach a ‘New Normal’ in Squash..,’ by Richard Millman)

(4) Multiple dimensions of the COVID – 19 Pandemic (Page numbers 44 - 291): (i) Overview: How can the virus be stopped? How long can the Pandemic Last? (ii) Dynamics of transmission: infections and transmission, infections and dispersal of the virus by symptomatic and asymptomatic patients, fetuses, children and elderly or weakened individuals are likely or known to be, infected, (iii) Social distancing, glove and mask utility, contact tracing, isolation, testing – all vital in ‘Flattening the Curve’ and so preventing saturation of Health/Medical resources, (iv) Lack of: Pandemic containment research labs, availability of PPEs, Ventilators, Testing kits and Vaccine – complexities and development, results and the known the leakage of masks were thought to be serious impediments to managing crises in its early days and directly responsible for magnitude of infections and fatalities of Pandemic, (v) Projection of aerosols beyond the current 6 feet (even continuing beyond 12 feet) of social distancing; (viral) matter, (vi) Viability of the virus on hard or inanimate (hard, wooden and metallic) surfaces for up to 72 hours, (vii) Testing kits and vaccine development: reliability of tests and accuracy of numbers recovered from testing, (viii) What does ‘Herd Immunity’ mean – is it working? Apparently not in France and Spain, (ix) Slowing the COVID-19 Pandemic with at least 70% of the population attaining immunity to SARS-CoV-2 coronavirus either conferred by vaccines or recovery post-infection by ‘Herd Immunity’ - which still does not mean that a second infection cannot occur, (x) Resistance to immune systems in immune-privileged tissues undermined and the mutated virus avoiding vaccines/immune-surveillance subverting a major arm of detection, testing and vaccination, (xi) Dangers of reopening too soon – second and third waves of infections, endemic COVID-19 in pockets of populations allowing 2nd and 3rd waves currently underway and expected to peak in the flu season

with the full impact of twin impacts, (xii) Complications and prospects for vaccine and pharmacological drug development; (Food and Drug Administration (FDA) has approved Remdesivir after accelerated evaluation – marginally effective (~3%), but does help recovering patients), (xiii) SARS-CoV-2 source – Wuhan, derived from Pangolins in Wet Markets? Where did it start? Is the SARS-CoV-2 really responsible for COVID – 19 Pandemic? Debated, (xiv) SARS-CoV-2 transmission: Zoonoses - Animals (Pets) to Humans (unknown) and Reverse Zoonoses - Humans to Animals (Pets) – confirmed as likely, (xv) Therapeutic or preemptive prospects, (Town Hall discussion), (xvi) Johns Hopkins UHM Pandemic Tracker, BBC and NYT reports on: postpandemic recovery.

(5) Biological and Medical Impact of the SARS-CoV-2 virus (Page numbers 291 - 328):

How, what, when and where of an inert particle, with embedded code, that can mushroom into a Pandemic: infecting multiple tissues (lungs, liver, blood system, digestive system), including breaching immune privileged tissues (eyes, brain, testis) being breached it could remain undetected and endemic; mutating virus and so possibly enhancing its potency by contributing to avoidance of the immune surveillance, endemic state in populations, its environmental resistance, drug resistance, virulence and pathogenicity; several collateral health conditions such as socioeconomic, physiological and microbiota health of infected patients are now the accepted target moves unpredictably!; Zoonoses and Environmental Impact – Where and how did it start still unsure? Bats, Pangolins, Cats, Tigers and illegal international trade in protected species which bear a higher (frequency of) viral and parasite burden,

(6) Economic impact of the Pandemic: (Segment #6 related to Specific Segment #3 on Squash, (Page numbers 328 - 345):

(7) Leaders, Leadership, Domestic Politics and Geopolitics driving or containing the COVID – 19 Pandemic (Page numbers 345 - 397): (i) From Vaccines to Dissemination of ‘Herd Immunity’, (ii) Socioeconomics, Sociopolitics and Policy decisions of Governments – good, bad and ugly (Xenophobia) that either fanned or tamped down the flames of the Pandemic as well as, (iii) Fatalities of Physicians ‘falling out of windows’, (iv) armed resistance to the ‘lockdown’ perceived and presented as a conspiracy of the elites, (v) Socioeconomics, Sociopolitics and Policy decisions of Governments.

(8) What if we are all wrong? Dr. Thomas Wilckens, MD (Article posted & comments exchanged on *LinkedIn*), (Page numbers 397 - 409).

(9) Ancillary segment: Fair questions by Players & Coaches on (FSN) Ferez’s qualifications and knowledge of the game (Squash) as well as the Pandemic entitling the positions he has taken (Page numbers, 409 – 413, [Internal Links](#))

(9A) Ancillary segment: Ferez, what do you know about virology and epidemiology that qualifies you to make these proposals? Such proposals as restraining play until Science, Medicine, Technology and Policy ensure safety, non-transmission, non-recurrence and a responsible re-opening of villages, towns and cities – let alone Squash Courts? How do you

know that the health and essential services personnel are being further burdened by Squash Players being on court?

(9B) Ancillary segment: Ferez, 'How is your own game?' As a scientist what could you know about Squash - now and in your peak - playing days? Why are you qualified to advise the Pros? What was your peak level of play? What do you know about intensity, training (on and off the court) and performance in match play? Or the joys and pains of losses that the Pros know well - on and off the court?

NOTE: BESIDES A PARA FROM THE BEGINNING AND ANOTHER FROM THE END OF THIS SECTION (Segment 9: Internal links) ALL OF SECTION 9A & 9B AND THE LINKS THEREIN WILL BE ACCESSIBLE VIA A SINGLE LINK IN THE TEXT AND POSTED ON THE WEBSITE (<https://sites.google.com/site/fereznsquashdocs/>):

(10)A Humanistic Perspective: Letter by Coronavirus, By Poet Vivienne R Reich (communicated by Prof. Dhanjoo Ghista, PhD) (Page numbers 413 - 414).

Summary and inferences (Page numbers 416 - 418)

Acknowledgements (Page numbers 417 - 418)

Multi-dimensional factors driving the pandemic and how their impact decides any return to the pre- COVID-19 world!

The Pandemic in 10 Representative Segments

(1)Frequently asked 'how to' questions :

(1a) The New York Times, [The Coronavirus Outbreak](#)

(1b) Therk Times, [Frequently Asked Questions and Advice, Updated April 11, 2020](#)

a. What should I do if I feel sick?

[If you've been exposed to the coronavirus or think you have.](#) and have a fever or symptoms like a cough or difficulty breathing, call a doctor. They should give you advice on whether you should be tested, how to get tested, and how to seek medical treatment without potentially infecting or exposing others.

b. When will this end?

This is a difficult question, because a lot depends on [how well the virus is contained](#). A better question might be: "How will we know when to reopen the country?" In [an American Enterprise Institute report](#), Scott Gottlieb, Caitlin Rivers, Mark B. McClellan, Lauren Silvis and

Crystal Watson [staked out four goal posts for recovery](#): Hospitals in the state must be able to safely treat all patients requiring hospitalization, without resorting to crisis standards of care; the state needs to be able to at least test everyone who has symptoms; the state is able to conduct monitoring of confirmed cases and contacts; and there must be a sustained reduction in cases for at least 14 days.

c. How can I help?

The Times Neediest Cases Fund has started a special campaign to help those who have been affected, which accepts [donations here](#). [Charity Navigator](#), which evaluates charities using a numbers-based system, has a running list of nonprofits working in communities affected by the outbreak. You can give blood through the [American Red Cross](#), and [World Central Kitchen](#) has stepped in to distribute meals in major cities. More than 30,000 coronavirus-related [GoFundMe fund-raisers](#) have started in the past few weeks. (The sheer number of fund-raisers [means more of them are likely to fail](#) to meet their goal, though.)

d. Should I wear a mask?

The C.D.C. has [recommended](#) that all Americans wear cloth masks if they go out in public. This is a shift in federal guidance reflecting [new concerns that the coronavirus is being spread by infected people who have no symptoms](#). Until now, the C.D.C., like the W.H.O., has advised that ordinary people don't need to wear masks unless they are sick and coughing. Part of the reason was to preserve medical-grade masks for health care workers who desperately need them at a time when they are in continuously short supply. Masks don't replace hand washing and social distancing.

e. How do I get tested?

If you're sick and you think you've been exposed to the new coronavirus, [the C.D.C. recommends that you call your healthcare provider and explain your symptoms and fears](#). They will decide if you need to be tested. Keep in mind that there's a chance — because of a lack of testing kits or because you're asymptomatic, for instance — you won't be able to get tested.

f. How does coronavirus spread?

It seems to spread [very easily from person to person](#), especially in homes, hospitals and other confined spaces. The pathogen can be carried on tiny respiratory droplets that fall as they are coughed or sneezed out. It may also be transmitted when we touch a contaminated surface and then touch our face.

g. Is there a vaccine yet?

No. [Clinical trials are underway](#) in the United States, China and Europe. But American officials and pharmaceutical executives have said that a vaccine remains at least 12 to 18 months away.

h. What makes this outbreak so different?

Unlike the flu, there is no known treatment or vaccine, and [little is known about this particular virus so far](#). It seems to be more lethal than the flu, but the numbers are still uncertain. And it hits the elderly and those with underlying conditions — not just those with

respiratory diseases — particularly hard.

i. What if somebody in my family gets sick?

If the family member doesn't need hospitalization and can be cared for at home, you should help him or her with basic needs and monitor the symptoms, while also keeping as much distance as possible, [according to guidelines issued by the C.D.C.](#) If there's space, the sick family member should stay in a separate room and use a separate bathroom. If masks are available, both the sick person and the caregiver should wear them when the caregiver enters the room. Make sure not to share any dishes or other household items and to regularly clean surfaces like counters, doorknobs, toilets and tables. Don't forget to wash your hands frequently.

j. Should I stock up on groceries?

Plan two weeks of meals if possible. But people should not hoard food or supplies. Despite the empty shelves, [the supply chain remains strong.](#) And remember to wipe the handle of the grocery cart with a disinfecting wipe and wash your hands as soon as you get home.

k. Can I go to the park?

Yes, but make sure you keep six feet of distance between you and people who don't live in your home. [Even if you just hang out in a park, rather than go for a jog or a walk, getting some fresh air, and hopefully sunshine, is a good idea.](#)

l. Should I pull my money from the markets?

[That's not a good idea.](#) Even if you're retired, having a balanced portfolio of stocks and bonds so that your money keeps up with inflation, or even grows, makes sense. But retirees may want to think about having enough cash set aside for a year's worth of living expenses and big payments needed over the next five years.

m. What should I do with my 401(k)?

Watching your balance go up and down can be scary. [You may be wondering if you should decrease your contributions — don't!](#) If your employer matches any part of your contributions, make sure you're at least saving as much as you can to get that "free money."

(1c) The New York Times, [The Coronavirus Outbreak: Frequently Asked Questions and Advice](#), Updated June 24, 2020

a. What's the best material for a mask?

Scientists around the country [have tried to identify everyday materials that do a good job of filtering microscopic particles.](#) In recent tests, HEPA [furnace filters](#) scored high, as did vacuum cleaner bags, fabric similar to flannel pajamas and those of 600-count pillowcases. Other materials tested included layered coffee filters and scarves and bandannas. These scored lower, but still captured a small percentage of particles.

b. Is it harder to exercise while wearing a mask?

A [commentary published this month on the website of the British Journal of Sports Medicine](#)

points out that covering your face during exercise “comes with issues of potential breathing restriction and discomfort” and requires “balancing benefits versus possible adverse events.” [Masks do alter exercise](#), says Cedric X. Bryant, the president and chief science officer of the American Council on Exercise, a nonprofit organization that funds exercise research and certifies fitness professionals. “In my personal experience,” he says, “heart rates are higher at the same relative intensity when you wear a mask.” Some people also could experience lightheadedness during familiar workouts while masked, says Len Kravitz, a professor of exercise science at the University of New Mexico.

c. I’ve heard about a treatment called dexamethasone. Does it work?

The steroid, dexamethasone, is [the first treatment shown to reduce mortality in severely ill patients](#), according to scientists in Britain. The drug appears to reduce inflammation caused by the immune system, protecting the tissues. In the study, dexamethasone reduced deaths of patients on ventilators by one-third, and deaths of patients on oxygen by one-fifth.

d. What is pandemic paid leave?

[The coronavirus emergency relief package](#) gives many American workers paid leave if they need to take time off because of the virus. It gives qualified workers two weeks of paid sick leave if they are ill, quarantined or seeking diagnosis or preventive care for coronavirus, or if they are caring for sick family members. It gives 12 weeks of paid leave to people caring for children whose schools are closed or whose child care provider is unavailable because of the coronavirus. [It is the first time the United States has had widespread federally mandated paid leave](#), and includes people who don’t typically get such benefits, like part-time and gig economy workers. But [the measure excludes](#) at least half of private-sector workers, including those at the country’s largest employers, and gives small employers significant leeway to deny leave.

e. Does asymptomatic transmission of Covid-19 happen?

So far, the evidence seems to show it does. A widely cited [paper](#) published in April suggests that people are most infectious about two days before the onset of coronavirus symptoms and estimated that 44 percent of new infections were a result of transmission from people who were not yet showing symptoms. Recently, a top expert at the World Health Organization stated that transmission of the coronavirus by people who did not have symptoms was “very rare,” [but she later walked back that statement](#).

f. What’s the risk of catching coronavirus from a surface?

Touching contaminated objects and then infecting ourselves with the germs is not typically how the virus spreads. But it can happen. A number [of studies](#) of flu, rhinovirus, coronavirus and other microbes have shown that respiratory illnesses, including the new coronavirus, can spread by touching contaminated surfaces, particularly in places like day care centers, offices and [hospitals](#). But a long chain of events has to happen for the disease to spread that way. The best way to protect yourself from coronavirus — whether it’s surface transmission or close human contact — is still social distancing, washing your hands, not touching your face and wearing masks.

g. How does blood type influence coronavirus?

A study by European scientists is the first to document a strong statistical link between [genetic variations and Covid-19](#), the illness caused by the coronavirus. [Having Type A blood](#)

was linked to a 50 percent increase in the likelihood that a patient would need to get oxygen or to go on a ventilator, according to the new study.

h. How many people have lost their jobs due to coronavirus in the U.S.?

The unemployment rate fell to 13.3 percent in May, the Labor Department said on June 5, an unexpected improvement in the nation's job market as hiring rebounded faster than economists expected. Economists had forecast the unemployment rate to increase to as much as 20 percent, after it hit 14.7 percent in April, which was the highest since the government began keeping official statistics after World War II. But the unemployment rate dipped instead, with employers adding 2.5 million jobs, after more than 20 million jobs were lost in April.

i. What are the symptoms of coronavirus?

Common symptoms [include fever, a dry cough, fatigue and difficulty breathing or shortness of breath](#). Some of these symptoms overlap with those of the flu, making detection difficult, but runny noses and stuffy sinuses are less common. [The C.D.C. has also](#) added chills, muscle pain, sore throat, headache and a new loss of the sense of taste or smell as symptoms to look out for. Most people fall ill five to seven days after exposure, but symptoms may appear in as few as two days or as many as 14 days.

j. How can I protect myself while flying?

If air travel is unavoidable, [there are some steps you can take to protect yourself](#). Most important: Wash your hands often, and stop touching your face. If possible, choose a window seat. A [study from Emory University](#) found that during flu season, the safest place to sit on a plane is by a window, as people sitting in window seats had less contact with potentially sick people. Disinfect hard surfaces. When you get to your seat and your hands are clean, use disinfecting wipes to clean the hard surfaces at your seat like the head and arm rest, the seatbelt buckle, the remote, screen, seat back pocket and the tray table. If the seat is hard and nonporous or leather or pleather, you can wipe that down, too. (Using wipes on upholstered seats could lead to a wet seat and spreading of germs rather than killing them.)

k. What should I do if I feel sick?

[If you've been exposed to the coronavirus or think you have](#), and have a fever or symptoms like a cough or difficulty breathing, call a doctor. They should give you advice on whether you should be tested, how to get tested, and how to seek medical treatment without potentially infecting or exposing others.

(1d) Frequently asked questions, [The Coronavirus Outbreak](#)

<https://www.nytimes.com/2020/05/02/us/politics/vaccines-coronavirus-research.html>

(1e) British Broadcasting Corporation

- A SIMPLE GUIDE: [What are the symptoms?](#)
- AVOIDING CONTACT: [Should I self-isolate?](#)

- **STRESS:** [How to protect your mental health](#)
- **LOOK-UP TOOL:** [Check cases in your area](#)
- **MAPS AND CHARTS:** [Visual guide to the outbreak](#)
- **VIDEO:** [The 20-second hand wash](#)

(1f) United States Centers for Disease Control, www.Healthcare.gov

According to the *CDC*, people with COVID-19 can have a [wide range of symptoms](#) — ranging from mild symptoms to severe illness. Symptoms may appear **2-14 days after exposure to the virus**.

People with these symptoms may have COVID-19:

- Cough
- Shortness of breath or difficulty breathing
- Fever
- Chills
- Muscle pain
- Sore throat
- New loss of taste or smell

This list is not all inclusive. Other less common symptoms have been reported, including nausea, vomiting, or diarrhea.

<https://www.cdc.gov/>

Health Considerations and Tools

- [Workplaces decision tool pdf icon\[PDF – 1 page\]](#)
- [Restaurants and bars decision tool pdf icon\[PDF – 1 page\]](#)
- [Cleaning and disinfecting](#)

Guidance to Plan, Prepare, and Respond

- [Businesses and employers](#)
- [Small businesses and employees](#)
- [General business FAQs](#)
- [Guidance for meat and poultry processors](#)
- [Manufacturing Workers and Employers](#)

Prevention and Support

- [Possible exposure of critical workers](#)
- [Preventive steps for grocery and food retail workers](#)

- [Strategies for respirator shortages in non-healthcare sectors](#)
- [OSHA guidance on preparing workplaces for COVID-19 pdf icon\[PDF – 35 pages\]external icon](#)
- [Coronavirus Tax Relief and Economic Impact Paymentsexternal icon](#)
- [Employees: How to Cope with Job Stress and Build Resilience During the COVID-19 Pandemic](#)
- [Managing Workplace Fatigue](#)

CDC Business Sector Call for COVID-19

Dr. Butler shared guidance for the private sector, including what CDC knows at this point and what CDC is doing in response to this outbreak.

<https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/businesses-employers.html>

(2) Examples of exceptional Human Spirit emerge as support for and defiance for those who are endangered – (a) Conversations on multiple dimensions of the Pandemic from Town Hall to Intercontinental Governance; (b) Specific sub-topics: (i) Health and Essential services personnel risking lives for patients and ‘flattening the curve’, (ii) Self- Isolated populations in Europe and USA breaking out in evening shows of support – as did Orchestras and Musicians:

CNN Coronavirus Town Hall (15 Videos)

<https://www.cnn.com/videos/health/2020/05/01/anthony-fauci-states-reopening-coronavirus-gupta-cooper-vpx.cnn/video/playlists/cnn-coronavirus-town-hall/>

Via [Eric Weber , I learn every day](#)

The most stunning visualization: that has no color or graphs that I've ever seen. NYT Sunday front page. It is much more than just a list of names (zoom in).

Link to tweet: <https://lnkd.in/gxFBG4W>, [#datavisualization](#) [#data](#)

NEW YORK, SUNDAY, MAY 24, 2020

[Source: CNN](#)

<https://www.cnn.com/videos/politics/2020/04/17/biden-economy-health-choice-sot-vpx.cnn/video/playlists/cnn-coronavirus-town-hall/>

Bill Gates says US system produces 'bogus' testing numbers

[CNN's Anderson Cooper](#) and [Dr. Sanjay Gupta](#) talk to **Bill Gates** on the fight against coronavirus.

[Source: CNN](#)

<https://www.cnn.com/videos/business/2020/05/01/bill-gates-coronavirus-testing-numbers-town-hall-vpx.cnn/video/playlists/cnn-coronavirus-town-hall/>

Part 5: Entire CNN coronavirus town hall (April 30)

Bill Gates explains the next steps ahead for a coronavirus vaccine with CNN's Anderson Cooper and Dr. Sanjay Gupta during a CNN town hall on the coronavirus pandemic.

[Source: CNN](#)

https://www.cnn.com/videos/media/2020/05/01/entire-april-30-coronavirus-town-hall-part-5-sot-vpx.cnn?hpt=ob_blogfooterold

Coronavirus: Why healthcare workers are at risk of moral injury

It is widely known that veterans can return from war with Post-Traumatic Stress Disorder (PTSD). Far less appreciated is moral injury - a trauma wrapped up in guilt that we are now learning more about thanks to US-based research, writes James Jeffrey.

Moral injury most often occurs when a person commits, fails to prevent or witnesses an act that is anathema to their moral beliefs.

[The Department of Veterans Affairs website](#) likens it to psychological trauma involving "extreme and unprecedented life experience", that can lead to "haunting states of inner conflict and turmoil".

US-based research into moral injury is now illuminating how such injuries can impact people in all walks of life, but especially first responders and healthcare workers facing the Covid-19 coronavirus outbreak.

Amid reports of New York City's emergency services getting overwhelmed and states struggling to provide enough ventilators, first responders and healthcare workers potentially face having to decide who gets a ventilator and who gets saved - something one nurse has described as "her biggest fear".

['You prepare for the worst as a nurse but not this'](#)

Already thousands are dying in their care - and medical workers say they are facing scenarios they had never anticipated.

One doctor told the BBC the stress was intense. "Seeing people die is not the issue. We're trained to deal with death... The issue is giving up on people we wouldn't normally give up on."

[The young doctors being asked to play god](#)

Arthur Markman, a professor in the department of psychology at the University of Texas at Austin, says: "Few people in healthcare have had real-life experience with triage in which a significant number of life-and-death decisions had to be made because of equipment shortages. That increases the chances that they may experience moral injury as a result of their jobs."

Media caption Coronavirus: Lack of medical supplies 'a national shame'

The risk is compounded, he says, by workers at the front-lines of the epidemic - in places like New York, Italy and Spain - working long shifts with little break and sleep before they get back on the job. This leaves little if any time to process an incident that, if left unattended, may prove a moral injury in the making.

"A person doesn't just take the gloves off afterwards without that loss affecting their moral fibre, their soul," says Noël Lipana, who was left with a moral injury from his 2008 Afghanistan tour. He now works as a social worker while promoting better understanding of moral injuries both in the military and beyond, which includes staging art performances and a forthcoming documentary film, *Quiet Summons*.

"They came into this profession to help people, so what do you do when there is that sense of helplessness: you are a great physician, a great surgeon, you have some of the best medical equipment in the world, but you still can't save someone."

- **A SIMPLE GUIDE:** [What are the symptoms?](#)
- **US v ITALY v CHINA:** [How do death rates compare?](#)
- **LEADING THE WAY:** [The US governor who saw it coming early](#)
- **ON FRONTLINE:** ['Nurses prepare for the worst but not this'](#)
- **REASON TO HOPE:** [The good that may come out of this crisis](#)

Mr Lipana notes how veterans are often the focal point of a trauma discussion that needs be much wider. Veterans Affairs treats about 500,000 veterans a year with PTSD symptoms while the National Institute of Mental Health estimates about 7.9 million civilians suffer from some form of PTSD.

"The range of human experiences that are potentially damaging, socially, psychologically, biologically and spiritually because they cause a crisis of conscience are in no way limited to the military serving in warzones," says Brett Litz from the Massachusetts Veterans Epidemiological Research and Information Center, who is also a professor of psychological and brain sciences at Boston University.

A recent paper co-authored by moral injury experts Rita Brock and HC Palmer states that "the fight against the coronavirus is strikingly similar to battlefield medicine: desperate and unrelenting encounters with patients, an environment of high personal risk, an unseen lethal enemy, extreme physical and mental fatigue, inadequate resources and unending accumulations of the dead."

Media caption Critical care nurse Dawn was driven to despair by the actions of panic-buyers

Mr Lipana deployed to Afghanistan as an Air Force major acting as his unit's counter improvised explosive device (IED) officer. He oversaw and trained US troops in how to detect and disable IEDs planted by insurgents. Two army soldiers he worked alongside died in separate explosions during his deployment.

"They were killed by the thing I was meant to protect them from," says Mr Lipana, who was also involved in an operation during which four Afghan children were killed in a blast. "You play over what you could have done, should have done differently."

Guilt has been identified as the crucial factor that distinguishes a moral injury, even as other symptoms - anxiety and despair, flashbacks, social isolation and suicidal thoughts - overlap with PTSD.

"Traditional trauma treatment is about what's going on between your ears - it says you are just thinking about the incident wrong," Mr Lipana says. "That has zero to do with the connection I have with my battle buddies, those kids, with our fundamental spiritual soul connection in this universe."

- [Why are people stealing hospital supplies?](#)

- [Doctors face agonising life-death care decisions](#)
- [How fear of coronavirus is changing our psychology](#)

The breach of a person's personal ethical code at the heart of a moral injury can inflict lasting behavioural, emotional and psychological damage, distorting a person's self-identity and provoking reflexive distrust of others.

"In the military, we have it better in a way, as we get this break between deployments," Mr Lipana says. "Firefighters and cops have to reset themselves every 12 hours and go back out on their next shift."

Research in America has identified how for many veterans the pride in once wearing their uniform collides with a feeling of futility about what their service achieved and a belief that military leaders failed or deceived them and their fallen comrades. The resulting sense of violation from this can further fuel a lingering crisis of the conscience and spirit - deepening the moral injury.

While healthcare workers know they are doing the right thing by helping people with Covid-19, they may still be affected by responses of leaders, from the hospital hierarchy up to the national level.

Media caption US death rates v UK, Italy and South Korea

"One of the most toxic forms of moral injury is betrayal," says Ms Brock, who is also co-author of *Soul Repair: Recovering from Moral Injury After War*, and the director of the Shay Moral Injury Center. "Our healthcare workers are working to save people, but they have been betrayed by the government's inadequate response."

Healthcare workers' self-knowledge that they are involved in an entirely virtuous endeavour - as opposed to how veterans view the wars in Iraq and Afghanistan - can "actually make it even worse," Ms Brock says.

"You know you are on a life-saving mission, and so you can't understand how the president doesn't seem to get it in the same way."

An estimated 11-20% of the 2.7 million men and women who deployed to Iraq and Afghanistan have received a diagnosis of PTSD linked to their service. The percentage of former service members coping with moral injury appears comparable, though experts warn that the prevailing emphasis on PTSD means moral injury can often go unrecognised and ignored.

Image copyright Submitted photo Image caption Noël Lipana (right) beside a British Army officer in Afghanistan

Between 2005 and 2017, 78,875 veterans took their own lives, according to the most recent data from Veterans Affairs. Currently, about 17 veterans are estimated to kill themselves each day.

The period following the acute phase of the coronavirus epidemic will likely be hardest for medical professionals in terms of psychological impact.

"Once the rest of society has said thank you and moved on to getting back to normal and thinking about the economy, that's when these people will sit down and think, 'What the hell happened back there?'" Ms Brock says.

Her paper with HC Palmer states that some medical personnel may take their lives because of moral injury, having been "crushed by decisions they had to make, swamped by unrelenting grief, consumed by fury and humiliation at the authorities who failed them".

Ms Brock explains that, as in the military, often these emotions and reflections don't sink in for months due to the initial response's all-consuming pace.

Prof Markman stresses that "moral injuries are not inevitable" - and that medical professions will need time to reflect, and support from their managers.

"Leaders of hospitals need to communicate with the people working for them that they are using their training to make the best possible decisions under horrible circumstances. Everyone in the profession needs to recognise that they are trying to do the least harm possible in a situation in which it is impossible to provide the highest-quality care to every patient in need."

Image copyright Submitted photo Image caption Noël Lipana now produces theatrical performances to help people understand more about moral injuries

Meanwhile, experts say that individuals in society have an important role to play too.

"The rest of us can offer compassion to those who must, because of safety, keep us separated from those we love who are dying," Brock and Palmer write.

"Essential, too, is support for the families of medical professionals who are our friends or neighbours. And every time we interact with a medical professional, we should thank them."

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- [Coronavirus lockdown measures](#)
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<https://www.bbc.com/news/world-us-canada-52144859>



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Four countries with a tradition of kindness

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

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[#COVID19](#) [#Spontaneous](#) [#Unrehearsed](#) [#NaturalGrace](#) [#GenerosityKindness](#) [#NoExpectations](#) 'Acts of kindness have come to define the coronavirus pandemic, whether that's tales of Italians singing in unison on their balconies or communities applauding the medical professionals on the frontline. These stories have the ability to make us feel that we're bigger than just this crisis, and that together we can overcome our fears.

That's why BBC Travel is celebrating those places around the world that already have a long tradition of generosity and helping one another. From the ancient Greek concept of hospitality to the Persian poets

espousing kindness, these traditions will shine a light on the goodness that already exists across the planet, as well as give us new ideas of how to live our best lives going forward.'

<http://www.bbc.com/travel/story/20200412-four-countries-with-a-tradition-of-kindness>

Coronavirus: Spain and Italy applaud health workers

Residents in Spain and Italy have shown their gratitude to health personnel on the coronavirus frontline by applauding from their windows.

The nationwide events were coordinated in the locked-down countries through social media.

BBC News has also been contacted via comments on our [Instagram page](#) to report the same thing happening in Portugal, an hour after Spain.

Read more: [Chaos at US airports as France and Spain lock down](#)

- 15 Mar 2020

[Go to next video: Why we touch our faces and how to stop doing it](#)

More On: Coronavirus pandemic

<https://www.bbc.com/news/av/world-europe-51895386/coronavirus-spain-and-italy-applaud-health-workers>

Coronavirus: Worldwide applause for front-line medical staff

People under lockdown are showing their gratitude to front-line healthcare workers worldwide by applauding them.

30 Mar 2020 11:32 GMT | [Coronavirus pandemic](#), [Health](#), [World Health Organization](#)

Tributes to healthcare workers are pouring in from around the world amid the [COVID-19 pandemic](#), as the world gives medical heroes a standing ovation from windows and balconies.

The phenomenon of people cheering in the evenings began in mid-January in the city of Wuhan in China, where the virus originated.

First social media posts recorded anonymous voices in the night, shouting from high-rise apartment buildings: "Keep up the fight!"

The practice took off in Italy, where those under quarantine not only clapped - they sang arias, football chants and popular songs, played instruments and waved flags.

It then quickly spread to other countries under lockdown with deafening applause heard in Paris, London, various cities across Spain, India and Turkey.

Watch our compilation of global tributes to front-line medical staff edited by Al Jazeera NewsFeed's Katya Bohdan.

Source: Al Jazeera

<https://www.aljazeera.com/programmes/newsfeed/2020/03/coronavirus-worldwide-applause-frontline-medical-staff-200330111116862.html>

Perspective

The nightly ovation for hospital workers may be New York's greatest performance

On April 5, New Yorkers cheered for healthcare workers on the frontlines of the coronavirus outbreak as part of New York's "Clap Because We Care" initiative. (The Washington Post)

By

[Peter Marks](#)

Theater critic

April 6, 2020 at 6:15 p.m. EDT

NEW YORK — Ovation is on pause in the theaters and concert halls and stadiums of this city. But they haven't ceased. They've just moved into the streets.

Like clockwork, they happen, every evening at 7. Up and down Manhattan — and probably the Bronx and Staten Island, too — cheers ring out from apartment towers and brownstones, along with the sounds of rhythmic chants, applause and whistles.

The denizens of this city of ordinarily high-decibel levels kick them up an ample notch at this hour for the doctors and nurses and technicians and administrators and custodians of the beleaguered ICUs and ERs. The new urban ritual, which is catching on in other cities, coincides with the shift break of hospital staffs, when medical workers emerge from the covid-19 war zone into the open air, to go home for a spell or smoke or eat or otherwise decompress.

I dashed out of our apartment Sunday night just before 7 to buy groceries, and as I made my way down Pearl Street to the market, this surround-sound expression of support and gratitude engulfed me. The Financial District in Lower Manhattan is not the most densely populated part of town, and yet the usually silent dusk of early spring in the streets around the Stock Exchange was alive with noise. I couldn't tell exactly where the cacophony was coming from: It seemed as if it was everywhere at once. There's a major hospital — New York-Presbyterian Lower Manhattan — on William Street, a few blocks from where I was standing. So perhaps the applause was ecstatic neighborhood reverberation, off low-rise storefronts and the offices of the New York Fed and the skyscrapers that were turned into apartments after the financial crisis of 2008.

The moment blew through me like a warm wind. "I hear America singing," the Brooklyn poet Walt Whitman once wrote. On this night, I heard New York cheering.

It was reminiscent of — of all things — a scene in "Seussical," the musical based on the books of Dr. Seuss. (You may know the interlude from its classic source material, Seuss's "Horton Hears a Who.") The Whos, citizens of a microscopic world that exists on a speck of dust, are in need of help from Horton the Elephant, and they figure out that the way to be heard is to yell in unison at the top of their lungs: "We are here! We are here!" So they do, and they are saved, by a creature with a heart as big as, well, an elephant.

TV news crews, celebrities such as [Amy Schumer](#) and ordinary people with their cellphones at the ready are all recording these audible spasms of approval. New York firefighters were filmed the other day, lining up and clapping outside city hospitals — including Elmhurst Hospital in Queens, one of the hardest hit. But as with all demonstrations of this kind, there is no equivalent to the firsthand immersion, of lingering on a corner and taking in the full force of the banging, the clapping, the roar of the crowd.

[Sign up for our Coronavirus Updates newsletter to track the outbreak. All stories linked in the newsletter are free to access.](#)

Bringing one's hands together to make noise is, you won't be surprised to hear, not a modern invention. In [the Atlantic several years ago](#), Megan Garber began a fascinating article on the subject by citing the seventh-century Roman emperor Heraclius, whose army was depleted but who still needed to impress an enemy

leader with his strength. Before their meeting, he recruited extra men not to fight in the presence of his adversary, but to clap.

"Applause, in the ancient world, was acclamation," Garber wrote. "But it was also communication. It was, in its way, power. It was a way for frail little humans to recreate, through hands made 'thunderous,' the rumbles and smashes of nature."

Shouting from the rooftops, too, is often depicted in contemporary culture as a release from isolation and impotence. Think of Howard Beale in "[Network](#)," exhorting the agitated viewers of his apocalyptic nightly newscast to go to their windows and shriek into the ether: "I'm as mad as hell, and I'm not going to take this anymore!"

The tumultuous reception accorded the hospital workers, though, is no cry of despair. It is an impromptu curtain call, of multitudinous thank-yous, from a vast audience rooting for everyday heroes. It's New Yorkers joining in a chorus, singing out in solidarity: "We are here."

https://www.washingtonpost.com/entertainment/theater_dance/the-nightly-ovation-for-hospital-workers-may-be-new-yorks-greatest-performance/2020/04/06/e443195c-7795-11ea-a130-df573469f094_story.html

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

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[#COVID19 #BenefitConcert #FrontlineOfAllHealthWorkers #FullSpectrumOfMusic #AllStars](#)

As It Happened: One World event blends health message with music

Now playing
Now playing video Captain Tom Moore releases fundraising single from BBC
Captain Tom Moore releases fundraising single BBC1:1918 April 2020 02:00

'Summary

The One World: Together At Home show sees more than 100 artists play live from their homes
The eight-hour event run by the Global Citizen movement and the WHO is being live-streamed and broadcast on TV

Lady Gaga, who helped organise the concert, will also perform

At his White House briefing on Saturday evening, President Donald Trump praised the production of hospital goods in the US: "V for victory, V for ventilator!"

President Trump said that "per capita" the US has a lower coronavirus death toll than many other countries

Councils in England are to get an extra £1.6bn in funding to help them deal with the pandemic

Britain's Queen Elizabeth has asked that there be no gun salutes to mark her birthday on Tuesday

It is thought to be the first such request from the Palace in the British monarch's 68-year reign.

As world coronavirus deaths pass 150,000, more than 4.5 billion people are under containment to slow the pandemic.'

<https://www.bbc.com/news/live/world-52336209>

Rare Ravi Shankar footage released to mark centenary

[VIA:](#)

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[#RaviShankarMemorial #AnoushakarShankar #SitarRagas #AnotherEndRunOnCOVID19 #OnHighHolidays](#)

'Rare Ravi Shankar footage released to mark centenary

This week would have seen the 100th birthday of the Indian musician Ravi Shankar, one of India's most celebrated artists who famously taught Beatle George Harrison to play the sitar.

Planned celebrations, including concerts at the London South Bank Centre and Carnegie Hall in New York, were postponed because of the coronavirus outbreak.

But to mark the occasion the Shankar family have shared material from their private archive with the BBC. Ravi Shankar's daughter, Anoushakar Shankar, also a renowned musician, spoke to BBC South Asia correspondent Rajini Vaidyanathan.'

<https://www.bbc.com/news/av/world-52233961/rare-ravi-shankar-footage-released-to-mark-centenary>

56th Governor of New York State: This is humanity at its best. I share his letter as inspiration.

[VIA:](#)

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[#THANKYOU](#) We want to say thanks to all of you that helped make this happen! We raised the \$120,000 we needed to bring in our 1st truck. The truck filled with Happi Foodi frozen meals arrived yesterday. The meals are currently en route to be distributed to the first 1435 recipients this morning with fresh fruit. Thanks to your support and the incredible efforts of so many, in just 2 weeks, we officially set up one of the largest operations in the city delivering [#food](#) to the homebound and immobile due to covid. With these frozen meals and the other fresh meals being made by our partner [#restaurants](#), today alone we will deliver 10,000+ meals to people who cannot get to a grab & go sites and have not been able to get on the city's delivery system. Thank you again for your continued support and encouragement and thanks to all of the partners involved in making this happen: NYC Covid-19 Rapid Response Coalition, Public Health Solutions, Rethink Food NYC, RCano Events & Happi Foodi. [#FEEDNYC](#) [#NYStrong](#) [#collaboration](#) cc: [Samuel Rockwell](#)

[Andrew Cuomo](#)

[56th Governor of New York State](#)

[3w •](#)

[I received this letter from a farmer in northeast Kansas. His wife is ill and he is aging.](#)

[He sent me 1 of 5 N95 masks he has from farming to pass on to a doctor or nurse in New York.](#)

[This is humanity at its best. I share his letter as inspiration.](#)

march 6, ~~2020~~
2020

Dear Mr. Chomo,

I seriously doubt that you will ever read this letter as I know you are busy beyond belief with the disaster that has befallen our country. We currently (As of March 26, 2020) are a nation in crisis. Of that there is no doubt. Your approach has been spot on correct. I commend you for that & for especially for telling the truth, something that has been sorely lacking as of late.

I am a retired farmer hunkered down in N.E. Kansas with my wife who has but one lung and occasional problems with her remaining lung. She also has diabetes. We are in our 70's now & frankly I am afraid for her.

Enclosed find a solitary N-95 mask left over from my farming days. It has never been used. If you could, would you please give this mask to a nurse or doctor in your city. I have kept four masks for my immediate family. Please keep on doing what you do so well, which is to lead.

Sincerely, Dennis & Sharon

<https://www.linkedin.com/in/ferez-soli-nallaseth-m-s-ph-d-3112a714/detail/recent-activity/>

New mum meets baby after emergency birth in coma

VIA:

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

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[#OneMoreFor](#) [#TheHumanSpirit](#) [#AfterCsectionEmergency](#) [#DespiteCOVID19](#)

[#NewMomEmergesFromComaAfter12days](#) [#MeetsHerNewbornSon](#)

New mum meets baby after emergency birth in coma

A woman met her son for the first time, twelve days after giving birth and recovering from the coronavirus. Yanira Soriano, 36, was given an emergency caesarean while in a medically-induced coma.

17 Apr 2020

<https://www.bbc.com/news/av/world-us-canada-52333334/new-mum-meets-baby-after-emergency-birth-in-coma>

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

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Virologist delivered kit, then her baby

"Our kit gives the diagnosis in two and a half hours while the imported testing kits take six-seven hours," says virologist Minal Dakhve Bhosale, Mylab's research and development chief.

Ms Bhosale, who headed the team that designed the coronavirus testing kit called Patho Detect, said it was done "in record time" - six weeks instead of three or four months.

And the scientist was battling with her own deadline too. Last week she gave birth to a baby girl - and only began work on the programme in February, just days after leaving hospital with a pregnancy complication.

"It was an emergency, so I took this on as a challenge. I have to serve my nation," she says, adding that her team of 10 worked "very hard" to make the project a success.

In the end, she submitted the kit for evaluation by the National Institute of Virology (NIV) on 18 March, just a day before delivering her daughter.

Image copyright Minal Dakhve Bhosale Image caption Minal Dakhve Bhosale says Mylab's testing kit was developed 'in record time'

That same evening, just an hour before she was taken to hospital ahead of her Caesarean, she submitted the proposal to the Indian FDA and the drugs control authority CDSCO for commercial approval.

"We were running against time," says Dr Wankhede. "Our reputation was at stake, we had to get everything right on the first go, and Minal was leading our efforts from the front."

Before submitting the kits for evaluation, the team had to check and re-check all the parameters to ensure its results that were precise, and accurate.

"If you carry out 10 tests on the same sample, all 10 results should be same," said Ms Bhosale. "And we achieved that. Our kit was perfect."

- **[Why is India testing so little?](#)**

The government-run Indian Council for Medical Research (ICMR), under which NIV operates, agreed. It said Mylab was the only Indian company to achieve 100% results.

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

'Gaping holes in Indian health system'

India has been criticised for not testing enough. It has one of the lowest rates in the world, with just 6.8 tests per million.

Initially, India insisted on testing only those who had travelled to high-risk countries or had come in contact with an infected person or health workers treating coronavirus patients. It later said that anyone admitted to hospital with severe respiratory distress should also be tested.

But with the circle of infection widening daily, the numbers are expected to grow hugely.

Image copyright Getty Images Image caption India has tightly controlled the number of people who could be tested for the coronavirus

In the past few days, India has scaled up testing. Initially, only the state labs were allowed to test for coronavirus, but permission has now been extended to several private labs too.

And on Thursday, India also gave approvals to 15 private companies to commercially sell diagnostic kits based on licences they have obtained in the US, European Union and some other countries.

Dr Wankhede says with the number of suppliers and labs increasing every day, the testing will go up exponentially.

Increased testing would be a huge help, but experts say India has gaping holes in its health infrastructure that need to be plugged urgently to deal with the growing threat of coronavirus.

"South Korea - that's so tiny - has 650 labs testing for the coronavirus, how many do we have?" asks Sujatha Rao, former federal health secretary.

- **A SIMPLE GUIDE:** [What are the symptoms?](#)
- **AVOIDING CONTACT:** [Should I self-isolate?](#)
- **STRESS:** [How to protect your mental health](#)
- **LOOK-UP TOOL:** [Check cases in your area](#)
- **MAPS AND CHARTS:** [Visual guide to the outbreak](#)
- **VIDEO:** [The 20-second hand wash](#)

India has only 118 government laboratories and officials say 50 private labs will also be roped in.

For a population of 1.3 billion, that is far from adequate.

"India will have to identify many more labs, then the testing kits have to reach there, and technicians have to be trained. And getting the infrastructure ramped up will take time," Ms Rao says.

And once the test results start coming in and if a large number of people test positive and require hospitalisation, India will find it difficult to cope.

"You know the state of the healthcare facilities in the country? They are all bunched up in urban areas, there's very little facility in rural India. That will be a big challenge," she says.

- (i) Media caption People panicked after Narendra Modi said nobody should leave their homes, and did not mention the status of essential supplies

[India coronavirus lockdown](#)

[VIA:](#)

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Coronavirus: Why so many US nurses are out of work

By Aleem Maqbool

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19 #MoreExamples #SuccessfulContainment #ToughestLevelsIsolation #Leadership](#)

[#FromAsiaANZAC](#) 'New Zealand says it has stopped community transmission of Covid-19, effectively eliminating the virus.

With new cases in single figures for several days - one on Sunday - Prime Minister Jacinda Ardern said the virus was "currently" eliminated.

But officials have warned against complacency, saying it does not mean a total end to new coronavirus cases.

The news comes hours before New Zealand is set to move out of its toughest level of social restrictions.

From Tuesday, some non-essential business, healthcare and education activity will be able to resume.

Most people will still be required to remain at home at all times and avoid all social interactions.

Follow our live updates from around the world

How New Zealand turned to science and kindness

The 'social bubble' approach to lockdown easing

"We are opening up the economy, but we're not opening up people's social lives," Ms Ardern said at the daily government briefing.

New Zealand has reported fewer than 1,500 confirmed or probable cases of coronavirus and 19 deaths.'

<https://www.bbc.com/news/world-asia-52436658>

The Navy Fired the Captain of the Theodore Roosevelt. See How the Crew Responded.

nytimes.com

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19 #NavyResponse #ToSelflessCaptain](#) "The rousing show of supp. provid. another gripping scene to emerge from the coronavirus pandemic: the rank & file cheering a boss they viewed as putting their safety ahead of his career.

His removal..command of an aircraft carrier w/ ~5,000 crew members has taken on an added significance, as his punishm. is viewed by some in the military as indicat. of the govt's handling of the entire pandemic, w/ public officials presenting upbeat pictures of the government's response, while contrary voices are silenced..

The cheering by the sailors is the most public repudiation of military practices to battle the virus since the pandemic began. At the Pentagon..concern about the public image of a Def. Dept. not doing enough to stay ahead of the curve on the virus..

Mr. Gallego pointed to the firings of the commanders of the John McCain and the Fitzgerald, two destroyers that were involved in fatal accidents in 2017 that killed 17 sailors. Those firings came after months of investigations, while Captain Crozier was fired within three days of his letter becoming public.

Yet..President Trump, for instance, granted clemency to Chief Petty Officer Edward Gallagher, a Navy SEAL who was acquitted of murder last year but convicted of a lesser war crime.'

<https://www.nytimes.com/2020/04/03/us/politics/coronavirus-brett-crozier-theodore-roosevelt.html?smid=li-share>

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

Three Russian doctors fall from hospital windows, raising questions amid coronavirus pandemic

By Mary Ilyushina, CNN

Updated 11:27 AM ET, Tue May 5, 2020

Nepomnyashchaya was reported to have opposed those changes due to the lack of protective gear in the hospital. The Health Ministry's regional health department denied the allegations in a statement, adding that the hospital is in "reserve" for coronavirus patients and its staff has been trained and equipped. The hospital did not respond to CNN's requests for comment.

This story has been updated.

CNN's Matthew Chance contributed to this report.

<https://www.cnn.com/2020/05/04/europe/russia-medical-workers-windows-intl/index.html>

Russian doctors mysteriously fall out of windows -- On a related note, this story about the deaths and injury of Russian **doctors who criticized the government** is distressing.

https://view.newsletters.cnn.com/messages/15886368531105921feecdab0/raw?utm_term=15886368531105921feecdab0&utm_source=What+Matters+for+May+4%2C+2020&utm_medium=email&utm_campaign=203908_1588636853113&bt_ee=vZFywLzvlwkmT0QhOI1huWCIUJfFPCC8cUOoUy8XcXTHCLsXytCCBTIRnADBRwME&bt_ts=1588636853113

Coronavirus: India doctors 'spat at and attacked'

By Vikas Pandey

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19](#) [#Superstitions](#) [#InDevelopingDevelopedWorld](#) [#AsInRespToMeaslesPoxPolioVaccines](#) [#DedicatedHealthcareWorkersAssaulted](#) "healthcare workers in India have been attacked as they battle to

stop the spread of the coronavirus.

..doctors have been spat at & chased away from homes, & that in 1 case patients direct. abusive & vulgar lang. towards female nurses.

Some physicians & their fam. have also been ostracised by their neighbours because of their exp. to patients infect. w/ Covid-19.

India has reported more than 2,300 cases & at least 50 people have died.

One video, which has gone viral, showed a mob throwing stones at two female doctors wearing personal protective equipment in the central city of Indore.

The Drs. had gone to a densely-populated area to check on a woman suspected of having Covid-19 when they came under attack.

Despite being injured, one of the Drs. seen in the video, Zakiya Sayed, said the incident "won't deter me from doing my duty".

"I had never seen scenes like that. It was frightening. We somehow fled from the mob. I am injured but not scared at all."

Dr Sayed added.."We are working to keep people safe. We had information about a person coming in contact with a Covid-19 patient. We were talking to the person when residents got agitated and attacked us."

<https://www.bbc.com/news/world-asia-india-52151141>

Coronavirus: Health workers face violent attacks in Mexico

By Marcos González Díaz Guadalajara, México

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

Mexican nurse Ligia Kantun says that in 40 years of work, she has never witnessed such a poisonous reaction to health workers. While in many countries doctors and nurses are being praised for their work on the coronavirus front line, in Mexico dozens have been attacked.

Ligia, 59, says that she has worked during the swine flu pandemic in 2009 and an outbreak of cholera in 2013, but some people are "behaving psychotically in response to this virus. It is terrible".

She was attacked on 8 April after leaving work in her hometown of Merida, Yucatan. Someone drove past her and threw hot coffee down her back. "Infected!" they yelled through the car window before speeding away.

She says that luckily she was not badly injured but recognises it could have been worse.

As of 28 April, there have been at least 47 attacks against health workers, particularly nurses, in the country, the Mexican government says. And the authorities recognise the true figure may be higher - reports on social media of discrimination range from nurses stopped from getting on buses to doctors assaulted by relatives of Covid-19 patients.

"It made me sad... to see how people are attacking us," says Ligia. "That hurt me more - the psychological damage."

Some of the attacks appear to have been motivated by a misguided attempt to disinfect health workers.

Alondra Torres, an ear, nose and throat specialist, had diluted bleach thrown over her on 13 April while walking her dogs in the city of Guadalajara. She does not see Covid-19 patients in her clinic, but is convinced her uniform made her a target.

Alondra, who suffered conjunctivitis and contact dermatitis on her neck and shoulder as a result, says she was "disappointed" that some people seem to believe she needs to be bathed in bleach.

<https://www.bbc.com/news/world-latin-america-52676939>

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

The backlash is ugly

Severe backlash to the Covid-19 shutdown may be felt among a minority of the population, according to polls, but it has gotten fierce and deadly.

A belief that it's gone. Norman McNickle is the city manager in Stillwater and during an interview on CNN he gave his theory about the pushback:

"It is as you know, unseen enemy. They don't see it. We've been fortunate here with a low number of cases and a low number of hospitalizations and one death in our county. And I think the belief is that it's just gone. Or that they're young enough that they will catch it and survive. And frankly, many of them don't care much about others that they might pass it on to."

[**Watch that interview here.**](#)

How Fauci got to be demonized and deified

Here's [**an interesting read by Ned Potter, who has covered science for decades**](#), about the simultaneous deification and demonization of Anthony Fauci.

Fauci has become a hero on the left, with Brad Pitt impersonating and thanking him on "Saturday Night Live," while critics on the right [**have called for him to be fired**](#). Potter writes about his concern that in a crisis like this one, anti-elitism fuels a distrust of facts. "In a crisis, we need experts," he writes. "If there's an outbreak of disease, I want an epidemiologist; if there's a nuclear accident, I want an engineer."

[Opinion](#)

We Were Planning an Inequality Project. Then History Lurched.

Times Opinion will be arguing its way to some proposals for how America can emerge stronger from this crisis.

By [James Bennet](#)

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#NYTOpenEd](#) [#COVID19catalysed](#) [#AlterationInDebate](#) 'Last fall, I polled my colleagues in Times Opinion about subjects they thought we should focus on in 2020. The overwhelming answer was that we should bear down on how inequality of wealth & income had distorted American society. And then history lurched...coronavirus scramble. Our plans, along with those of the rest of the world. It cast a searing light on the ideas we were debating. Yes, the pandemic reminded America that they were all still bound together. But it also began revealing, day by day, how dangerously far apart they'd become...through this project, Times Opinion will be arguing its way toward a set of proposals for how American society can eventually emerge from this crucible stronger, fairer & more free. We will examine the geography of opportunity in America, the relationship between employers & workers, the gaps in wealth and income among generations & races. We will hear from poor people & rich people, business people, activists, philosophers. As always, we will be soliciting dissenting views as we go. Our goal, also as always, is not to tell you what to think — we don't presume to do that — but to aid you in the project of thinking for yourself, & the United States in the never-ending project of renewing itself.'

<https://www.nytimes.com/2020/04/09/opinion/sunday/inequality-coronavirus.html>

India coronavirus: The woman who pushed for homemade masks

24 April 2020

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19](#) [#MaskIndia](#) [#PolicyCh](#) [#ByFemBiochemist](#)

'PM N Modi wore a homemade cloth mask (HCM)...change from...early...posit...Behind India's pol. ch. & a push for mass use of HCM for more than a billion people is a little-known female biochemist...Shailaja V Gupta, 58...a scientist in the office of India's principal scientific adviser... "People living in slums, for example, need a local, cheap & simple solution and that is where the HCM can make a difference..."...The position of the WHO is that there isn't much evidence...masks as a protective measure...Asian countries, including Hong Kong & China, have made masks compulsory...those infected not showing symptoms, masks are necessary to prevent the unwitting spread of the virus...the US & UK, to make wearing masks mandatory..."When the pandemic broke out in India, Ms Gupta helped prepare a manual on how to make masks at home, got it translated into 22 official Indian languages and relentlessly pushed for making HCM an integral part of the strategy to counter the virus...efficacy of face masks in international journals...re-usable HCM costs few rupees (< 3 cents)...disposable surgical masks...cost 10 rupees apiece...N95 masks...cost ~500 rupees - > a typical daily-wager makes in a day...20 million HCM...already made by...78,000 self-help groups in 27 states.'

<https://www.bbc.com/news/world-asia-india-52270444>

Jack Ma: The billionaire trying to stop coronavirus (and fix China's reputation)

By Celia Hatton BBC News

26 April 2020

[VIA:](#)

Ferez Soli Nallaseth, M.S., Ph.D.

Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey

[#COVID19](#) [#PRCPresXiJinjing](#) [#BillionJackMa](#) [#DomIntPolicyEquilib](#) [#MedivacSuppliesTo150Countries](#) [#GlobalLeadership](#) [#FillingVacOfAmerFirst](#) 'The richest man in China..every one of his posts has been devoted to his unrivalled campaign to deliver medical supplies to almost every country around the world..to more than 150 countries so far, sending face masks and ventilators to many places that have been elbowed out of the global brawl over life-saving equipment..But..aren't sure what he's getting himself into. He appears to be following China's diplomatic rules, particularly when choosing which countries should benefit from his donations, but his growing clout might put him in the crosshairs of the jealous leaders at the top of China's political pyramid..Candid, a US-based philanthropy watchdog..puts Alibaba 12th on a list of private Covid-19 donors..Ma..Alibaba foundations..airlifting supplies to Africa, Asia, Europe, Latin America and even to ..Iran, Israel, Russia and the US..Ma's donations are following Party guidelines: there is no evidence that any of the Jack Ma and Alibaba Foundation donations have gone to countries that have formal ties with Taiwan..Ma's donations are following Party guidelines: ..any of the Jack Ma and Alibaba Foundation donations have gone'..CONTD IN COMMENTS any of the Jack Ma and Alibaba Foundation donations have gone to countries that have formal ties with Taiwan..all of the foundations' shipments dispatched from China appear to have been gratefully received..As Ma soaks up praise, Xi faces persistent questions about how he handled the early stages of the virus and where, exactly, the outbreak began..the Chinese government has certainly done what it can to capitalise on Ma's generosity..China might just need a popular global Chinese figure so much that Ma has done what no one else can: make himself indispensable.."Here's the one key takeaway from all that happened with Jack Ma and Africa: he said he would do something and it got done," exp. Eric Olander.."They're taking a leadership role, the kind of thing they used to be done by the United States," he says. "The most obvious past example is the response to Ebola, the Ebola outbreak in 2014..Chinese donors are taking on that role with this virus.'

<https://www.bbc.com/news/world-asia-china-52325269>



Posted on LinkedIn by EU

[European Commission](#)

[915,341 followers](#)

[We have come together against the coronavirus! 🌐 The pandemic is affecting every single country in the world. It has brought heartache and heartbreak, pain and suffering to millions of people. It has put enormous strain on healthcare and welfare systems, but it has also brought the best out of humanity.](#)

[Governments from across the world teamed up with health organisations and partners to contribute to the worldwide pledging marathon, which will run until the end of May.](#)

[We at the European Commission have mobilised €1.4 billion for the Coronavirus Global Response. All together, we raised €7.4 billion \(\\$8 billion\) in initial funding to develop diagnostics, treatments and vaccines and make them accessible for everyone globally. But this is only the beginning.](#)

[After governments, civil society and people worldwide need to join in, in a global mobilisation of hope and resolve. This is the true power of unity and humanity. The world is united against the coronavirus, and the world will win! More about this initiative: <https://europa.eu/!DB63HJ>](#)

[#UnitedAgainstCoronavirus #Coronavirus #COVID19](#)

https://ec.europa.eu/commission/presscorner/detail/en/ip_20_797

Coronavirus Global Response: €7.4 billion raised for universal access to vaccines

Page contents

Today, the Commission registered €7.4 billion, equivalent to \$8 billion, in pledges from donors worldwide during the Coronavirus Global Response pledging event. This includes a pledge of €1.4 billion by the Commission. This almost reaches the [initial target](#) of €7.5 billion and is a solid starting point for the worldwide pledging marathon, which begins today. The aim is to gather significant funding to ensure the collaborative development and universal deployment of **diagnostics, treatments** and **vaccines** against coronavirus.

President of the European Commission, Ursula **von der Leyen**, said: *"Today the world showed extraordinary unity for the common good. Governments and global health organisations joined forces against coronavirus. With such commitment, we are on track for developing, producing and deploying a vaccine for all. However, this is only the beginning. We need to sustain the effort and to stand ready to contribute more. The pledging marathon will continue. After governments, civil society and people worldwide need to join in, in a global mobilisation of hope and resolve."*

The pledging event was co-convened by the European Union, Canada, France, Germany, Italy (also incoming G20 presidency), Japan, the Kingdom of Saudi Arabia (also holding the G20 presidency), Norway, Spain and the United Kingdom. The initiative is a response to the [call](#) from the World Health Organization (WHO) and a group of health actors for a global collaboration for the accelerated development, production and equitable global access to new coronavirus essential health technologies. The Coronavirus Global Response Initiative is comprised of **three partnerships** for testing, treating and preventing underpinned by health systems strengthening.

An ongoing pledging marathon

Today is an extraordinary achievement but also the start of a process to mobilise more resources. The initial target of €7.5 billion will not be enough to ensure the distribution of coronavirus health technologies worldwide, as this involves significant costs in terms of production, procurement and distribution.

To help reach the objectives of the Coronavirus Global Response, the European Commission is committing €1 billion in grants and €400 million in guarantees on loans through reprioritisation of [Horizon 2020](#) (€1 billion), [RescEU](#) (€80 million), the [Emergency Support Instrument](#) (€150 million) and [external instruments](#) (€170 million).

€100 million will be donated to CEPI and €158 million to the World Health Organization. EU-funded calls for proposals and subsequent projects under Horizon 2020 will be aligned with the objectives of the three

partnerships and subject to open access to data. Funding under RescEU will go towards the procurement, stockpiling and distribution of vaccines, therapeutics and diagnostics.

Donors are invited to continue pledging to the Coronavirus Global Response. They can choose which priority to donate to – Test, Treat or Prevent. They can also donate to the horizontal work stream of the Coronavirus Global Response, aiming to help health systems in the world cope with the pandemic.

The Commission will soon announce the breakdown of the amount raised today and how much will go to vaccines, therapeutics, diagnostics and health systems strengthening related to COVID-19.

A cooperation framework to align global efforts

A universal and affordable **Access to COVID-19 Tools** (ACT-Accelerator) was the main objective of the 24 April [call to action](#) from global health partners. For this, significant funding is needed, as well as a solid collaborative structure, with a clarity of purpose to ensure that the donated money is put to good use and to avoid fragmentation of efforts.

Based on discussions with public and private sector partners as well as non-profit organisations, the European Commission proposes a collaborative framework for the ACT-accelerator global response. This framework is designed as a coordination structure to steer and oversee progress made globally in accelerating work on developing vaccines, therapeutics and diagnostics with universal access as well as strengthening health systems as required for meeting these three priorities.

This collaboration framework is intended to be time-bound (2 years, renewable) and build on existing organisations without creating any new structures. In the European Commission's view, it would bring together partners like the WHO, the Bill and Melinda Gates Foundation, the Wellcome Trust and some of the initial convenor countries as well as many recognised global health actors such as CEPI, Gavi, the Vaccine Alliance, the Global Fund or UNITAID.

The core of the framework would be **three partnerships** based on the three priorities of the Coronavirus Global Response. They gather industry, research, foundations, regulators and international organisations, with a “whole-value-chain” approach: from research to manufacturing and deployment. The three partnerships would work as autonomously as possible, with a transversal work stream on enhancing the capacity of health systems and knowledge and data sharing.

The Commission registers and keeps track of pledges up until end of May but will not receive any payments into its accounts. Funds go directly to the recipients. Recipients will, however, not decide alone on the use of the donation, but deploy it in concertation with the partnership. The commitment is for all new vaccines, diagnostics and treatments against coronavirus to be made available globally for an affordable price, regardless of where they were developed.

Next steps

The global response must also include civil society, and the global community of citizens. For that reason, the European Commission is joining forces with NGOs such as Global Citizen and other partners.

The Global Vaccines Summit that Gavi, the Vaccine Alliance, will organise on 4 June will mobilise additional funding to protect the next generation with vaccines. As the world relies on Gavi's work for making vaccination available everywhere, the success of Gavi's replenishment will be crucial to the success of the Coronavirus Global Response.

Background

The Coronavirus Global Response builds on the commitment made by G20 leaders on 26 March.

Grounded in a vision of a planet protected from human suffering and the devastating social and economic consequences of the coronavirus, an initial group of global health actors launched a call to action for global collaboration for the accelerated development, production and equitable global access to new coronavirus essential health technologies.

On 24 April, the World Health Organization (WHO) and an initial group of health actors launched a collaboration for the accelerated development, production and equitable global Access to COVID-19 Tools – the ACT Accelerator. Together, they issued a [call to action](#).

The European Commission responded to this call by joining forces with global partners to host a pledging event – the Coronavirus Global Response Initiative – as of 4 May 2020.

Funding, including the EU contribution, pledged since 30 January 2020 – the date when the WHO declared coronavirus a global health emergency – will be counted as part of the Coronavirus Global Response funding target with the commitment that these will contribute to and align with the ACT-Accelerator framework.

For More Information

[Coronavirus Global Response website](#)

[Questions and Answers: the Coronavirus Global Response](#)

[Factsheet – The Coronavirus Global Response](#)

[The Commission's Coronavirus Response](#)

https://ec.europa.eu/commission/presscorner/detail/en/ip_20_797

(3) Squash and the (SARS-CoV-2) virus induced COVID – 19 Pandemic (2020)(How and when should we begin playing Squash? As with everything in the post COVID-19 world - considering the stakes – very slowly and carefully!):

(i) Roundup of select articles (and/or comments) covering the relevant news and issues on the courts, by Alan Thatcher, Ferez S. Nallaseth, James Roberts, Richard Millman, Harry Leitch, Amanda Sobhy, Jahangir Khan, Sourav Ghosal, Jerome Elhaik, Maria Toor Pakai, Rod Bannister, Nick Mattew, Daryl Selby, Laura Massaro, Danny Lee, Alex Wall, Tony Griffin, Alexia Clonda, Alex Wan, (ii) Economic Impact of Pandemic (Specific topic # 6), (iii) Comments on a proposal offsetting the economic impact of the pandemic on Squash (comments extracted from article in Squash Mad entitled ‘How we can approach a ‘New Normal’ in Squash..,’ by Richard Millman)

(a) Italian report ranks squash among the most ‘risky’ sports for COVID-19 infection

By JAMES ROBERTS – Squash Mad Correspondent

Posted on May 9, 2020

Indeed, in the case of Switzerland, clubs are set to re-open from this Monday, albeit following a set of strict health guidelines and only allowing certain drills or routines for two-player scenarios which seek to maintain a reasonable distance between the two players.

However, the recent publication of a study undertaken by the Polytechnic University of Turin could prove to pour some cold water over such notions, or at the very least provoke the exercise of a lot more caution.

The report called *“Restarting Sport Safely”* was commissioned by the Italian National Olympic Committee and sought to evaluate the potential for spread of Coronavirus with every imaginable sporting discipline – 387 of them to be precise so it is a very comprehensive study.

..The study was undertaken with the full cooperation of all the sports governing bodies, who each completed a questionnaire covering all the risk factors. The findings then were used to produce a sort of league table for the dangers of spreading the virus, with a risk score allocated to each sport from 0 to 4: 0 = no risk, 1 = low risk, 2 = average risk, 3 = high risk, 4 = very high risk.

..Sports deemed the lowest risk by scoring near to 0 include golf, tennis, horse riding, fishing and sailing. In the low risk bracket with a score around 1 are swimming and cycling, whilst water polo and beach volleyball come in with a moderate risk score of 2. Sports gaining a high-risk score of 3 include football and fencing. However, the list of sports scoring the maximum high-risk score of 4 features boxing, volleyball, basketball and most notably squash.

Squash it seems scored highly on the risk scale for a variety of reasons, most notably the confined space, the proximity of the players to each other and the incidence of heavy breathing and sweating.

Although this report has been produced for the Italian government, it perhaps shines a bit of light on how other countries could progress in terms of allowing the resumption of competitive and leisure sport, bearing in mind the desire to avoid a 'second spike' of infection. The Italian newspaper Il Fatto Quotidiano speculates that only sports classed as zero or low risk will be permitted to resume first off in Italy.

Notable too is the classification of football as high risk, which could deal a blow to any notion of football completing seasons any time soon. Even sports like tennis, classed as virtually zero risk, might have to be radically different to how it was.

11 Comments

<https://squashmad.com/breaking-news/squash-ranked-amongst-the-most-risky-sports-for-covid-19-infection/>

(b) Clubs must hold pilot trials to satisfy safety rules before a full reopening

By ALAN THATCHER – Squash Mad Editor

Squash clubs appear to have been given permission to reopen in a restricted fashion on July 25 following today's government announcement, although this seems to be a date for launching a selective trial process to guarantee safety for players and club staff members. England Squash say they will release plans next week but suggest that safe distancing will need to apply.

Culture Secretary Oliver Dowden confirmed today that outdoor sports, including team games, will be able to restart in stages from this weekend, with indoor venues to follow on July 25.

However, all facilities will have to follow distancing guidelines introduced following the spread of the Covid-19 pandemic.

Dowden stated that indoor clubs will need to hold "pilot" trial sessions before being allowed to fully reopen. "Sports will publish sport-specific guidance," he said.

Gyms have been instructed to allow 100 square feet per person, so how that kind of advice will translate to squash facilities is currently unclear.

Squash, of course, has been rated as a "high-risk activity" in a number of recent medical surveys because potentially infectious droplets of breath can be trapped inside poorly ventilated courts.

Today's announcement will apply to England only. The Scottish government confirmed that indoor sports would have to continue to wait. Irish Squash was given the green light to return to full play last week but they has chose to adopt a more cautious approach, with solo hitting and two-player training sessions that observe safe distancing protocols.

Sport England chief executive Tim Hollingsworth has welcomed the government's announcement that recreational sport can continue its return on a larger scale, and that gym and leisure facilities are set to reopen.

In a Sport England statement, Hollingsworth said: "The Secretary of State for Digital, Culture, Media and Sport,

Oliver Dowden, announced today that:

- indoor gyms, leisure facilities and swimming pools will be able to reopen from 25 July
- outdoor pools and cricket can begin this coming weekend
- the return of team sports will be facilitated by the relevant national governing body having their own sport-specific guidance approved by government.

“For the millions of people who have missed going to the gym, playing their favourite sport indoors, heading for a swim or training with their team-mates, today’s news is an important step forward and testament to the hard work so many have put in to preparing to restart and reopen,” he said.

“Now, more than ever, there is recognition of the vital role sport and activity plays in supporting people’s physical and mental health so there is a massive opportunity as we emerge from lockdown to truly embrace the idea that exercise is essential to our wellbeing and to recognise the opportunities all around us to be more active.

“We are also acutely aware that many providers, specifically public leisure centres which are such valuable assets in their communities, are facing significant financial challenges and many are at risk of being unable to reopen fully or may remain closed.

“Indoor facilities will need to prepare for reopening, so as the sport and physical activity sector gets ready for the continuing ‘return to play’, we’ve collated advice, guidance and resources (below) to help.

“With advice likely to evolve as restrictions change, we’ll monitor and update our guidance to ensure it’s in line with the what the government is advising and we’ll continue to listen to providers when they tell us what resources will help most.

“We will continue to work closely with government and key partners to help these operators to get as much as support as possible.”

England Squash has been contacted for a statement. In a post on Twitter, they said: “The UK Government has just announced that indoor sports facilities in England can reopen from 25th July with social distancing in place.

“In the meantime, we are interpreting the newly-released Government guidance. We will finalise and release full guidance for clubs and venues to facilitate safe play next week.”

Mike Hegarty, a director of Lexden Rackets and Fitness Club in Colchester, has offered to make the club available to England Squash for testing procedures.

Government figures today revealed that another 85 people have died after testing positive for coronavirus in the UK, taking the total number of deaths to 44,602 from 288,000 cases of infection.

In America, College sports programmes have been cancelled for the remainder of this year and a number of universities, including Stanford and Brown, have axed their squash teams in a bid to save money.

The USA has so far seen more than three million cases of coronavirus, with 134,000 deaths. In New York, where the iconic Tournament of Champions is due to take place early next year, there have been 400,000 infections and 32,000 deaths. Neighbouring New Jersey has 176,000 cases of infection with 15,000 deaths.

+++ UK Government advice published today for providers of [grassroots sport and indoor indoor gym and leisure facilities](#)

Posted on July 9, 2020

<https://squashmad.com/breaking-news/squash-on-trial-as-indoor-facilities-are-allowed-to-reopen-in-uk-on-july-25/>

(c) Laura leads my lockdown recovery as the squash world waits to reopen

By ALAN THATCHER – Squash Mad Editor

Posted on April 30, 2020

<https://squashmad.com/breaking-news/alan-thatcher-squash-faces-a-rocky-road-to-reopening-as-france-and-new-zealand-lead-the-way/>

(d) What day is it? Where am I? If you are losing track of time during the coronavirus lockdown, join the club

Right now, under lockdown, my domestic priorities are mowing the lawn every week, nurturing my rhubarb, chasing the squirrels off the bird feeders and strengthening the fences to stop the neighbouring cats getting into the garden when the blue tits fledge.

Despite being unable to set foot on a court, I am still heavily occupied on the squash front.



On a personal level, I am planning World Squash Day to go ahead on the published date in October (10/10/20) and hoping to confirm a date to rearrange the Colin Payne Kent Open, sponsored by Trident Machines, at Tunbridge Wells, possibly in September.

Decisions concerning health and hygiene will remain top of the agenda for everyone, as federations across the world discuss the prospect of reopening.

Articles by James Roberts, Rod Bannister and Richard Millman published here on Squash Mad in the past few days (with some interesting medical and scientific input from Dr Ferez Nallaseth and Mike Hegarty) suggest that similar safeguarding measures will have to be applied in different hemispheres.

I have attached a list of links to all those articles and many more at the foot of this column.

I am proud that Squash Mad provides a platform to share ideas and information across the globe, and, most importantly, keep us all connected.

Related articles published here on Squash Mad:

[Harry Leitch on the front line](#)

[Amanda Sobhy copes with a smile, a song and some fun workouts](#)

[Jahangir Khan leads the way as squash rallies round to help communities](#)

[Saurav Ghosal says India is on a war footing](#)

[Training goes on for French stars Victor Crouin and Baprista Masotti](#)

[Maria Toor Pakai says being confined to home is nothing new](#)

[Rod Bannister looks at different scenarios to relaunch the game in Australia](#)

[French Resistance to the Covid-19 threat](#)

[Back to the future with Richard Millman in America \(plus some fascinating medical responses\)](#)

[James Roberts on how UK clubs are coping: Part 1](#)

[James Roberts on how UK clubs are coping: Part 2](#)

[Hard-up coach says: I can't pay my rent](#)

[How the Selby family are dealing with life without squash](#)

[WSF praise vitality of players and clubs during lockdown](#)

[Nick Matthew and Daryl Selby launch Lockdown Chat Show](#)

[Danny Lee and Alex Wall make music to raise money and raise spirits](#)

[Tony Griffin: Lockdown leads to debate on gender equality in squash](#)

[No international sport without a vaccine](#)

[Malaysia asks for World Juniors to be postponed, not cancelled](#)

[British Open a major casualty as PSA extends lockdown](#)

[Alexia Clonda: No more blokey jokes as Australia shuts down](#)

[UK clubs in the dark after shutdown order](#)

[How the lockdown began in squash \(including Alex Wan in Singapore\)](#)

[Canary Wharf final gave us an epic to remember](#)

[Canary Wharf and Black Ball Open allowed to finish as PSA announce shutdown](#)

[Plus: Laura Massaro and yoga](#)

Posted on April 30, 2020

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About The Author

[Alan Thatcher](#)

Founder of World Squash Day, Squash Mad and the new Squash 200 Partnership, building clubs of the future. Founder of the Kent Open and co-promoter of the St. James's Place Canary Wharf Classic. Author and Public Speaker.

<https://squashmad.com/breaking-news/alan-thatcher-squash-faces-a-rocky-road-to-reopening-as-france-and-new-zealand-lead-the-way/>

(e) How we can approach a 'new normal' in squash: with masks and gloves compulsory to start with

By RICHARD MILLMAN – Squash Mad Correspondent

Posted on April 27, 2020

While we are hunkered down, staying home to allow our amazing front line workers in the hospitals, ambulances, police, armed forces etc to do their brave and essential work in combatting this terrible virus, we cannot but cast our worried minds toward the survival of our beloved game.

We don't yet know if we will have vaccines, anti-body testing, plasma donations or indeed whether or not we will be able to become reinfected having once had the Covid-19 virus.

We do know that unless we meticulously take steps to protect our fellows and ourselves, whatever activities we engage in outside our own homes could, potentially, lead to spread of the disease and a spike in infections and – horrifically – deaths.

But. We must prepare our sport for the day that we can begin to approach the 'new normal' in the history of squash.

16 Comments

<https://squashmad.com/breaking-news/back-to-the-future-if-and-when-squash-courts-reopen/>

(ii) Economic Impact of the Pandemic on Squash (Included in specific segment/topic # 6)

(iii) Extracted comments on a proposal offsetting the economic impact of the pandemic on Squash (comments extracted from article, by Richard Millman),

[Ferez S. Nallaseth, PhD](#)

April 29, 2020 at 4:10 pm

Dear Alan, Richard and Mike,

The point that Richard raised regarding the economic impact that quarantine has on the very fabric of the game requires more discussion. Something that should be more fully included but in a separate discussion from the questionable wisdom of taking the court with a partner in the immediate future. That is before any understanding of the COVID-19 containment measures have crystallized. This issue is the deep and destructive economic impact of COVID-19 that is inflicted on Squash.

That this issue is expected from Squash being a part of all affected human activities on the planet neither lessens the pain nor the existential threat that it poses for the game.

All this may already be under discussion in the WSF and the PSA but nevertheless bears airing out in the community. As Richard and others have pointed out those who represent the very foundation of Squash are most threatened by the loss inflicted by the necessity of quarantine induced by COVID-19. Those who are Touring and Teaching Pros, Club Owners, Managers, Amateur Competitors, Equipment Manufacturers and Sales, Communications, Public Relations and Publication Personnel are most threatened. A collapse of Squash leading to their migration into other professions or activities might lead to an impact from which the game could not possibly recover.

One possible counterbalance to the impending crisis is for the Global Squash community to put together a small New Deal or Marshall Plan tailored for Squash. The Global Squash community is 20 million strong and is

represented in at least 185 countries (US Squash, <https://www.ussquash.com/squash-facts/>). Voluntary donations from Players and or their families that are commensurate with economic backgrounds would likely produce a reasonable sum which could be partially and immediately used for ameliorating the current crisis. Another partial sum could simultaneously be placed in an escrow fund for all such crisis in the future. The accumulating interest could be re-invested in the escrow fund as well as being applied to meeting the current crisis.

Nations, Families and Donors are more likely to donate to this existential crisis than they are to say, a more abstract concept such as growing the game!

To ensure equitable distributions (which is more a matter of perception than actual concern), the distributions would be determined by representatives of donors, players, club owners, nations, etc... Again it is important to re-direct some capital while awaiting accretion of funds and interest could be recruited for immediate needs.

Also Players, Pros, Club Owners in nations/societies with economic safety nets might be able to wait a little longer for funds than those in nations without such economic safety nets.

All this needs a brief but detailed discussion before actual implementation. However, emergency funds could be released immediately.

Kind regards,

Ferez

[Alan Thatcher](#) May 1, 2020 at 9:54 pm

Ferez

This is a fascinating idea and deserves further debate.

It would be interesting to see if any individual or group steps forward and offers to manage such a project. Just one point: the much-touted figure of 20 million players is a little over-optimistic.

Alan

Ted Gross May 1, 2020 at 11:25 pm

Ferez, you're an optimist!

My sense is the only way we get out of this mess is if we can instantly test all players entering a facility.

[Ferez S. Nallaseth, MS, PhD](#) May 2, 2020 at 12:17 pm

Ted,

As he was the author, I think that you meant to address this to Richard.

But I'll use it as an opportunity to give you some information.

But testing will not reveal transmission of the virus on on clothes, etc..Or the virus picked up by contact with hard surfaces and transmitted before it elicits an immune response or infection detected with tests. I think that the virus is viable as an infectious particle for at least 24 hours. Many different forms of contact on hard surfaces, door handles etc.. can occur.

So the only real out is for at least 60% of the Global Population to either become infected and develop antibodies or to be immunized with a vaccine.

A report released yesterday from the University of Minnesota estimated that this would take a minimum of 2 years!

F

Ted Gross May 3, 2020 at 6:24 am

Ferez I don't see the donation program happening. My sense is squash players are tight with their money unless an urban program is involved.

[Ferez S. Nallaseth, MS, PhD](#) May 3, 2020 at 11:53 am

Ted,

You might well be right. But it should be voted on by the Leadership in the Squash community. Even if 50% of the Squash Community by that it means, Players, Coaches, Clubs, Teams, Families and Friends appreciated that we have far greater resources as a whole than the sum of our parts (members) this would be progress. Correspondingly, the greater the participation shrinks the necessary donation per participant without diminishing the sum into insignificance.

It would amplify and make available finances and so resources which would stabilize the community considerably in a post COVID-19 world.

After all at the end of WWII, the United States was preoccupied with losses of families and rebuilding. To put it mildly it was strapped for cash. There were those who were inward looking. Yet General and Secretary of State George Marshall and President Harry Truman understood the vital importance of the Marshall Plan to rebuilding a Free and Strong Europe. They led the recovery!

I am not convinced that this is the option of choice – but it certainly merits informed discussion!

Best,

Ferez

Ted Gross May 3, 2020 at 9:04 pm

Ferez in my view the afflicted group that you mention should seek another line of work for the time being, since it's questionable whether squash will return as we know it.

[Ferez S. Nallaseth, MS, PhD](#) May 3, 2020 at 9:23 pm

Ted,

You may be absolutely correct – certainly in that nothing, let alone Squash, will bear resemblance to the Pre-Pandemic World.

However, my admittedly limited understanding of the rationale of such things as insurance and pension funds allows for creating the specified safety net for Squash Players. Namely the costs and burdens of a few accidents and job losses are borne by the majority of Insured who are safe if not prospering. Eventually contributions from these 'many' pull the 'few' at risk to safety.

In this case the shared resources of 'the many' in the international community deposited in an escrow fund, would far exceed the individual personal or national resources of 'the few'. As a consequence donations themselves, though commensurate with socioeconomic status, also would not have to be unaffordable.

Of course the 'devil is in the details!' It may already be too late to start. But in all fairness, all this will have to be worked out by sociopolitically and socioeconomically progressive Economists, Financiers, Bankers and Insurers. Preferably those who have an affinity for Squash!

(iv) Via Alan Thatcher

More than 100 infections linked to fitness classes in South Korea, study finds

By Arman Azad

Updated 1:14 AM ET, Mon May 18, 2020

(CNN)Indoor fitness classes could provide a route for spreading [coronavirus](#), researchers in South Korea report.

They found evidence that a single, intense dance workshop led to the spread of Covid-19 to 112 different people.

The infections aren't recent -- the class was held in February and the cases were all identified by March 9 -- but the new research offers insight into how rapidly coronavirus can spread in enclosed spaces.

Almost 30 instructors participated in the original workshop, held in Cheonan, South Korea. They trained intensely for four hours, and while none had symptoms at the time, eight instructors eventually tested positive for the virus.

Content by CNN Underscored

Get meat delivered to your doorstep with these services

Dreaming of an indulgent porterhouse for two? Want to be surprised by a mixture of tasty meats, monthly? These delivery services will keep you well-fed as long as you like.

"All were asymptomatic on the day of the workshop," the team at Dankook University Hospital wrote in the journal [Emerging Infectious Diseases](#).

[A person who was Covid-19 positive attended a church service and exposed 180 people, officials say](#)

"By March 9, we identified 112 Covid-19 cases associated with fitness dance classes in 12 different sports facilities in Cheonan," they wrote.

Half of the cases were the result of direct transmission from instructors to students, and some people went on to infect others outside of class.

"The instructors and students met only during classes, which lasted for 50 minutes two times per week, and did not have contact outside of class. On average, students developed symptoms 3.5 days after participating in a fitness dance class," the Dankook team wrote.

<https://www.cnn.com/2020/05/18/health/fitness-classes-coronavirus-korea-wellness/index.html>

(4) Multiple dimensions of the COVID – 19 Pandemic: (i) Overview: How can the virus be stopped? How long can the Pandemic Last? (ii) Dynamics of transmission: infections and transmission, infections and dispersal of the virus by symptomatic and asymptomatic patients, fetuses, children and elderly or weakened individuals are likely or known to be, infected, (iii) Social distancing, glove and mask utility, contact tracing, isolation, testing – all vital in 'Flattening the Curve' and so preventing saturation of Health/Medical resources, (iv) Lack of: Pandemic containment research labs, availability of PPEs, Ventilators, Testing kits and Vaccine – complexities and development, results and the known the leakage of masks were thought to be serious impediments to managing crises in its early days and directly responsible for magnitude of infections and fatalities of Pandemic, (v) Projection of aerosols beyond the current 6 feet (even continuing beyond 12 feet) of social distancing; (viral) matter, (vi) Viability of the virus on hard or inanimate (hard, wooden and metallic) surfaces for up to 72 hours, (vii) Testing kits and vaccine development: reliability of tests and accuracy of numbers recovered from testing, (viii) What does 'Herd Immunity' mean – is it working? Apparently not in France and Spain, (ix) Slowing the COVID-19 Pandemic with at least 70% of the population attaining immunity to SARS-CoV-2 coronavirus either conferred by vaccines or recovery post-infection by 'Herd Immunity' - which still does not

mean that a second infection cannot occur, (x) Resistance to immune systems in immune-privileged tissues undermined and the mutated virus avoiding vaccines/immune-surveillance subverting a major arm of detection, testing and vaccination, (xi) Dangers of reopening too soon – second and third waves of infections, endemic COVID-19 in pockets of populations allowing 2nd and 3rd waves currently underway and expected to peak in the flu season with the full impact of twin impacts

(i) Overview: How can the virus be stopped? How long can the Pandemic Last?

The Virus Can Be Stopped, but Only With Harsh Steps, Experts Say

Scientists who have fought pandemics describe difficult measures needed to defend the United States against a fast-moving pathogen.

By [Donald G. McNeil Jr.](#)

- Published March 22, 2020 Updated March 25, 2020

Terrifying though the coronavirus may be, it can be turned back. China, South Korea, Singapore and Taiwan have demonstrated that, with furious efforts, the contagion can be brought to heel.

Whether they can keep it suppressed remains to be seen. But for the United States to repeat their successes will take extraordinary levels of coordination and money from the country's leaders, and extraordinary levels of trust and cooperation from citizens. It will also require international partnerships in an interconnected world.

There is a chance to stop the coronavirus. This contagion has a weakness.

Although there are incidents of rampant spread, [as happened on the cruise ship Diamond Princess](#), the coronavirus more often infects clusters of family members, friends and work colleagues, said Dr. David L. Heymann, who chairs an expert panel advising the World Health Organization on emergencies.

No one is certain why the virus travels in this way, but experts see an opening nonetheless. "You can contain clusters," Dr. Heymann said. "You need to identify and stop discrete outbreaks, and then do rigorous contact tracing."

<https://www.nytimes.com/2020/03/22/health/coronavirus-restrictions-us.html>

New report says coronavirus pandemic could last for two years – and may not subside until 70% of the population has immunity

By Christopher Brito

May 2, 2020 / 9:24 AM / CBS News

As [coronavirus restrictions](#) around the world are being lifted, a [new report](#) warns the pandemic that has already killed [more than 230,000 people](#) likely won't be contained for two years. The modeling study from the Center for Infectious Disease Research and Policy (CIDRAP) at the University of Minnesota also says that about 70% of people need to be immune in order to bring the virus to a halt.

For the study, experts looked at eight major influenza pandemics dating back to the 1700s, as well as data about the new coronavirus, to help forecast how [COVID-19](#) may spread over the coming months and years. Out of the eight past flu pandemics, scientists said seven had a second substantial peak about six months after the first one. Additionally, some had "smaller waves of cases over the course of 2 years" after the initial outbreak.

A key factor in their prediction for the current pandemic revolves around herd immunity, which refers to the community-wide resistance to the spread of a contagious disease that results when a high percentage of people are immune to it, either through vaccination or prior exposure.

Coronavirus: The Race To Respond

- [NRA lays off dozens and shuts down fundraising amid coronavirus](#)
- [Gottlieb says coronavirus mitigation "didn't work as well as we expected"](#)
- [Illinois governor faults White House for testing supply shortages](#)
- [Transcript: Gilead CEO Daniel O'Day on "Face the Nation"](#)

"The length of the pandemic will likely be 18 to 24 months, as herd immunity gradually develops in the human population," the report says. "Given the transmissibility of SARS-CoV-2" — the virus that causes COVID-19 — "60% to 70% of the population may need to be immune to reach a critical threshold of herd immunity to halt the pandemic."

It will take time to reach that point, since data from blood tests show only a small fraction of the overall population has been infected so far, and a possible vaccine is still [months](#) if not [a year or more](#) away. It is not yet clear whether people who've recovered from the infection will be [immune](#) or how long such protection would last.

The report lays out several possible scenarios, including one in which a [larger wave of illnesses may happen in the fall or winter of 2020](#) and then subsequent smaller waves in 2021. The researchers say this model — similar to the pattern seen in the devastating [1918 Spanish flu pandemic](#) — would "require the reinstitution of mitigation measures in the fall in an attempt to drive down spread of infection and prevent healthcare systems from being overwhelmed."

Two other scenarios in the report involve either recurring peaks and valleys of outbreaks, or smaller waves of illness over the next two years.

In any case, the researchers said people must be prepared for "at least another 18 to 24 months of significant COVID-19 activity, with hot spots popping up periodically" in different geographic areas.

As the virus continues to circulate among the human population and outbreaks finally start to wane, they say it will likely "synchronize to a seasonal pattern with diminished severity over time."

First published on May 1, 2020 / 2:24 PM

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<https://www.cbsnews.com/news/coronavirus-pandemic-two-years-70-percent-immunity/>

(ii) Dynamics of transmission: infections and transmission, infections and dispersal of the virus by symptomatic and asymptomatic patients, fetuses, children and elderly or weakened individuals are likely or known to be, are re-infections possible? (In this as well as other specific sub-sections 4 (ii) – 4 (xvi)

Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period

Science 14 Apr 2020:

eabb5793

DOI: 10.1126/science.abb5793

Abstract

It is urgent to understand the future of severe acute respiratory syndrome–coronavirus 2 (SARS-CoV-2) transmission. We used estimates of seasonality, immunity, and cross-immunity for betacoronaviruses OC43 and HKU1 from time series data from the USA to inform a model of SARS-CoV-2 transmission. We projected that recurrent wintertime outbreaks of SARS-CoV-2 will probably occur after the initial, most severe pandemic wave. Absent other interventions, a key metric for the success of social distancing is whether critical care capacities are exceeded. To avoid this, prolonged or intermittent social distancing may be necessary into 2022. Additional interventions, including expanded critical care capacity and an effective therapeutic, would improve the success of intermittent distancing and hasten the acquisition of herd immunity. Longitudinal serological studies are urgently needed to determine the extent and duration of immunity to SARS-CoV-2. Even in the event of apparent elimination, SARS-CoV-2 surveillance should be maintained since a resurgence in contagion could be possible as late as 2024.

<https://science.sciencemag.org/content/early/2020/04/24/science.abb5793>

In rare cases, coronavirus might ail children

Pediatric multisystem inflammatory syndrome— a serious condition in children that has been compared with an illness called Kawasaki disease — seems to be linked to the coronavirus. Physicians in Bergamo, at the heart of the COVID-19 outbreak in Italy, report a 30-fold increased incidence of Kawasaki-like disease. New York governor Andrew Cuomo said this week that the syndrome has affected around 100 children in the state, 2 of whom have died. Pediatricians stress that the problem is extremely rare, and most children who have it get better. (BBC | 4 min read)

Reference: *The Lancet* paper

https://www.bbc.com/news/amp/health-52648557?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

VIA Alan Thatcher:

Coronavirus: The mystery of asymptomatic 'silent spreaders'

By David Shukman Science editor

31 May 2020

As the crisis has unfolded, scientists have discovered more evidence about a strange and worrying feature of the coronavirus. While many people who become infected develop a cough, fever and loss of taste and smell, others have no symptoms at all and never realise they're carrying Covid-19.

Researchers say it's vital to understand how many are affected this way and whether "silent spreaders" are fuelling the pandemic.

When people gathered at a church in Singapore on 19 January, no-one could have realised that the event would have global implications for the spread of coronavirus. It was a Sunday and, as usual, one of the services was being conducted in Mandarin. Among the congregation at The Life Church and Missions, on the ground floor of an office building, was a couple, both aged 56, who'd arrived that morning from China.

As they took their seats, they seemed perfectly healthy so there was no reason to think they might be carrying the virus. At that time, a persistent cough was understood to be the most distinctive feature of Covid-19 and it was seen as the most likely way to transmit it. Having no symptoms of the disease should have meant having no chance of spreading it.

The couple left as soon as the service was over. But shortly afterwards, things took a turn for the worse, and in a wholly confusing way. The wife started to become ill on January 22, followed by her husband two days later. Because they had flown in from Wuhan, the epicentre of the outbreak, that was no big surprise.

But over the following week, three local people also came down with the disease for no obvious reason, leading to one of Singapore's first and most baffling coronavirus cases. Working out what had happened would lead to a new and disturbing insight into how the virus was so successfully finding new victims.

Mobilising 'disease detectives'

"We were extremely perplexed," says Dr Vernon Lee, head of communicable diseases at Singapore's Ministry of Health. "People who didn't know one another somehow infected each other," while showing no sign of illness. This new batch of cases simply did not make sense, according to what was known about Covid-19 back then.

So Dr Lee and his fellow scientists, along with police officers and specialist disease trackers, launched an investigation, generating detailed maps showing who was where and when. This involved the very best of the process known as contact tracing - a version of which is getting under way now in the UK. It's seen as a vital system for tracking down everyone involved in an outbreak and helping to stamp it out, and Singapore is renowned for the skill and speed with which this is carried out.

Image copyright Getty Images Image caption Early in the pandemic, Singapore was seen as a shining example of how to tackle the virus

Amazingly, within a few days, investigators had spoken to no fewer than 191 members of the church and had found out that 142 of them had been there that Sunday. They quickly established that two of the Singaporeans who became infected had been at the same service as the Chinese couple.

"They could have spoken to each other, greeted each other, during the usual activities of a church service," says Dr Lee.

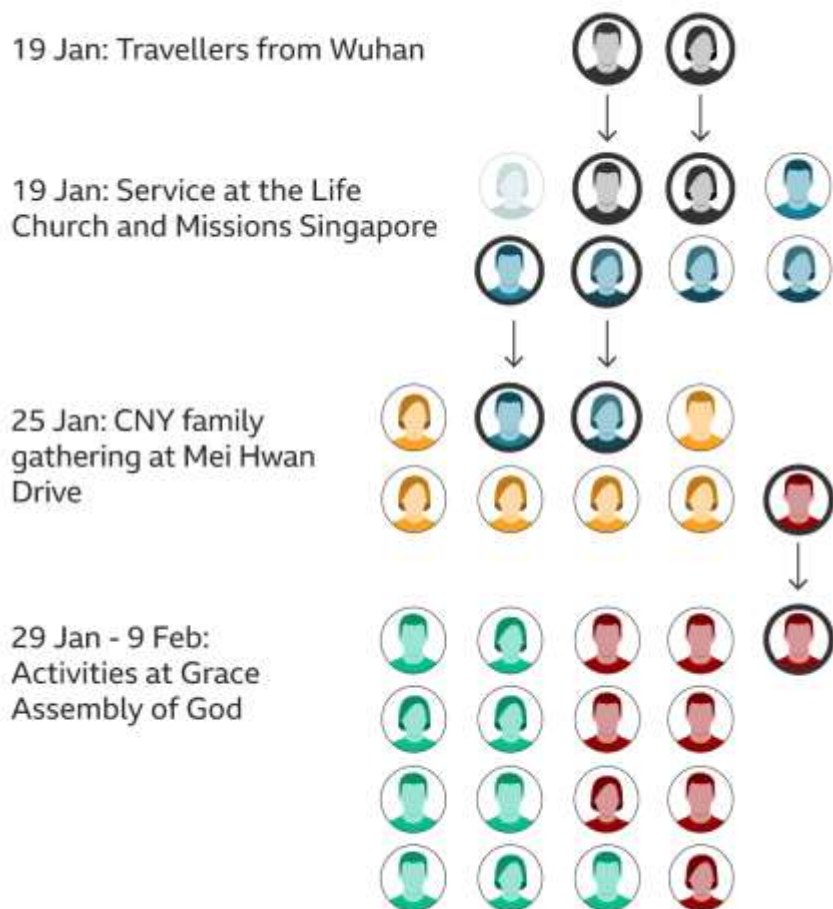
That was a useful start and would explain in theory how the infection could have been passed on, apart from one key factor. It did not answer the crucial question of how the virus could have been transmitted by the two Chinese people when at that stage they had shown no indication of having the disease.

And on top of that was an even greater puzzle. It was confirmed that the third Singaporean to become infected, a 52-year-old woman, had not been at the same service as the others. Instead she had attended another event in the same church later that day, so how could she have picked up the virus?

Evidence no-one expected

Investigators resorted to going through the CCTV recordings made at the church that Sunday to search for clues. And they stumbled across something completely unexpected - the woman who'd attended the later service, after the Chinese couple had left, had sat in the seats they had used several hours earlier.

Links between church virus cases and Wuhan travellers



Note: As of 25 February

Source: Singapore Ministry of Health

BBC

Somehow, despite having no symptoms and not feeling ill, the Chinese husband and wife had managed to spread the virus. Maybe they'd had it on their hands and touched the seats, maybe their breath carried the infection and it landed on a surface, it's not clear, but the implications were huge.

For Dr Lee, piecing everything together, there was only one possible explanation - that the virus was being passed by people who had it without even realising. This was a revelation that would be relevant the world over because the central message of all public health advice on coronavirus has always been to look out for symptoms in yourself and others.

But if the virus was also being spread by people without symptoms, silently and invisibly, how could the disease be stopped? He remembers the moment, while working in his office, when the reality dawned on him. "Every time you make a scientific discovery, it is like a 'eureka' moment when you realise that this is something important that you've uncovered, through the hard work of many individuals and teams."

[Spread before symptoms show](#)

What was revealed was what's known as "pre-symptomatic transmission" where someone is unaware of being infected because the cough, fever and other classic symptoms have yet to begin.

Image copyright Getty Images Image caption Singapore saw a rise in cases after appearing to have the virus under control

Along with many others, this study highlighted a critical period of 24-to-48 hours before the visible onset of the disease in which people can be highly infectious, perhaps even their most infectious.

Being aware of that is potentially invaluable, because as soon as you realise you're ill then everyone you've been in close contact with can be warned to stay at home.

That would mean that they would be isolating during the key phase of infection before their own symptoms start. But exactly how the disease can be transmitted without a cough to project droplets containing the virus is still open to debate.

One option is that simply breathing or talking to someone can do the job. If the virus is reproducing in the upper respiratory tract at that time then it's possible that some of it will emerge with each exhalation. Anyone close enough, especially indoors, could easily pick it up.

And another potential form of transmission is by touch - the virus gets onto someone's hands and they touch another person or a door handle - or a seat in a church. Whatever the route, the virus is clearly exploiting the fact that people are bound to be less vigilant if they're not aware that they might be infected.

Some people never show symptoms

This is an even more mysterious scenario, and one that scientists simply have no definitive answer to. It's one thing to know that people can be infectious before their symptoms show, quite another when they become infected but never have any sign of it.

This is what's known as being "asymptomatic" because you are a carrier of the disease but do not suffer in any way yourself. The most famous case is that of an Irish woman who was working as a cook in New York at the beginning of the last century.

Image copyright Getty Images

Wherever Mary Mallon was employed, in house after house, people became ill with typhoid and at least three, maybe many more, died of it, but she was completely unaffected. Eventually a connection was established and it was confirmed that she was the unwitting spreader of the disease.

Reporters dubbed her "Typhoid Mary", a label she always resented, but the authorities took no chances and kept her in confinement for 23 years until her death in 1938.

Assumptions undermined

Staff nurse Amelia Powell was shocked when she found out that she is asymptomatic. She was at work on her hospital ward at Addenbrooke's Hospital in Cambridge in April when a doctor rang to give her the result of a swab test.

She had been feeling normal and safe behind the personal protective equipment she had to wear while caring for patients with Covid-19. But suddenly all those assumptions were undermined because, to her horror, she had tested positive.

"It was a bit like hearing that someone in the family had passed, it was surreal. "I thought, 'This can't be right, not me, I'm absolutely fine,'" says 23-year-old Amelia.

She had to leave her post straightaway to go into isolation at home.

- A SIMPLE GUIDE: [What are the symptoms?](#)
- RISK AT WORK: [How exposed is your job?](#)
- HOW A VIRUS SPREADS: [An explanation](#)
- RECOVERY: [How long does it take to get better?](#)

<https://www.bbc.com/news/uk-52840763>

In the W.H.O.'s Coronavirus Stumbles, Some Scientists See a Pattern

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[42m •](#)

[#COVID19](#) [#SARSCoV2](#) [#OnTheRebound](#) [#SymptomlessTransmission](#) [#CavalierHealthAgenGovts](#)?! “The W.H.O. has been out of step with most of the world on the issue of droplets & aerosols,” said Michael Osterholm, an infect. dis. exp. at the Univ. of Minnesota.

...scientific disagreements have wide policy implic. Many countries, including the U.S., adopted lockdown strategies because they recognized that isolating only people who were sick might not be enough to contain the epidemic..virus is trans. by small airborne droplets, people will need to conti. to avoid congreg. in poorly vent. spaces, even if they pract. rigorous hand hygiene.

The W.H.O. trad. has taken a cautious app. to eval. scient. evid. But the pace of res. has chang.: Now scient. are rushing to pub. prelim. res., even before their results can be thorly vetted by other experts.

The avalanche of findings may bring advances — like a vaccine — in record time. But the onslaught also has led to confusion, even retractions of high-profile results.

“On the one hand, I do want to cut the W.H.O. some slack, because it is hard to do this in an evolving pandemic,” said Dr. Ashish Jha, director of the Harvard Global Health Institute. “At the same time, we do rely on the W.H.O. to give us the best scientific data and evidence.”

[In the W.H.O.'s Coronavirus Stumbles, Some Scientists See a Pattern](#)

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[Europe](#)|

How the World Missed Covid-19's Silent Spread

 [The Coronavirus Outbreak](#)

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Dr. Camilla Rothe's team was among the first to warn about asymptomatic transmission. Credit...Laetitia Vancon for The New York Times

Behind the Curve

How the World Missed Covid-19's Silent Spread

Dr. Camilla Rothe's team was among the first to warn about asymptomatic transmission. Credit...Laetitia Vancon for The New York Times

Symptomless transmission makes the coronavirus far harder to fight. But health officials dismissed the risk for months, pushing misleading and contradictory claims in the face of mounting evidence.

By Matt Apuzzo, Selam Gebrekidan and David D. Kirkpatrick

June 27, 2020

MUNICH — Dr. Camilla Rothe was about to leave for dinner when the government laboratory called with the surprising test result. Positive. It was Jan. 27. She had just discovered Germany's first case of the new coronavirus.

But the diagnosis made no sense. Her patient, a businessman from a nearby auto parts company, could have been infected by only one person: a colleague visiting from China. And that colleague should not have been contagious.

The visitor had seemed perfectly healthy during her stay in Germany. No coughing or sneezing, no signs of fatigue or fever during two days of long meetings. She told colleagues that she had started feeling ill after the flight back to China. Days later, she tested positive for the coronavirus.

Scientists at the time believed that only people with symptoms could spread the coronavirus. They assumed it acted like its genetic cousin, SARS.

Advertisement

[Continue reading the main story](#)

"People who know much more about coronaviruses than I do were absolutely sure," recalled Dr. Rothe, an infectious disease specialist at Munich University Hospital.

But if the experts were wrong, if the virus could spread from seemingly healthy carriers or people who had not yet developed symptoms, the ramifications were potentially catastrophic. Public-awareness campaigns, airport screening and stay-home-if-you're sick policies might not stop it. More aggressive measures might be required — ordering healthy people to wear masks, for instance, or restricting international travel.

Dr. Rothe and her colleagues were among the first to warn the world. But even as evidence accumulated from other scientists, leading health officials expressed unwavering confidence that symptomless spreading was not important.

In the days and weeks to come, politicians, public health officials and rival academics disparaged or ignored the Munich team. Some actively worked to undermine the warnings at a crucial moment, as the disease was spreading unnoticed in [French churches](#), Italian soccer stadiums and Austrian ski bars. A cruise ship, the Diamond Princess, would become a deadly harbinger of symptomless spreading.



Image

London's Columbia Road flower market was packed as usual in March.Credit...Andrew Testa for The New York Times

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Image



Officers in protective gear boarded the the Diamond Princess in February to move a person with the coronavirus to a hospital.Credit...Kim Kyung-Hoon/Reuters

Interviews with doctors and public health officials in more than a dozen countries show that for two crucial months — and in the face of mounting genetic evidence — Western health officials and political leaders played down or denied the risk of symptomless spreading. Leading health agencies including the World Health Organization and the European Center for Disease Prevention and Control provided contradictory and sometimes misleading advice. A crucial public health discussion devolved into a semantic debate over what to call infected people without clear symptoms.

Behind The Curve: The Silent Spread of Covid-19

This series of articles examines the missteps, misunderstandings and missed warning signals that allowed Covid-19 to spread around the world.

The two-month delay was a product of faulty scientific assumptions, academic rivalries and, perhaps most important, a reluctance to accept that containing the virus would take drastic measures. The resistance to emerging evidence was one part of the world's sluggish response to the virus.

It is impossible to calculate the human toll of that delay, but models suggest that earlier, aggressive action might have saved tens of thousands of lives. Countries like Singapore and Australia, which used testing and contact-tracing and moved swiftly to quarantine seemingly healthy travelers, fared far better than those that did not.

Image



Enjoying a sunny day at the Louvre in Paris in mid-March.Credit...Dmitry Kostyukov for The New York Times

Image



Patients awaiting test results in March at a hospital in Brescia, Italy, one of the first parts of Europe to be hit hard by the coronavirus.Credit...Alessandro Grassani for The New York Times

It is now widely accepted that seemingly healthy people can spread the virus, though uncertainty remains over how much they have contributed to the pandemic. Though estimates vary, models using data from [Hong Kong, Singapore and China](#) suggest that 30 to 60 percent of spreading occurs when people have no symptoms.

"This was, I think, a very simple truth," Dr. Rothe said. "I was surprised that it would cause such a storm. I can't explain it."

Even now, with more than 9 million cases around the world, and [a death toll approaching 500,000](#), Covid-19 remains an unsolved riddle. It is too soon to know whether the worst has passed, or if a second global wave of infections is about to crash down. But it is clear that an array of countries, from secretive regimes to overconfident democracies, have fumbled their response, misjudged the virus and ignored their own emergency plans.

It is also painfully clear that time was a critical commodity in curbing the virus — and that too much of it was wasted.

[‘She Was Not Ill’](#)

On the night of Germany’s first positive test, the virus had seemed far away. Fewer than 100 fatalities had been reported worldwide. Italy, which would become Europe’s ground zero, would not record its first cases for another three days.

A few reports out of China had already suggested the possibility of symptomless spreading. But nobody had proved it could happen.

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That night, Dr. Rothe tapped out an email to a few dozen doctors and public health officials.

“Infections can actually be transmitted during the incubation period,” she wrote.

Three more employees from the auto parts company, Webasto, tested positive the following day. Their symptoms were so mild that, normally, it’s likely that none would have been flagged for testing, or have thought to stay at home.

Dr. Rothe decided she had to sound the alarm. Her boss, Dr. Michael Hoelscher, dashed off an email to The New England Journal of Medicine. “We believe that this observation is of utmost importance,” he wrote.

Editors responded immediately. How soon could they see the paper?

Dr. Michael Hoelscher in his office during an interview with a local TV station.Credit...Laetitia Vancon for The New York Times

Image



Dr. Rothe swabbing a volunteer during a Covid-19 study in a nursing home in Munich this month.Credit...Laetitia Vancon for The New York Times

The next morning, Jan. 30, public health officials interviewed the Chinese businesswoman by phone. Hospitalized in Shanghai, she explained that she’d started feeling sick on the flight home. Looking back, maybe she’d had some mild aches or fatigue, but she had chalked them up to a long day of travel.

“From her perspective, she was not ill,” said Nadine Schian, a Webasto spokeswoman who was on the call. “She said, ‘OK, I felt tired. But I’ve been in Germany a lot of times before and I always have jet lag.’”

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When the health officials described the call, Dr. Rothe and Dr. Hoelscher quickly finished and submitted their article. Dr. Rothe did not talk to the patient herself but said she relied on the health authority summary.

Within hours, [it was online](#). It was a modest clinical observation at a key time. Just days earlier, the World Health Organization had said it needed more information about this very topic.

What the authors did not know, however, was that in a suburb 20 minutes away, another group of doctors had also been rushing to publish a report. Neither knew what the other was working on, a seemingly small academic rift that would have global implications.

[Academic Hairsplitting](#)

The second group was made up of officials with the Bavarian health authority and Germany's national health agency, known as the Robert Koch Institute. Inside a suburban office, doctors unfurled mural paper and traced infection routes using colored pens.

Their team, led by the Bavarian epidemiologist Dr. Merle Böhmer, submitted an article to *The Lancet*, another premier medical journal. But the Munich hospital group had scooped them by three hours. Dr. Böhmer said her team's article, which went unpublished as a result, had reached similar conclusions but worded them slightly differently.

Dr. Rothe had written that patients appeared to be contagious before the onset of *any* symptoms. The government team had written that patients appeared to be contagious before the onset of *full* symptoms — at a time when symptoms were so mild that people might not even recognize them.

The Chinese woman, for example, had woken up in the middle of the night feeling jet-lagged. Wanting to be sharp for her meetings, she took a Chinese medicine called 999 — containing the equivalent of a Tylenol tablet — and went back to bed.

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Perhaps that had masked a mild fever? Perhaps her jet lag was actually fatigue? She had reached for a shawl during a meeting. Maybe that was a sign of chills?

Dr. Merle Böhmer and her team wrote that patients appeared to be contagious before showing full symptoms, not before showing any symptoms. Credit...Laetitia Vancon for The New York Times

Dr. Hoelscher said he refused to change the wording of Dr. Rothe's report and to replace her name with those of members of the government task force. Credit...Laetitia Vancon for The New York Times

After two lengthy phone calls with the woman, doctors at the Robert Koch Institute were convinced that she had simply failed to recognize her symptoms. They wrote to the editor of *The New England Journal of Medicine*, casting doubt on Dr. Rothe's findings.

Editors there decided that the dispute amounted to hairsplitting. If it took a lengthy interview to identify symptoms, how could anyone be expected to do it in the real world?

"The question was whether she had something consistent with Covid-19 or that anyone would have recognized at the time was Covid-19," said Dr. Eric Rubin, the journal's editor.

"The answer seemed to be no."

The journal did not publish the letter. But that would not be the end of it.

That weekend, Andreas Zapf, the head of the Bavarian health authority, called Dr. Hoelscher of the Munich clinic. "Look, the people in Berlin are very angry about your publication," Dr. Zapf said, according to Dr. Hoelscher.

He suggested changing the wording of Dr. Rothe's report and replacing her name with those of members of the government task force, Dr. Hoelscher said. He refused.

The health agency would not discuss the phone call.

Until then, Dr. Hoelscher said, their report had seemed straightforward. Now it was clear: “Politically, this was a major, major issue.”

‘A Complete Tsunami’

On Monday, Feb. 3, the journal Science published [an article calling Dr. Rothe’s report “flawed.”](#) Science reported that the Robert Koch Institute had written to the New England Journal to dispute her findings and correct an error.

The Robert Koch Institute declined repeated interview requests over several weeks and did not answer written questions.

Dr. Rothe’s report quickly became a symbol of rushed research. Scientists said she should have talked to the Chinese patient herself before publishing, and that the omission had undermined her team’s work. On Twitter, she and her colleagues were disparaged by scientists and armchair experts alike.

“It broke over us like a complete tsunami,” Dr. Hoelscher said.

The controversy also overshadowed another crucial development out of Munich.

The next morning, Dr. Clemens-Martin Wendtner [made a startling announcement.](#) Dr. Wendtner was overseeing treatment of Munich’s Covid-19 patients — there were eight now — and had taken swabs from each.

He discovered the virus in the nose and throat at much higher levels, and far earlier, than had been observed in SARS patients. That meant it probably could spread before people knew they were sick.

Image



Dr. Clemens-Martin Wendtner’s work also suggested the risk that patients could spread the virus before they realized they had it. Credit...Laetitia Vancon for The New York Times

But the Science story drowned that news out. If Dr. Rothe’s paper had implied that governments might need to do more against Covid-19, the pushback from the Robert Koch Institute was an implicit defense of the conventional thinking.

Sweden’s public health agency declared that Dr. Rothe’s report had contained major errors. The agency’s website said, unequivocally, that “there is no evidence that people are infectious during the incubation period” — an assertion that would remain online in some form for months.

French health officials, too, left no room for debate: “A person is contagious only when symptoms appear,” [a government flyer read.](#) “No symptoms = no risk of being contagious.”

As Dr. Rothe and Dr. Hoelscher reeled from the criticism, Japanese doctors were preparing to board the Diamond Princess cruise ship. A former passenger had tested positive for coronavirus.

Yet on the ship, parties continued. The infected passenger had been off the ship for days, after all. And he hadn’t reported symptoms while onboard.

A Semantic Debate

Immediately after Dr. Rothe's report, the World Health Organization had noted that patients might transmit the virus before showing symptoms. But the organization also underscored a point that it continues to make: Patients with symptoms are the main drivers of the epidemic.

Once the Science article was published, however, the organization waded directly into the debate on Dr. Rothe's work. On Tuesday, Feb. 4, Dr. Sylvie Briand, the agency's chief of infectious disease preparedness, tweeted a link to the Science article, calling Dr. Rothe's report flawed.

With that tweet, the W.H.O. focused on a semantic distinction that would cloud discussion for months: Was the patient asymptomatic, meaning she would never show symptoms? Or pre-symptomatic, meaning she became sick later? Or, even more confusing, oligo-symptomatic, meaning that she had symptoms so mild that she didn't recognize them?

To some doctors, the focus on these arcane distinctions felt like whistling in the graveyard. A person who feels healthy has no way to know that she is carrying a virus or is about to become sick. Airport temperature checks will not catch these people. Neither will asking them about their symptoms or telling them to stay home when they feel ill.

The W.H.O. later said that the tweet had not been intended as a criticism.

One group paid little attention to this brewing debate: the Munich-area doctors working to contain the cluster at the auto parts company. They spoke daily with potentially sick people, monitoring their symptoms and tracking their contacts.

Image



Dr. Rothe and her team preparing for the day.Credit...Laetitia Vancon for The New York Times

Image



Dr. Hoelscher said The New England Journal of Medicine paper had become a "major, major" political issue for him.Credit...Laetitia Vancon for The New York Times

"For us, it was pretty soon clear that this disease can be transmitted before symptoms," said Dr. Monika Wirth, who tracked contacts in the nearby county of Fürstentfeldbruck.

Dr. Rothe, though, was shaken. She could not understand why much of the scientific establishment seemed eager to play down the risk.

"All you need is a pair of eyes," she said. "You don't need rocket-science virology."

But she remained confident.

"We will be proven right," she told Dr. Hoelscher.

That night, Dr. Rothe received an email from Dr. Michael Libman, an infectious-disease specialist in Montreal. He thought that criticism of the paper amounted to semantics. Her paper had convinced him of something: "The disease will most likely eventually spread around the world."

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Political Paralysis

On Feb. 4, Britain's emergency scientific committee met and, while its experts did not rule out the possibility of symptomless transmission, nobody put much stock in Dr. Rothe's paper.

"It was very much a hearsay study," said Wendy Barclay, a virologist and member of the committee, known as the Scientific Advisory Group for Emergencies. "In the absence of real robust epidemiology and tracing, it isn't obvious until you see the data."

The data would soon arrive, and from an unexpected source. Dr. Böhmer, from the Bavarian health team, received a startling phone call in the second week of February.

Virologists had discovered a subtle genetic mutation in the infections of two patients from the Munich cluster. They had crossed paths for the briefest of moments, one passing a saltshaker to the other in the company cafeteria, when neither had symptoms. Their shared mutation made it clear that one had infected the other.

Dr. Böhmer had been skeptical of symptomless spreading. But now, there was no doubt: "It can only be explained with pre-symptomatic transmission," Dr. Böhmer said.

Now it was Dr. Böhmer who sounded the alarm. She said she promptly shared the finding, and its significance, with the W.H.O. and the European Center for Disease Prevention and Control.

Neither organization included the discovery in its regular reports.

A week after receiving Dr. Böhmer's information, European health officials were still declaring: "We are still unsure whether mild or asymptomatic cases can transmit the virus." There was no mention of the genetic evidence.

Dr. Böhmer had been skeptical of symptomless spreading, but her research ultimately provided genetic proof that it was happening. Credit...Laetitia Vancon for The New York Times

Image



“This was a misleading statement by the W.H.O.,” Dr. Wendtner said of remarks in February by the agency’s technical lead about symptomless spreading. Credit...Laetitia Vancon for The New York Times

W.H.O. officials say the genetic discovery informed their thinking, but they made no announcement of it. European health officials say the German information was one early piece of an emerging picture that they were still piecing together.

[The Coronavirus Outbreak](#)

<https://www.nytimes.com/2020/05/02/us/politics/vaccines-coronavirus-research.html>

The doctors in Munich were increasingly frustrated and confused by the World Health Organization. First, the group wrongly credited the Chinese government with alerting the German authorities to the first infection. Government officials and doctors say the auto parts company itself sounded the alarm.

Then, the World Health Organization’s emergency director, Dr. Michael Ryan, said on Feb. 27 that the significance of symptomless spreading was becoming a myth. And Dr. Maria Van Kerkhove, the organization’s technical lead on coronavirus response, suggested it was nothing to worry about.

“It’s rare but possible,” she [said](#). “It’s very rare.”

The agency still maintains that people who cough or sneeze are more contagious than people who don’t. But there is no scientific consensus on how significant this difference is or how it affects the spread of virus.

And so, with evidence mounting, the Munich team could not understand how the W.H.O. could be so sure that symptomless spreading was insignificant.

“At this point, for us it was clear,” said Dr. Wendtner, the senior doctor overseeing treatment of the Covid-19 patients. “This was a misleading statement by the W.H.O.”

[‘If This Is True, We’re in Trouble’](#)

The Munich cluster was not the only warning.

The Chinese health authorities had explicitly cautioned that patients were contagious before showing symptoms. A Japanese bus driver was infected while transporting seemingly healthy tourists from Wuhan.

And by the middle of February, 355 people aboard the Diamond Princess cruise ship had tested positive. About a third of the infected passengers and staff had no symptoms.

But public health officials saw danger in promoting the risk of silent spreaders. If quarantining sick people and tracing their contacts could not reliably contain the disease, governments might abandon those efforts altogether.

In Sweden and Britain, for example, discussion swirled about enduring the epidemic until the population obtained “herd immunity.” Public health officials worried that might lead to overwhelmed hospitals and needless deaths.

Image



Diners enjoying a night out in Stockholm in April.Credit...Andres Kudacki for The New York Times

Image



A crowded train in São Paulo, Brazil, last month.Credit...Victor Moriyama for The New York Times

Plus, preventing silent spreading required aggressive, widespread testing that was then impossible for most countries.

“It’s not like we had some easy alternative,” said Dr. Libman, the Canadian doctor. “The message was basically: ‘If this is true, we’re in trouble.’”

European health officials say they were reluctant to acknowledge silent spreading because the evidence was trickling in and the consequences of a false alarm would have been severe. “These reports are seen everywhere, all over the world,” said Dr. Josep Jansa, a senior European Union health official. “Whatever we put out, there’s no way back.”

Looking back, health officials should have said that, yes, symptomless spreading was happening and they did not understand how prevalent it was, said Dr. Agoritsa Baka, a senior European Union doctor.

But doing that, she said, would have amounted to an implicit warning to countries: What you’re doing might not be enough.

‘Stop Buying Masks!’

While public health officials hesitated, some doctors acted. At a conference in Seattle in mid-February, Jeffrey Shaman, a Columbia University professor, said [his research suggested](#) that Covid-19’s rapid spread could only be explained if there were infectious patients with unremarkable symptoms or no symptoms at all.

In the audience that day was Steven Chu, the Nobel-winning physicist and former U.S. energy secretary. “If left to its own devices, this disease will spread through the whole population,” he remembers Professor Shaman warning.

Afterward, Dr. Chu began insisting that healthy colleagues at his Stanford University laboratory wear masks. Doctors in Cambridge, England, concluded that asymptomatic transmission was a big source of infection and advised local health workers and patients to wear masks, well before the British government acknowledged the risk of silent spreaders.

The American authorities, faced with a shortage, actively discouraged the public from buying masks. “Seriously people — STOP BUYING MASKS!” Surgeon General Jerome M. Adams tweeted on Feb. 29.

By early March, while the World Health Organization continued pressing the case that symptom-free transmission was rare, science was breaking in the other direction.

Shoppers wearing masks lined up outside a Costco in Livermore, Calif. Credit...Max Whittaker for The New York Times

Producing cloth masks in Bangkok. Credit...Adam Dean for The New York Times

Researchers in Hong Kong [estimated that](#) 44 percent of Covid-19 transmission occurred before symptoms began, an estimate that was in line with [a British study](#) that put that number as high as 50 percent.

The Hong Kong study [concluded](#) that people became infectious about two days before their illness emerged, with a peak on their first day of symptoms. By the time patients felt the first headache or scratch in the throat, they might have been spreading the disease for days.

In Belgium, doctors saw that math in action, as Covid-19 tore through nursing homes, killing nearly 5,000 people.

“We thought that by monitoring symptoms and asking sick people to stay at home, we would be able to manage the spread,” said Steven Van Gucht, the head of Belgium’s Covid-19 scientific committee. “It came in through people with hardly any symptoms.”

More than 700 people aboard the Diamond Princess were sickened. Fourteen died. Researchers [estimate](#) that most of the infection occurred early on, while seemingly healthy passengers socialized and partied.

Government scientists in Britain [concluded](#) in late April that 5 to 6 percent of symptomless health care workers were infected and might have been spreading the virus.

In Munich, Dr. Hoelscher has asked himself many times whether things would have been different if world leaders had taken the issue seriously earlier. He compared their response to a rabbit stumbling upon a poisonous snake.

“We were watching that snake and were somehow paralyzed,” he said.

[Acceptance. Or Not.](#)

As the research coalesced in March, European health officials were convinced.

“OK, this is really a big issue,” Dr. Baka recalled thinking. “It plays a big role in the transmission.”

By the end of the month, the U.S. Centers for Disease Control announced it was rethinking its policy on masks. It concluded that up to [25 percent](#) of patients might have no symptoms.

Since then, the C.D.C., governments around the world and, finally, the World Health Organization have recommended that people wear masks in public.

Still, the W.H.O. is sending confusing signals. Earlier this month, Dr. Van Kerkhove, the technical lead, repeated that transmission from asymptomatic patients was “very rare.” After an outcry from doctors, the agency said there had been a misunderstanding.

“In all honesty, we don’t have a clear picture on this yet,” Dr. Van Kerkhove said. She said she had been referring to a few studies showing limited transmission from asymptomatic patients.

Image



Dr. Droste at home.Credit...Laetitia Vancon for The New York Times

Image



Dr. Böhmer published a study in The Lancet last month that found “substantial” transmission from people with no symptoms or exceptionally mild, nonspecific symptoms.Credit...Laetitia Vancon for The New York Times

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Recent internet ads confused the matter even more. A Google search in mid-June for studies on asymptomatic transmission returned a W.H.O. advertisement titled: “People With No Symptoms — Rarely Spread Coronavirus.”

Clicking on the link, however, offered a much more nuanced picture: “Some reports have indicated that people with no symptoms can transmit the virus. It is not yet known how often it happens.”

After The Times asked about those discrepancies, the organization removed the advertisements.

Back in Munich, there is little doubt left. Dr. Böhmer, the Bavarian government doctor, published [a study in The Lancet](#) last month that relied on extensive interviews and genetic information to methodically track every case in the cluster.

In the months after Dr. Droste swabbed her first patient, 16 infected people were identified and caught early. All survived. Aggressive testing and flawless contact-tracing contained the spread.

Dr. Böhmer’s study found “substantial” transmission from people with no symptoms or exceptionally mild, nonspecific symptoms.

Dr. Droste and her colleagues got a footnote.

Mysteries and Missteps in the Fight Against the Coronavirus

[In the W.H.O.'s Coronavirus Stumbles, Some Scientists See a Pattern](#)

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[After 6 Months, Important Mysteries About Coronavirus Endure](#)

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Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has spread rapidly throughout the world since the first cases of coronavirus disease 2019 (COVID-19) were observed in December 2019 in Wuhan, China. It has been suspected that infected persons who remain asymptomatic play a significant role in the ongoing pandemic, but their relative number and effect have been uncertain. The authors sought to review and synthesize the available evidence on asymptomatic SARS-CoV-2 infection. Asymptomatic persons seem to account for approximately 40% to 45% of SARS-CoV-2 infections, and they can transmit the virus to others for an extended period, perhaps longer than 14 days. Asymptomatic infection may be associated with subclinical lung abnormalities, as detected by computed tomography. Because of the high risk for silent spread by asymptomatic persons, it is imperative that testing programs include those without symptoms. To supplement conventional diagnostic testing, which is constrained by capacity, cost, and its one-off nature, innovative tactics for public health surveillance, such as crowdsourcing digital wearable data and monitoring sewage sludge, might be helpful.

Key Summary Points

The likelihood that approximately 40% to 45% of those infected with SARS-CoV-2 will remain asymptomatic suggests that the virus might have greater potential than previously estimated to spread silently and deeply through human populations.

Asymptomatic persons can transmit SARS-CoV-2 to others for an extended period, perhaps longer than 14 days.

The absence of COVID-19 symptoms in persons infected with SARS-CoV-2 might not necessarily imply an absence of harm. More research is needed to determine the significance of subclinical lung changes visible on computed tomography scans.

The focus of testing programs for SARS-CoV-2 should be substantially broadened to include persons who do not have symptoms of COVID-19.

In the early months of the coronavirus disease 2019 (COVID-19) pandemic, an iconic image has been the “proned” patient in intensive care, gasping for breath, in imminent need of artificial ventilation. This is the deadly face of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which as of 26 May 2020 had

claimed more than 348 000 lives worldwide (1). But it is not the only face, because SARS-CoV-2 now seems to have a dual nature: tragically lethal in some persons and surprisingly benign in others.

Since February 2020 (2, 3), there have been reports of persons who were infected with SARS-CoV-2 but did not develop symptoms of COVID-19. In some cases (4, 5), the viral load of such asymptomatic persons has been equal to that of symptomatic persons, suggesting similar potential for viral transmission. The prevalence of asymptomatic SARS-CoV-2 infection, however, has remained uncertain. We sought to review and synthesize the available evidence on testing for SARS-CoV-2 infection, carried out by real-time reverse transcriptase polymerase chain reaction using nasopharyngeal swabs in all studies that specified the method of testing.

Most data from the 16 cohorts in this narrative review are not the output of large, carefully designed studies with randomly selected, representative samples. They do not generally purport to depict anything more than certain circumscribed cohorts at specific moments in time. We have not attempted to pool them for the purposes of statistical analysis. When viewed as a collection, though—as a kind of mosaic or patchwork—these data may offer potentially valuable insights into SARS-CoV-2 incidence and the highly variable effect of infection.

The difficulty of distinguishing asymptomatic persons from those who are merely presymptomatic is a stumbling block. To be clear, the asymptomatic individual is infected with SARS-CoV-2 but will never develop symptoms of COVID-19. In contrast, the presymptomatic individual is similarly infected but eventually will develop symptoms. The simple solution to this conundrum is longitudinal testing—that is, repeated observations of the individual over time. Unfortunately, only 5 of our cohorts include longitudinal data. We must therefore acknowledge the possibility that some of the proportions of asymptomatic persons are lower than reported.

Methods

From 19 April through 26 May 2020, using the keywords *COVID-19*, *SARS-CoV-2*, *symptoms*, and *asymptomatic*, we periodically searched the published medical literature using the PubMed service maintained by the U.S. National Library of Medicine of the National Institutes of Health. We also searched for unpublished manuscripts using the bioRxiv and medRxiv services operated by Cold Spring Harbor Laboratory. In addition, we searched for news reports using Google and monitored relevant information shared on Twitter.

Cohorts

Iceland

In the largest cohort in our set (6), researchers in Iceland used the following 2 methods to screen the general population for SARS-CoV-2 infection: an open invitation for interested parties to register online then provide biosamples at a Reykjavik location, and a text message sent to “randomly chosen Icelanders between the ages 20 and 70 years” inviting them to participate in the same manner as the first group (Table) <(7–19)>. In all, 13 080 persons volunteered for the screening, 100 (0.8%) of whom tested positive for SARS-CoV-2. All who tested positive were aged 10 years or older. None of the 848 children younger than 10 years in the sample tested positive. Among those with positive results, 43 (43%) had no symptoms of COVID-19 at the time of testing. As the researchers note, though, “symptoms almost certainly developed later in some of them” (6).

Table. Summary of SARS-CoV-2 Testing Studies

Table. Summary of SARS-CoV-2 Testing Studies

Cohort	Tested, n	SARS-CoV-2 Positive, n (%)	Positive but Asymptomatic, n (%)	Notes*
Iceland residents (6)	13 080	100 (0.8)	43 (43.0)	R
Vo', Italy, residents (7)	5155	102 (2.0)	43 (42.2)	R, L
Diamond Princess cruise ship passengers and crew (8)	3211	712 (19.2)	331 (46.5)	—
Boston homeless shelter occupants (9)	408	147 (36.0)	129 (87.8)	—
New York City obstetric patients (11)	214	33 (15.4)	29 (87.9)	L
U.S.S. Theodore Roosevelt aircraft carrier crew (12)	4954	856 (17.3)	~500 (58.4)	E
Japanese citizens evacuated from Wuhan, China (2)	565	13 (2.3)	4 (30.8)	L
Greek citizens evacuated from the United Kingdom, Spain, and Turkey (14)†	783	40 (5.1)	35 (87.5)	L
Charles de Gaulle aircraft carrier crew (13)	1760	1046 (59.4)	~500 (47.8)	E
Los Angeles homeless shelter occupants (10)	178	43 (24.2)	27 (62.8)	—
King County, Washington, nursing facility residents (15)	76	48 (63.2)	3 (6.3)	L
Arkansas, North Carolina, Ohio, and Virginia inmates (16)	4693	3277 (69.8)	3146 (96.0)	—
New Jersey university and hospital employees (17)	829	41 (4.9)	27 (65.9)	—
Indiana residents (18)	4611	78 (1.7)	35 (44.8)	R
Argentine cruise ship passengers and crew (19)	217	128 (59.0)	104 (81.3)	—
San Francisco residents (29)	4160	74 (1.8)	39 (52.7)	—

E = estimated from incomplete source data; L = longitudinal data collected; R = representative sample.

* A dash indicates that the study did not have a representative sample, collected no longitudinal data, and did not require estimation of missing data.

† Clarified via e-mail communication with coauthor.

Vo', Italy

At the beginning and end of a 14-day lockdown imposed by authorities in the northern Italian town of Vo' (7), researchers collected nasopharyngeal swabs from 2812 residents during the first sampling effort and 2343 during the second; this represented 85.9% and 71.5%, respectively, of the entire population. In the first group, 30 (41.1%) of 73 persons who tested positive for SARS-CoV-2 had no symptoms. In the second, 13 (44.8%) of 29 who tested positive were asymptomatic. According to the researchers, in the roughly 2-week period between the sampling efforts, none of the asymptomatic persons developed any symptoms of COVID-19. In addition, through contact tracing, they confirmed that several new cases of SARS-CoV-2 infection that appeared during the second sampling had been caused by exposure to asymptomatic persons. In Vo' during the 14-day period studied, young children seemed to play no role in the transmission of SARS-CoV-2: "No infections were detected in either survey in 234 tested children ranging from 0 to 10 years, despite some of them living in the same household as infected people" (7).

Diamond Princess

On 3 February 2020, the *Diamond Princess* cruise ship returned to Yokohama, Japan, for quarantine (8), having transferred an ill passenger to shore in Hong Kong on 25 January who later tested positive for SARS-CoV-2. As of 16 March, 712 (19.2%) of 3711 passengers and crew had tested positive. At the time of testing, 331 (46.5%) of those with positive results were asymptomatic. Although the latter infected persons reported no symptoms, some actually had subclinical changes in their lungs. When computed tomography scans for 76 of these persons were examined, 54% showed lung opacities (20).

An independent statistical modeling analysis (21) based on data available as of 21 February claimed to estimate—with "a Bayesian framework using Hamiltonian Monte Carlo algorithm"—the proportion of asymptomatic persons on the *Diamond Princess*; it arrived at a figure of 17.9%. Considering, though, that data for asymptomatic persons were available only for 15 through 20 February and that the actual proportions of asymptomatic persons among those tested on these dates were 56.7%, 54.3%, 70.7%, 73.9%, 86.1%, and 46.2%, this estimate seems puzzling. In a separate news account (22), one of the coauthors of this analysis was reported to have estimated that "40% of the general population might be able to be infected [with SARS-CoV-2] without showing any signs."

Boston Homeless Shelter

After a cluster of 15 COVID-19 cases was identified over 5 days at a large homeless shelter in Boston, Massachusetts, the infected persons were removed from the shelter, and all occupants were subsequently tested over a 2-day period (9). Among 408 occupants, 147 (36.0%) tested positive for SARS-CoV-2, of whom 129 (87.8%) were asymptomatic (23). The researchers concluded that “front-door symptom screening in homeless shelter settings will likely miss a substantial number of COVID-19 cases in this high-risk population” (9).

Los Angeles Homeless Shelter

On 28 March, an initial case of COVID-19 was diagnosed with a positive test result at a homeless shelter in downtown Los Angeles, California (10). After a cluster of symptomatic persons was identified early in the week of 20 April, the shelter was closed to new occupants and testing was started for current occupants. As of 22 April, 43 (24.2%) of 178 completed tests were positive for SARS-CoV-2 and 27 (63.8%) of the persons who tested positive were asymptomatic.

New York City Obstetric Patients

Between 22 March and 4 April 2020, women who delivered infants at 2 New York City hospitals were tested for SARS-CoV-2 (11). Among 214 patients, 33 (15.4%) tested positive, 29 (87.9%) of whom were asymptomatic. The researchers note that “fever developed in 3 (10%) before postpartum discharge (median length of stay, 2 days)” (11). Two of those patients, though, were presumed to have endomyometritis, for which they were treated with antibiotics.

U.S.S. *Theodore Roosevelt*

The first case of SARS-CoV-2 infection aboard the American aircraft carrier U.S.S. *Theodore Roosevelt* was diagnosed on 22 March 2020 (24). As of 24 April, 4954 crew members had been tested for the virus; 856 (17.3%) tested positive (12). According to a news report, about 60% of those with positive results were asymptomatic (25). After an extended period of isolation, many of these asymptomatic persons continued to test positive for SARS-CoV-2. An internal U.S. Navy document stated, “Results of out-testing portions of the [*Theodore Roosevelt*] crew following 14 days of quarantine leads us to reevaluate our assessment of how the virus can remain active in an asymptomatic host” (26).

***Charles de Gaulle* Aircraft Carrier**

On 8 April 2020, crew members aboard the French naval vessel *Charles de Gaulle* first began showing symptoms of COVID-19, 24 days after last having had contact with those outside the ship while docked on 15 March (27). On 10 April, 50 crew members received positive test results for SARS-CoV-2. The entire crew of 1760 was subsequently tested. As of 18 April, 1046 (59.4%) had tested positive, and of these, nearly 50% were asymptomatic (13).

Japanese Citizens Evacuated From Wuhan, China

As of 6 February 2020, a total of 565 Japanese citizens had been repatriated from Wuhan, China, on charter flights. Thirteen (2.3%) tested positive for SARS-CoV-2, of whom 4 (30.8%) were asymptomatic. As of 6 March, none of the latter persons had developed COVID-19 symptoms (2).

Greek Citizens Evacuated From Spain, Turkey, and the United Kingdom

From 20 through 25 March 2020, a total of 783 Greek citizens were repatriated from Spain, Turkey, and the United Kingdom on 7 flights. Forty (5.1%) tested positive for SARS-CoV-2 ([14](#)). At the time of testing, 39 (97.5%) were asymptomatic. At follow-up about 2 weeks later, 35 (87.5%) had remained asymptomatic (Lytras T. Personal communication.).

Nursing Facility Residents in King County, Washington

On 1 March 2020, a staff member who had worked at a 116-bed skilled-nursing facility in King County, Washington, on 26 and 28 February tested positive for SARS-CoV-2 ([15](#)). On 13 March, 76 (92.6%) of the facility's 82 current residents were tested; 23 (30.3%) tested positive. At the time of testing, 12 (52.2%) of the latter persons were asymptomatic. On 19 and 20 March, 49 residents were retested, including those who had previously received negative results and those who had tested positive but were asymptomatic or had atypical symptoms. In this second round of testing, 24 residents (49.0%) had positive results. Of these, 15 (63.5%) were asymptomatic. After a median of 4 days of follow-up, 24 (88.9%) of the 27 asymptomatic persons developed symptoms of COVID-19.

The researchers note, "More than half of residents with positive test results were asymptomatic at the time of testing and most likely contributed to transmission. Infection-control strategies focused solely on symptomatic residents were not sufficient to prevent transmission after SARS-CoV-2 introduction into this facility" ([15](#)).

Inmates in Arkansas, North Carolina, Ohio, and Virginia

Widespread outbreaks of COVID-19 in the correctional facilities of several states have led to large-scale screening programs. According to research by Reuters journalists ([16](#)), as of 25 April 2020, SARS-CoV-2 test results that include data on symptom status were available for 4693 inmates in the state prison systems of Arkansas, North Carolina, Ohio, and Virginia. Among these inmates, 3277 (69.8%) tested positive, of whom 3146 (96%) had no symptoms at the time of testing.

Rutgers University Students and Employees

From 24 March through 7 April 2020, researchers recruited 829 students and employees at Rutgers University and 2 affiliated hospitals for SARS-CoV-2 testing ([17](#)); 546 were health care workers. In total, 41 (4.9%) tested positive. Among health care workers, 40 (7.3%) tested positive, compared with 1 (0.4%) of those in other fields. Of all who tested positive, 27 (65.9%) reported no symptoms when they were tested.

Indiana Residents

From 25 April through 1 May 2020, the Indiana State Department of Health and the Indiana University Richard M. Fairbanks School of Public Health tested 4611 residents of Indiana for SARS-CoV-2 ([18](#), [28](#)). "This number includes more than 3,600 people who were randomly selected and an additional 900 volunteers recruited through outreach to the African American and Hispanic communities to more accurately represent state demographics" ([28](#)). In total, 78 (1.7%) tested positive; 35 (44.8%) of these persons were asymptomatic.

Argentine Cruise Ship Passengers and Crew

In mid-March 2020, a cruise ship departed Ushuaia, Argentina, for a planned 21-day expedition ([19](#)). After the emergence of a febrile passenger on the eighth day of the cruise, the ship's itinerary was altered, and it eventually docked at Montevideo, Uruguay, on the 13th day. All 217 passengers and crew members were tested; 128 (59.0%) tested positive, of whom 104 (81.3%) were asymptomatic.

San Francisco Residents

During 4 days in late April 2020, “4,160 adults and children, including more than half of the residents in the 16 square blocks that make up San Francisco Census Tract 229.01” in the Mission District, were tested ([29](#)). Seventy-four (1.8%) tested positive, of whom 39 (52.7%) were asymptomatic.

Discussion

Despite concerns about distinguishing asymptomatic from presymptomatic persons, data from 4 of 5 of the cohorts with longitudinal reporting suggest that a small fraction of asymptomatic persons may eventually develop symptoms. In the Italian and Japanese cohorts, 0% of asymptomatic persons became symptomatic. In the Greek and New York cohorts, 10.3% of asymptomatic persons became symptomatic. In the New York cohort, the figure might be as low as 3.4% because of the presumed diagnosis of endomyometritis in 2 of the 3 women who developed fevers. The observation period in this cohort, however, was extremely brief: a median of 2 days.

The King County cohort—in a skilled-nursing facility—is an outlier. Of 27 initially asymptomatic residents, 24 (88.9%) eventually developed symptoms and were therefore recategorized as having been presymptomatic. These persons were presumably much older and had more comorbid conditions than those in the other 4 longitudinal cohorts. In addition, they resided together in a single facility, which might have allowed for repeated exposures to infected persons. More research is needed to ascertain the effect of age and environmental factors on the natural history of COVID-19.

The Vo' cohort seems to confirm that asymptomatic persons can indeed transmit SARS-CoV-2 to others, and the experience aboard the U.S.S. *Theodore Roosevelt* suggests that they might be able to transmit the virus to others for longer than 14 days. These worrisome findings could explain, in part, the rapid spread of the virus around the globe. Persons who do not feel or look ill are likely to have far more interaction with others than those who have symptoms. If asymptomatic transmission is indeed common, testing only those with symptoms would seem to be folly.

The finding that 54% of the 76 asymptomatic persons on the *Diamond Princess* who were examined by computed tomography appeared to have significant subclinical abnormalities in their lungs is disturbing. Further research will be required to confirm this potentially important finding, taking into account possible confounding factors, including the age of passengers aboard the *Diamond Princess*. If confirmed, this finding suggests that the absence of symptoms might not necessarily mean the absence of harm. The subclinical nature of the finding raises the possibility that SARS-CoV-2 infection causes subtle deficits in lung function that might not be immediately apparent.

Does the relatively high proportion (60.5%) of asymptomatic cases on the U.S.S. *Theodore Roosevelt*—whose crew members, presumably, are mostly in their 20s and 30s—suggest that asymptomatic infection is more

likely in younger persons? Perhaps, but it must be noted that the proportion of asymptomatic infection (47.8%) on the *Charles de Gaulle* aircraft carrier seems to be only marginally higher than average. A case series from Wuhan, China, from 24 December 2019 to 24 February 2020 included data for “78 patients from 26 cluster cases of exposure to the Hunan seafood market or close contact with other patients with COVID-19” (30). Asymptomatic patients “were younger (median [interquartile range] age, 37 [26-45] years vs 56 [34-63] years; $P < .001$), and had a higher proportion of women (22 [66.7%] women vs 14 [31.1%] [sic] women; $P = .002$).”

As noted earlier, the data and studies reviewed here are imperfect in many ways. The ideal study of asymptomatic SARS-CoV-2 infection has yet to be done. What might that study look like? Most important, it must include a large, representative sample of the general population, similar to the U.S. serosurvey for which the National Institutes of Health is currently recruiting (31). In contrast to the narrowly defined cohorts here, it will be illuminating to have data that accurately reflect the population at large. In addition, longitudinal data must be collected over a sufficiently long time to distinguish between asymptomatic and presymptomatic cases.

Closed cohorts, such as cruise ships, aircraft carriers, and correctional facilities, offer both advantages and disadvantages. Because the likelihood of viral exposure is so much greater than in other settings, the “treatment” that participants receive may be close to uniform. As a result, we may learn more about the average incidence of asymptomatic infection. But the confined environment—which ensures frequent, overlapping interaction between participants—makes it challenging to accurately trace contacts and elucidate the chain of viral transmission.

On the basis of the 3 cohorts with representative samples—Iceland and Indiana, with data gathered through random selection of participants, and Vo', with data for nearly all residents—the asymptomatic infection rate may be as high as 40% to 45%. A conservative estimate would be 30% or higher to account for the presymptomatic admixture that has thus far not been adequately quantified. In any case, these high rates are not aligned with current testing programs that have predominantly focused on symptomatic cases. Beyond expanding testing to those without symptoms or known exposure, our inability to recognize carriers might make necessary the broad adoption of preventive strategies, such as masks.

The 96% rate of asymptomatic infection among thousands of inmates in 4 state prison systems is remarkable. Without any longitudinal data, we cannot estimate the number of presymptomatic cases. If the missing data prove to be similar to the Italian, Japanese, Greek, and New York cohorts, though, the vast majority of these persons will remain asymptomatic. Why, then, might the asymptomatic infection rate in this setting be so anomalously high?

One plausible factor could be cross-immunity imparted by the betacoronaviruses HCoV-OC43 and HCoV-HKU1, which has been proposed as a mitigating factor in the spread of SARS-CoV-2 (32). According to the U.S. Centers for Disease Control and Prevention, HCoV-HKU1 was active across the United States from late November 2019 through mid-February 2020 (33). In a locked-down congregate setting like a prison, it seems possible that contagious respiratory viruses could spread rapidly, so it would be interesting to do a serosurvey for antibodies to these betacoronaviruses. Still, 96% is very high. It would be prudent to review the source data carefully for errors.

What individual differences might account for why 2 persons of the same age, sex, and health status, for example, have idiosyncratic responses to SARS-CoV-2 infection? Why does one come through with nary a

symptom, while the other lies near death in intensive care? At the moment, we simply do not know. If ever there were a need for precision medicine—for deeply and thoroughly understanding the multitudinous “-omics” that shape each of us—this is it. Perhaps there will be not just 1 therapy or vaccine for SARS-CoV-2 but versions that are individualized to maximize their efficacy.

In countries like the United States that have been hardest hit by the SARS-CoV-2 pandemic, it has been apparent for some time that the amount of testing must be significantly and rapidly increased—perhaps by an order of magnitude or more. With this new knowledge that a large proportion of those infected with SARS-CoV-2 have no symptoms, the urgency for more testing becomes even greater.

In a perfect world, perhaps using simple, accurate, inexpensive technology that is still on the drawing board (34), we would test each person every day for SARS-CoV-2. Until that is possible, innovative surveillance tactics might provide useful data for public health officials. Self-monitoring with internet-connected thermometers and smart watches that monitor heart rate, then crowdsourcing the resulting data, has been shown to accurately predict the incidence of influenza-like illness as reported by the California Department of Public Health and the Centers for Disease Control and Prevention (35–37). Similarly, monitoring sewage sludge provided “SARS-CoV-2 RNA concentrations [that] were a seven-day leading indicator ahead of compiled COVID-19 testing data and led local hospital admissions data by three days” (38).

The early data that we have assembled on the prevalence of asymptomatic SARS-CoV-2 infection suggest that this is a significant factor in the rapid progression of the COVID-19 pandemic. Medical practice and public health measures should be modified to address this challenge.

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Comments

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<https://www.acpjournals.org/doi/10.7326/M20-3012>

(iii) Social distancing, glove and mask utility, contact tracing, isolation, testing – all vital in ‘Flattening the Curve’ and so preventing saturation of Health/Medical resources

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A new peer-reviewed publication in PNAS suggest that the main route of transmission of SARS-CoV-2 is through the air and that wearing masks prevented at least 78,000 cases of COVID-19 in Italy between April 6 and May 9 and more than 60,000 cases in NY from April 17 to May 9. It also suggests that any measures that are aimed to prevent spread of SARS-CoV-2 effectively must include face masks usage.

The study results confirm earlier results of other studies about the effectiveness of mask usage, for example <https://lnkd.in/gfD7qQz>

“The current mitigation measures, such as social distancing, quarantine, and isolation implemented in the United States, are insufficient by themselves in protecting the public. Our analysis reveals that the difference with and without mandated face covering represents the determinant in shaping the trends of the pandemic worldwide. We conclude that wearing of face masks in public corresponds to the most effective means to prevent interhuman transmission, and this inexpensive practice, in conjunction with extensive testing, quarantine, and contact tracking, poses the most probable fighting opportunity to stop the COVID-19 pandemic, prior to the development of a vaccine.”

[#sars_cov_2](#) [#coronavirus2019](#) [#sarscov2](#) [#scientists](#)

<https://lnkd.in/gjxqfFE>

Research Article

Identifying airborne transmission as the dominant route for the spread of COVID-19

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Significance

We have elucidated the transmission pathways of coronavirus disease 2019 (COVID-19) by analyzing the trend and mitigation measures in the three epicenters. Our results show that the airborne transmission route is highly virulent and dominant for the spread of COVID-19. The mitigation measures are discernable from the trends of the pandemic. Our analysis reveals that the difference with and without mandated face covering represents the determinant in shaping the trends of the pandemic. This protective measure significantly reduces the number of infections. Other mitigation measures, such as social distancing implemented in the United States, are insufficient by themselves in protecting the public. Our work also highlights the necessity that sound science is essential in decision-making for the current and future public health pandemics.

Abstract

Various mitigation measures have been implemented to fight the coronavirus disease 2019 (COVID-19) pandemic, including widely adopted social distancing and mandated face covering. However, assessing the

effectiveness of those intervention practices hinges on the understanding of virus transmission, which remains uncertain. Here we show that airborne transmission is highly virulent and represents the dominant route to spread the disease. By analyzing the trend and mitigation measures in Wuhan, China, Italy, and New York City, from January 23 to May 9, 2020, we illustrate that the impacts of mitigation measures are discernable from the trends of the pandemic. Our analysis reveals that the difference with and without mandated face covering represents the determinant in shaping the pandemic trends in the three epicenters. This protective measure alone significantly reduced the number of infections, that is, by over 78,000 in Italy from April 6 to May 9 and over 66,000 in New York City from April 17 to May 9. Other mitigation measures, such as social distancing implemented in the United States, are insufficient by themselves in protecting the public. We conclude that wearing of face masks in public corresponds to the most effective means to prevent interhuman transmission, and this inexpensive practice, in conjunction with simultaneous social distancing, quarantine, and contact tracing, represents the most likely fighting opportunity to stop the COVID-19 pandemic. Our work also highlights the fact that sound science is essential in decision-making for the current and future public health pandemics.

- [COVID-19](#)
- [virus](#)
- [aerosol](#)
- [public health](#)
- [pandemic](#)

The novel coronavirus outbreak, coronavirus disease 2019 (COVID-19), which was declared a pandemic by the World Health Organization (WHO) on March 11, 2020, has infected over 4 million people and caused nearly 300,000 fatalities over 188 countries ([1](#)). Intensive effort is ongoing worldwide to establish effective treatments and develop a vaccine for the disease. The novel coronavirus, named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), belongs to the family of the pathogen that is responsible for respiratory illness linked to the 2002–2003 outbreak (SARS-CoV-1) ([2](#)). The enveloped virus contains a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry of ~ 120 nm. There exist several plausible pathways for viruses to be transmitted from person to person. Human atomization of virus-bearing particles occurs from coughing/sneezing and even from normal breathing/talking by an infected person ([3,4–6](#)). These mechanisms of viral shedding produce large droplets and small aerosols ([3](#)), which are conventionally delineated at a size of $5\text{ }\mu\text{m}$ to characterize their distinct dispersion efficiencies and residence times in air as well as the deposition patterns along the human respiratory tract ([3, 7](#)). Virus transmission occurs via direct (deposited on persons) or indirect (deposited on objects) contact and airborne (droplets and aerosols) routes ([3](#)). Large droplets readily settle out of air to cause person/object contamination; in contrast, aerosols are efficiently dispersed in air. While transmission via direct or indirect contact occurs in a short range, airborne transmission via aerosols can occur over an extended distance and time. Inhaled virus-bearing aerosols deposit directly along the human respiratory tract.

Previous experimental and observational studies on interhuman transmission have indicated a significant role of aerosols in the transmission of many respiratory viruses, including influenza virus, SARS-CoV-1, and Middle East Respiratory Syndrome coronavirus (MERS-CoV) ([8,9–11](#)). For example, airborne coronavirus MERS-CoV exhibited strong capability of surviving, with about 64% of microorganisms remaining infectious 60 min after atomization at $25\text{ }^{\circ}\text{C}$ and 79% relative humidity (RH) ([9](#)). On the other hand, rapid virus decay occurred, with only 5% survival over a 60-min procedure at $38\text{ }^{\circ}\text{C}$ and 24% RH, indicative of inactivation. Recent experimental studies have examined the stability of SARS-CoV-2, showing that the virus remains infectious in aerosols for hours ([12](#)) and on surfaces up to days ([12, 13](#)).

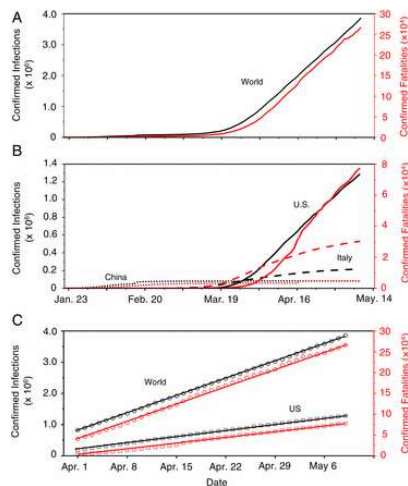
Several parameters likely influence the microorganism survival and delivery in air, including temperature, humidity, microbial resistance to external physical and biological stresses, and solar ultraviolet (UV) radiation ([7](#)). Transmission and infectivity of airborne viruses are also dependent on the size and number concentration of inhaled aerosols, which regulate the amount (dose) and pattern for respiratory deposition. With typical nasal breathing (i.e., at a velocity of $\sim 1\text{ m}\cdot\text{s}^{-1}$) ([4](#)), inhalation of airborne viruses leads to direct and continuous deposition into the human respiratory tract. In particular, fine aerosols (i.e., particulate matter smaller than $2.5\text{ }\mu\text{m}$, or $\text{PM}_{2.5}$) penetrate deeply into the respiratory tract and even reach other vital

organs (14, 15). In addition, viral shedding is dependent on the stages of infection and varies between symptomatic and asymptomatic carriers. A recent finding (16) showed that the highest viral load in the upper respiratory tract occurs at the symptom onset, suggesting the peak of infectiousness on or before the symptom onset and substantial asymptomatic transmission for SARS-CoV-2.

The COVID-19 outbreak is significantly more pronounced than that of the 2002/2003 SARS, and the disease continues to spread at an alarming rate worldwide, despite extreme measures taken by many countries to constrain the pandemic (1). The enormous scope and magnitude of the COVID-19 outbreak reflect not only a highly contagious nature but also exceedingly efficient transmission for SARS-CoV-2. Currently, the mechanisms to spread the virus remain uncertain (17), particularly considering the relative contribution of the contact vs. airborne transmission routes to this global pandemic. Available epidemiological (1) and experimental (12, 18) evidence, however, implicates airborne transmission of SARS-CoV-2 via aerosols as a potential route for the spreading of the disease.

Distinct Pandemic Trends in the Three Epicenters

To gain insight into the mechanism of the virus transmission routes and assess the effectiveness of mitigation measures, we analyzed the trend of the pandemic worldwide from January 23 to May 9, 2020 (Fig. 1). The COVID-19 outbreak initially emerged during December 2019 in Wuhan, China (1). The numbers of confirmed infections and fatalities in China dominated the global trend during January and February 2020 (Fig. 1A), but the increases in the newly confirmed cases and fatalities in China have exhibited sharp declines since February (Fig. 1B). In contrast to the curve flattening in China, those numbers in other countries have increased sharply since the beginning of March. The epicenter shifted from Wuhan to Italy in early March and to New York City (NYC) in early April. By April 30, the numbers of confirmed COVID-19 cases and deaths, respectively, reached over 200,000 and 27,000 in Italy and over 1,000,000 and 52,000 in the United States, compared to about 84,000 and 4,600 in China (Fig. 1B). Notably, the curves in Italy exhibit a slowing trend since mid-April, while the numbers in the world and the United States continue to increase. Remarkably, the recent trends in the numbers of infections and fatalities in the world and in the United States exhibit striking linearity since the beginning of April (Fig. 1C).



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Fig. 1.

Distinct global trends of the COVID-19 pandemic. (A) Confirmed infections and fatalities worldwide. (B) Comparison of the confirmed infections and fatalities between China, Italy, and United States. (C) Linear regression of the confirmed infections and fatalities worldwide and in United States from April 1 to May 9, 2020; the linear regression is, respectively, $y = 79,398x + 810,167$ ($R^2 = 0.999$) for infections and $y = 6,075x + 39,409$ ($R^2 = 0.998$) for fatalities worldwide and $y = 28,971x + 201,187$ ($R^2 = 0.999$) for infections and $y =$

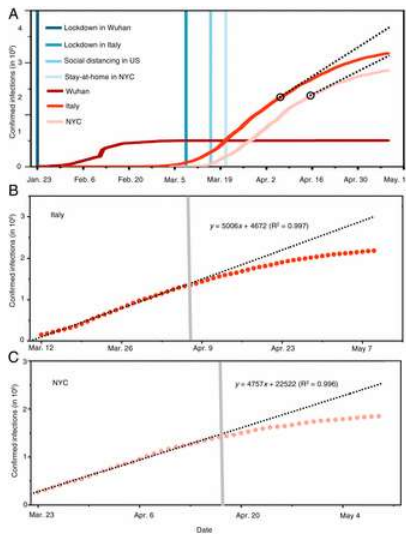
$2,059x + 243$ ($R^2 = 0.995$) for fatalities in the United States. The left axis and black color correspond to the numbers of confirmed infections, and the right axis and red color represent the confirmed fatalities.

We interpreted the differences in the pandemic trends by considering the mitigation measures implemented worldwide. The curve flattening in China can be attributed to extensive testing, quarantine, and contact tracing; other aggressive measures implemented in China include lockdown of all cities and rural areas in the whole country, isolation of residents having close contact with infected people, and mandated wearing of face masks in public. However, the effectiveness of those mitigation measures has yet to be rigorously evaluated. Differentiation of the effects of those mitigation measures in China is challenging (19), since the implementation occurred almost simultaneously in January 2020. While similar quarantine, isolation, and city lockdown measures were also implemented on March 9 in Italy after the country became the second epicenter, the curve of infections has yet to show complete flattening. In the United States, guidelines for social distancing, quarantine, and isolation were issued by the federal government on March 16, and stay-at-home orders were implemented by many state and local governments starting, for example, on March 19 and April 3 and on March 22 in NYC. The social distancing measures implemented in the United States include staying at least 6 feet (~2 m) away from other people, no gathering in groups, staying out of crowded places, and avoiding mass gatherings (20). Obviously, the continuous rise in the US infected numbers casts doubt on the effectiveness of those preventive measures alone (Fig. 1 B and C).

In contrast to China, wearing of face masks was not mandated and was unpopular in most of the western world during the early outbreak of the pandemic. Advice on the use of face masks was not issued until April 6, 2020 by the WHO (1), claiming that it is important only to prevent infected persons from viral transmission by filtering out droplets but that it is unimportant to prevent uninfected persons from breathing virus-bearing aerosols. The regions heavily plagued by COVID-19 in northern Italy, such as Lombard, ordered face covering in public starting on April 6, and the Italian authorities required nationwide mandatory use of face masks on May 4. All New Yorkers were mandated to use face covering in public starting on April 17, when social distancing was not possible. With measures implemented in the United States seemingly comparable to those in China, social distancing, quarantine, and isolation exhibited little impact on stopping the spreading of the disease in the United States, as reflected by the linearity from April 1 to May 9 (Fig. 1C). It is possible, however, that these measures likely alter the slope of the infection curve, that is, by reducing the rate of infections during the early stage of the pandemic (Fig. 1). Notably, the recommended physical separation for social distancing is beneficial to prevent direct contact transmission but is insufficient (without face masks) to protect inhalation of virus-bearing aerosols (or even small droplets at intermediate proximity), owing to rapid air mixing (7).

Understanding the Impacts of Face Covering

Compared to the simultaneous implementation of measures in China, intervention measures were successively implemented in the western world (Fig. 2A), providing an opportunity for assessing their relative effectiveness. We quantified the effects of face covering by projecting the number of infections based on the data prior to implementing the use of face masks in Italy on April 6 and NYC on April 17 (Fig. 2A; see Methods). Such projections are reasonable considering the excellent linear correlation for the data prior to the onset of mandated face covering (Fig. 2 B and C and SI Appendix, Fig. S1). Our analysis indicates that face covering reduced the number of infections by over 78,000 in Italy from April 6 to May 9 and by over 66,000 in NYC from April 17 to May 9. In addition, varying the correlation from 15 d to 30 d prior to the onset of the implementation reveals little difference in the projection for both places, because of the high correlation coefficients (SI Appendix, Fig. S1). Notably, the trends of the infection curves in Italy and NYC contrast to those in the world and in the United States (Fig. 1C), which show little deviation from the linearity due to the nonimplementation of face-covering measures globally and nationally, respectively. The inability of social distancing, quarantine, and isolation alone to curb the spread of COVID-19 is also evident from the linearity of the infection curve prior to the onset of the face-covering rule in Italy on April 6 and in NYC on April 17 (Fig. 2 B and C). Hence, the difference made by implementing face covering significantly shapes the pandemic trends worldwide.

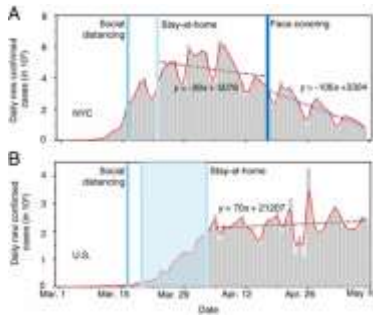


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Fig. 2.

The evolving epicenter from Wuhan, to Italy, to NYC. (A) Comparison of the trends and mitigation measures between Wuhan, Italy, and NYC in 2020. The vertical lines mark the date for implementing mitigation measures. The two black circles label the dates when face covering was implemented: April 6 in northern Italy and April 17 in NYC. The black dashed lines represent the projection without face covering based on linear regression of 26-d data prior to implementing this measure. (B) Linear regression of the number of confirmed infections for 26-d data prior to implementing face covering in Italy. The shaded vertical line denotes the date when face covering was implemented on April 6 in northern Italy. (C) Linear regression of the number of confirmed infections for 26-d data prior to implementing face covering in NYC. The shaded vertical line denotes the date when face covering was implemented on April 17 in NYC. In B and C, the circles are reported values, and the dotted line represents fitting and projection of the confirmed infections before and after face-covering, respectively.

We further compared the numbers of daily new cases between NYC and the United States (excluding the data in NYC) from March 1 to May 9 (Fig. 3). The daily numbers of newly confirmed infections in NYC and the United States show a sharp increase in late March and early April. There exists a slower increase in the number after implementation of the stay-at-home order (about 14 d in New York and shortly after April 3 in the United States), which is attributable to the impacts of this measure. After April 3, the only difference in the regulatory measures between NYC and the United States lies in face covering on April 17 in NYC. We applied linear regression to the data between April 17 and May 9 in NYC and between April 5 and May 9 in the United States. While the daily numbers of newly confirmed infections fluctuate considerably, the slope of the regression unambiguously reflects the trend in both data. The daily new infection in NYC decreases with a slope of 106 cases per day after April 17, corresponding to a decreasing rate of $\sim 3\%$ per day (relative to April 17). For comparison, the daily new infections in the United States (excluding NYC) increase, with a slope of 70 cases per day after April 4, corresponding to an increasing rate of $\sim 0.3\%$ per day (relative to April 5). Hence, the decreasing rate in the daily new infections in NYC with mandated face covering is in sharp contrast to that in the United States with only social-distancing and stay-at-home measures, further confirming the importance of face covering in intervening the virus transmission.



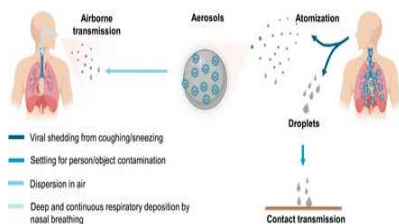
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Fig. 3.

Contrasting the trends of new infections between NYC and the United States. Daily new confirmed infections in (A) NYC and (B) the United States. The dotted lines represent linear fitting to the data between April 17 and May 9 in NYC and between April 4 and May 9 in the United States. In B, the number in NYC was subtracted from that in the United States. The vertical lines label the dates for social distancing, stay-at-home orders, and mandated face-covering.

Dominant Airborne Transmission

We further elucidated the contribution of airborne transmission to the COVID-19 outbreak by comparing the trends and mitigation measures during the pandemic worldwide and by considering the virus transmission routes (Fig. 4). Face covering prevents both airborne transmission by blocking atomization and inhalation of virus-bearing aerosols and contact transmission by blocking viral shedding of droplets. On the other hand, social distancing, quarantine, and isolation, in conjunction with hand sanitizing, minimize contact (direct and indirect) transmission but do not protect against airborne transmission. With social distancing, quarantine, and isolation in place worldwide and in the United States since the beginning of April, airborne transmission represents the only viable route for spreading the disease, when mandated face covering is not implemented. Similarly, airborne transmission also contributes dominantly to the linear increase in the infection prior to the onset of mandated face covering in Italy and NYC (Fig. 2 B and C and SI Appendix, Fig. S1). Hence, the unique function of face covering to block atomization and inhalation of virus-bearing aerosols accounts for the significantly reduced infections in China, Italy, and NYC (Figs. 1–3), indicating that airborne transmission of COVID-19 represents the dominant route for infection.



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Fig. 4.

Transmission of COVID-19. Human atomization of viruses arises from coughing or sneezing of an infected person, producing virus-containing droplets ($>5 \mu\text{m}$) and aerosols ($<5 \mu\text{m}$). Virus transmission from person to person occurs through direct/indirect contact and airborne aerosol/droplet routes. Large droplets mainly settle out of air to cause person/object contamination, while aerosols are efficiently dispersed in air. Direct

and airborne transmissions occur in short range and extended distance/time, respectively. Inhaled airborne viruses deposit directly into the human respiration tract.

Recent measurements identified SARS-CoV-2 RNA on aerosols in Wuhan's hospitals (18) and outdoor in northern Italy (21), unraveling the likelihood of indoor and outdoor airborne transmission. Within an enclosed environment, virus-bearing aerosols from human atomization are readily accumulated, and elevated levels of airborne viruses facilitate transmission from person to person. Transmission of airborne viruses in open air is subject to dilution, although virus accumulation still occurs due to stagnation under polluted urban conditions (7, 22). Removal of virus-bearing particles from human atomization via deposition is strongly size dependent, with the settling velocities ranging from $2.8 \times 10^{-5} \text{ m}\cdot\text{s}^{-1}$ to $1.4 \times 10^{-3} \text{ m}\cdot\text{s}^{-1}$ for the sizes of 1 and 10 μm , respectively (7). For comparison, typical wind velocity is about $1 \text{ m}\cdot\text{s}^{-1}$ to $3 \text{ m}\cdot\text{s}^{-1}$ indoors (23) and is $\sim 1 \text{ m}\cdot\text{s}^{-1}$ horizontally and $0.1 \text{ m}\cdot\text{s}^{-1}$ vertically in stable air (7, 22). Under those indoor and outdoor conditions, the residence time of virus-bearing aerosols reaches hours, due to air mixing (7).

We also examined ambient conditions relevant to the outbreaks in Wuhan, Italy, and NYC. The initial outbreak of COVID-19 in Wuhan coincided with the winter haze season in China (7, 22), during which high levels of $\text{PM}_{2.5}$ were prevalent in air (SI Appendix, Figs. S2 and S3). On the other hand, the daily average $\text{PM}_{2.5}$ concentrations were much lower during the outbreaks in Rome, Italy, and in NYC (SI Appendix, Fig. S2). The airborne transmission pathways (i.e., indoor or outdoor) as well as the effects of ambient $\text{PM}_{2.5}$ levels on virus transmission may be variable among urban cities. For example, the winter haze conditions in China likely exacerbated outdoor virus spreading (24, 25), because of low UV radiation, air stagnation (lacking ventilation on the city scale), and low temperature (7, 22). Also, there may exist a synergetic effect of simultaneous exposure to the virus and $\text{PM}_{2.5}$ to enhance the infectivity, severity, and fatalities of the disease (14, 26). In addition, nascent virus-bearing aerosols produced from human atomization likely undergo transformation in air, including coagulation with ambient preexisting PM and/or growth on a time scale of a few hours in typical urban air (27–29). Such transformation, as recently documented on coarse PM in Italy (21), may mitigate virus inactivation (9, 12), by providing a medium to preserve its biological properties and elongating its lifetimes. However, key questions remain concerning transformation and transmission of virus-bearing aerosols from human atomization in air. Specifically, what are the impacts of transformation of human-atomized aerosols on viral surviving and infectivity in air?

While the humidity effect on viral surviving is uncertain (3, 9), the conditions during the outbreaks in Wuhan, Rome, and NYC correspond to high RH yet low absolute humidity because of low temperature (SI Appendix, Fig. S3). Early experimental work (9) showed remarkable survival for the analogous coronavirus MERS-CoV at the RH level characteristic of the COVID-19 outbreaks in Wuhan, Rome, and NYC. For comparison, indoor temperature and RH typically range from 21 °C to 27 °C and 20 to 70%, respectively (23).

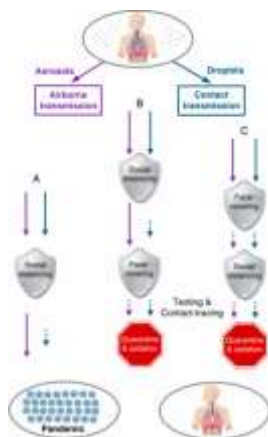
Of particular importance are the considerations that render airborne SARS-CoV-2 the most efficient among all transmission routes. Even with normal nasal breathing, inhalation of virus-bearing aerosols results in deep and continuous deposition into the human respiratory tract, and this transmission route typically requires a low dose (8). Also, airborne viruses have great mobility and sufficiently long surviving time for dispersion (9, 12), and residents situated in densely populated environments are highly vulnerable. In addition, nascent micrometer-size aerosols produced from coughing/sneezing of infected people have the potential of containing many viruses, particularly for asymptomatic carriers (16).

Future research is critically needed to assess the transmission, transformation, and dispersion of virus-bearing aerosols from human atomization under different environmental conditions, as well as the related impacts on virus infectivity. It is equally important to understand human atomization of airborne viruses: What are the number and size distributions of nascent aerosols as well as the viral load per particle from coughing/sneezing? It is also imperative to evaluate human inhalation of airborne viruses: How are aerosols deposited along the respiratory tract, and what is the minimum dose of airborne viruses required for infection? It is also important to evaluate the performance of face masks to quantify the efficiency to filtrate airborne viruses relevant to human atomization and inhalation. Elucidation of these mechanisms requires an interdisciplinary effort.

A Policy Perspective

The governments' responses to the COVID pandemic have so far differed significantly worldwide. Swift actions to the initial outbreak were undertaken in China, as reflected by nearly simultaneous implementation of various aggressive mitigation measures. On the other hand, the response to the pandemic was generally slow in the western world, and implementation of the intervention measures occurred only consecutively. Clearly, the responsiveness of the mitigation measures governed the evolution, scope, and magnitude of the pandemic globally (Figs. 1 and 2).

Curbing the COVID-19 relies not only on decisive and sweeping actions but also, critically, on the scientific understanding of the virus transmission routes, which determines the effectiveness of the mitigation measures (Fig. 5). In the United States, social distancing and stay-at-home measures, in conjunction with hand sanitizing (Fig. 5, path a), were implemented during the early stage of the pandemic (March 16) (20). These measures minimized short-range contact transmission but did not prevent long-range airborne transmission, responsible for the inefficient containing of the pandemic in the United States (Figs. 1 and 3). Mandated face covering, such as those implemented in China, Italy, and NYC, effectively prevented airborne transmission by blocking atomization and inhalation of virus-bearing aerosols and contact transmission by blocking viral shedding of droplets. While the combined face-covering and social distancing measures offered dual protection against the virus transmission routes, the timing and sequence in implementing the measures also exhibited distinct outcomes during the pandemic. For example, social distancing measures, including city lockdown and stay-at-home orders, were implemented well before face covering was mandated in Italy and NYC (Fig. 5, path b), and this sequence left an extended window (28 d in Italy and 32 d in NYC) for largely uninterrupted airborne transmission to spread the disease (Figs. 2 and 3). The simultaneous implementation of face covering and social distancing (Fig. 5, path c), such as that undertaken in China, was most optimal, and this configuration, in conjunction with extensive testing and contact tracing, was responsible for the curve flattening in China (Fig. 1). Also, there likely existed remnants of virus transmission after the implementation of regulatory measures, because of circumstances when the measures were not practical or were disobeyed and/or imperfection of the measures. Such limitations, which have been emphasized by the WHO (1), spurred on controversial views on the validity of wearing face masks to prevent the virus transmission during the pandemic (30). However, it is implausible that the limitations of mitigation measures alone contributed dominantly to the global pandemic trend, as exemplified by the success in China. Our work suggests that the failure in containing the propagation of COVID-19 pandemic worldwide is largely attributed to the unrecognized importance of airborne virus transmission (1, 20).



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Fig. 5.

Mitigation paradigm. Scenarios of virus transmission under the distancing/quarantine/isolation measure only (path a), the measures with distancing/quarantine/isolation followed by face covering (path b), and the

measures with simultaneous face covering and distancing/quarantine/isolation (path c). The short-dashed arrows label possible remnants of virus transmission due to circumstances when the measure is not possible or disobeyed and/or imperfection of the measure.

Conclusions

The inadequate knowledge on virus transmission has inevitably hindered development of effective mitigation policies and resulted in unstoppable propagation of the COVID-19 pandemic (Figs. 1–3). In this work, we show that airborne transmission, particularly via nascent aerosols from human atomization, is highly virulent and represents the dominant route for the transmission of this disease. However, the importance of airborne transmission has not been considered in establishment of mitigation measures by government authorities (1, 20). Specifically, while the WHO and the US Centers for Disease Control and Prevention (CDC) have emphasized the prevention of contact transmission, both WHO and CDC have largely ignored the importance of the airborne transmission route (1, 20). The current mitigation measures, such as social distancing, quarantine, and isolation implemented in the United States, are insufficient by themselves in protecting the public. Our analysis reveals that the difference with and without mandated face covering represents the determinant in shaping the trends of the pandemic worldwide. We conclude that wearing of face masks in public corresponds to the most effective means to prevent interhuman transmission, and this inexpensive practice, in conjunction with extensive testing, quarantine, and contact tracking, poses the most probable fighting opportunity to stop the COVID-19 pandemic, prior to the development of a vaccine. It is also important to emphasize that sound science should be effectively communicated to policy makers and should constitute the prime foundation in decision-making amid this pandemic. Implementing policies without a scientific basis could lead to catastrophic consequences, particularly in light of attempts to reopen the economy in many countries. Clearly, integration between science and policy is crucial to formulation of effective emergency responses by policy makers and preparedness by the public for the current and future public health pandemics.

Methods

Projection of the pandemic trend without implementing face covering in Italy and NYC was performed first by establishing the linear correlation between the infection number and date. We considered the data for both 15 and 30 d prior to the onset of face covering (SI Appendix, Fig. S1). The slope and the reported infection number were used for the projections. The avoided infection number due the face covering was determined from the difference between the projected and reported values on May 9, 2020.

The data for accumulative confirmed infections and fatalities in Wuhan, Italy, and NYC were taken from the reports by Wuhan Municipal Health Commission (<http://wjw.wuhan.gov.cn/>), European CDC (<https://www.ecdc.europa.eu/en>), and NYC government (<https://www1.nyc.gov/site/doh/covid/covid-19-data.page>), respectively. The data of accumulative confirmed infections and fatalities worldwide were taken from WHO COVID-19 situation report (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>) (1), and the numbers in China, Italy, and United States were from taken from European CDC.

Ground-based measurements of PM_{2.5} and RH in Wuhan were taken from the China National Environmental Monitoring Centre (<http://beijingair.sinaapp.com/>). The PM_{2.5} data in NYC were taken from US Environmental Protection Agency (<https://www.epa.gov/outdoor-air-quality-data>). The PM_{2.5} data in Rome were taken from Centro Regionale della Qualità dell'aria (<http://www.arpalazio.net/main/aria/>). The RH data in Rome and NYC were taken from the 6-hourly interim reanalysis of the European Centre for Medium-range Weather Forecasts (<https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5>).

We used spaceborne measurements of aerosol optical depth (AOD) to characterize the regional aerosol pollution during the COVID-19 outbreak (January 23 to February 10, 2020) in China. The green band AODs at 0.55 μm are available from Terra and Aqua combined Moderate Resolution Imaging Spectroradiometer Version 6 Multiangle Implementation of Atmospheric Correction (<https://lpdaac.usgs.gov/products/mcd19a2v006/>). The Level-2 product has daily global coverage with 1-km pixel resolution. The AOD retrieval is only available for the clear sky.

Data Availability.

All data relevant to this research are available in the main text and [SI Appendix](#).

Acknowledgments

This work was supported by the Robert A. Welch Foundation (Grant A-1417). A.L.Z. acknowledges the support of a fellowship from the Robert A. Welch Foundation. We are grateful to Fang Zhang for the PM_{2.5} data in Wuhan, China.

<https://www.pnas.org/content/early/2020/06/10/2009637117>

Activate link to view larger image.

VACCINES ARE EFFECTIVE: DELIVERY IS SKETCHY (IN THE US)

Coronavirus Vaccine Tracker

NYT By [Carl Zimmer](#), [Jonathan Corum](#) and [Sui-Lee Wee](#)


Updated Dec. 29, 2020













Vaccines typically require years of research and testing before reaching the clinic, but in 2020, scientists embarked on a race to produce safe and effective coronavirus vaccines in record time. Researchers are currently testing **64 vaccines** in clinical trials on humans, and 19 have reached the final stages of testing. At least 85 preclinical vaccines are under active investigation in animals.

New additions and recent updates

Dec. 28	Novavax begins a Phase 3 trial in the United States.
Dec. 27	Kazakhstan moves to Phase 3.
Dec. 24	Iran enters Phase 1.
Dec. 23	Canada approves the Moderna vaccine.
Dec. 22	Maryland-based Altimmune enters Phase 1.
Dec. 21	The European Union authorizes the Pfizer-BioNTech vaccine.
Dec. 19	Kazakhstan moves to Phase 2.
Dec. 18	The F.D.A. authorizes Moderna 's vaccine for emergency use.
Dec. 18	Cuba's Soberana 2 vaccine moves to Phase 2.
Dec. 17	Japan's Shionogi launches a Phase 1/2 trial.
Dec. 17	South Korea's GeneOne enters Phase 1/2.

Leading vaccines

Developer	Type	Phase	Status
 Pfizer-BioNTech mRNA		23	Approved in Canada and other countries.

				Emergency use in U.S. and other countries.
	Moderna	mRNA	3	Approved in Canada. Emergency use in U.S.
	Gamaleya	Adenovirus	3	Early use in Russia. Emergency use in Belarus, Argentina.
	CanSino	Adenovirus	3	Limited use in China.
 	Johnson & Johnson	Adenovirus	3	
 	Oxford-AstraZeneca	Adenovirus	23	
	Vector Institute	Protein	3	Early use in Russia.
	Novavax	Protein	3	
	Sinovac	Inactivated	3	Limited use in China.
	Sinopharm-Beijing	Inactivated	3	Approved in U.A.E., Bahrain. Limited use in China.
	Sinopharm-Wuhan	Inactivated	3	Limited use in China, U.A.E.

Below is a list of all vaccines that have reached trials in humans, along with a selection of promising vaccines being tested in animals. For an overview of treatments for Covid-19, see our [Coronavirus Drug and Treatment Tracker](#).

<https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html>

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[Billy Ethridge](#) • 1st [Executive Director, "WNE4 LLC" \(international funding for \\$150 million+ projects\) AND Cofounder/ Advisor, "Brain-Body Research Institute"\(nonprofit\)...](#) 6h •

By Debora Patta CBS News January 22, 2021, 10:29 AM

[COVID strain in South Africa shows huge resistance to antibodies from original virus](#)

Durban, South Africa — The race to vaccinate people against COVID-19 has been made even more urgent by the emergency of new, more contagious variants of the [coronavirus](#). CBS News got rare access to a lab in

South Africa studying one of the [more worrying new strains](#) of the virus, which appears to have at least some resistance to the antibodies that vaccines create in the human body to fend off the bug.

Virus hunters in the high-risk biohazard lab in Durban are hot on the trail of the mutant strain spreading at breakneck speed across South Africa. The virus has mutated to attach itself more easily to human cells, making the disease no more deadly, but helping it spread a lot more easily.

[U.K. COVID strain unlikely to "escape" Pfizer vaccine](#)

"We do believe that we are going through a new pandemic with this variant that not only transmits much faster, but that also potentially has less neutralization," genetic scientist Tulio de Oliveira tells CBS News.

De Oliveira discovered the new variant after observing a dramatic uptick in infections in November. His colleagues in the highly secured lab have developed a live culture of the strain to speed up their research.

Alex Sigal is a senior researcher at the Africa Health Research Institute and at Germany's Max Planck Institute for Infection Biology. He says the new strain discovered in South Africa appears to have the ability to reduce the effectiveness of antibodies in people infected with the original version of the virus significantly.

"Ten-fold would be conservative," he tells CBS News, but "you can also have complete knock-out," meaning a person's natural defenses to the original strain of the virus could prove useless against the variant in South Africa.

A researcher investigating the new strain of the COVID-19 virus discovered in South Africa works at a lab in Durban. CBS News

That means those infected in the first wave could have little protection from the new strain, and even more troubling, it could render some of the vaccines less effective.

"It's clear that we've underestimated this virus," he says. "On the other hand, the evidence is not there yet that vaccines will be affected, and certainly people should keep vaccinating because that's the solution to this pandemic."

At the country's central lab, scientists stress that immunity is only part of the picture. Data on just how effective the vaccines are against the new strain won't be available for a couple weeks, but in the future, vaccines may have to be tweaked every so often to protect against mutant strains — much as the annual flu shot has been for years.

<https://www.cbsnews.com/news/south-africa-covid-strain-resistance-antibodies-coronavirus-vaccine-latest-research/>

[Via Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[Lockdowns stopped flu in its tracks](#)

Social-distancing measures aimed at slowing the spread of coronavirus seem to have [shortened the influenza season in the northern hemisphere by about six weeks](#). A shorter flu season could spare tens of thousands of lives. But the net impacts on global health will be hard to tease apart from the large number of deaths from COVID-19 as well as other causes in 2020 and beyond.

[Nature | 4 min read](#)

NEWS

21 May 2020

How coronavirus lockdowns stopped flu in its tracks

Reported rates of influenza and other infections have fallen sharply, but some communicable diseases may see a rise.

[Nicola Jones](#)

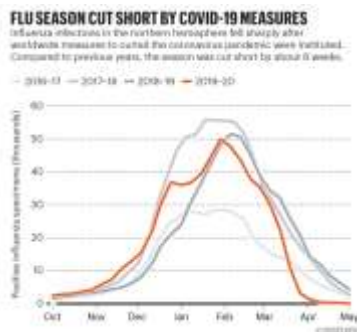


Measures aimed at slowing coronavirus spread are affecting other communicable diseases. Credit: Leon Neal/Getty

Lockdowns and social-distancing measures aimed at slowing the spread of coronavirus seem to have shortened the influenza season in the northern hemisphere by about six weeks.

Globally, an estimated 290,000–650,000 people typically die from seasonal flu, so a shorter flu season could mean tens of thousands of lives are spared. But the net impacts on global health will be hard to unpick against the large number of deaths from COVID-19 as well as other causes in 2020 and beyond. Tracking influenza and other infectious diseases can help to reveal the effectiveness of public-health policies aimed at stopping the coronavirus pandemic.

Seasonal flu cases in the northern hemisphere usually peak in February and tail off by the end of May. This year, unusually, lab-confirmed cases of influenza [dropped precipitously in early April](#), a few weeks after the coronavirus pandemic was declared on 11 March (see 'Flu season cut short by COVID-19 measures'). The data comes from tests of more than 150,000 samples from national influenza laboratories in 71 countries that report data to [FluNet](#), a global surveillance system.



Source: [FluNet](#) Global Influenza Surveillance and Response System.

The early end to the flu season comes despite the fact that it started with a bang; in January, before the coronavirus pandemic, the influenza season was on track to be the most severe in decades.

There are other possible contributors to the decline: people with flu symptoms might have avoided clinics altogether, for example, isolating at home and so not showing up in the statistics. But the response to the pandemic is likely to be an important factor: “Public-health measures such as movement restrictions, social distancing and increased personal hygiene likely had an effect on decreasing influenza and other respiratory virus transmission,” said the World Health Organization in a statement to *Nature*.

[Lockdowns stopped flu in its tracks](#)



[Coronavirus vaccine trials have delivered their first results — but their promise is still unclear](#)

Local data from the state of New York show a similar pattern. Although the flu season started a few weeks earlier than usual there, the rate of cases fell sharply and the season ended five weeks early. In Hong Kong, the 2019–20 influenza season was 63% shorter than those of the previous five years, and the number of deaths from lab-confirmed flu was 62% lower¹. A similar decline was seen during the 2003 epidemic of the related coronavirus that causes SARS (severe acute respiratory syndrome).

Other infectious diseases might also have been affected this year, says study co-author, infectious-disease researcher Pak-leung Ho at the University of Hong Kong. In Hong Kong, compared with previous years, the number of chickenpox cases dropped by about half to three-quarters. In April, cases of measles and rubella were their lowest, globally, since at least 2016, according to provisional data available so far — only 36 cases of rubella were reported in April worldwide. Ho notes that typically these are diseases that affect children. “Closure of schools may have had the biggest impact,” he says.



[How to address the coronavirus's outsized toll on people of colour](#)

Sexually transmitted infections (STIs) might also be affected, says Amanda Simanek, an epidemiologist at the University of Wisconsin–Milwaukee. Cases may decline in the absence of close contact, she says, but there may also be a decline in detection and treatment leading to a later surge. Other communicable diseases, such as tuberculosis, are more likely to see an upswing, because programmes to fight the disease have been derailed by the pandemic. The international organization the Stop TB Partnership released a report in May estimating that a 3-month lockdown and a 10-month period of recovery would cause an additional 1.37 million deaths globally during the next 5 years.

The flu season in the southern hemisphere is just starting (it typically peaks in July or August); it is unclear whether a similar flu trend will be seen there.

doi: 10.1038/d41586-020-01538-8

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Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period

Science 14 Apr 2020:

eabb5793

DOI: 10.1126/science.abb5793

Abstract

It is urgent to understand the future of severe acute respiratory syndrome–coronavirus 2 (SARS-CoV-2) transmission. We used estimates of seasonality, immunity, and cross-immunity for betacoronaviruses OC43 and HKU1 from time series data from the USA to inform a model of SARS-CoV-2 transmission. We projected that recurrent wintertime outbreaks of SARS-CoV-2 will probably occur after the initial, most severe pandemic wave. Absent other interventions, a key metric for the success of social distancing is whether critical care capacities are exceeded. To avoid this, prolonged or intermittent social distancing may be necessary into 2022. Additional interventions, including expanded critical care capacity and an effective therapeutic, would improve the success of intermittent distancing and hasten the acquisition of herd immunity. Longitudinal serological studies are urgently needed to determine the extent and duration of immunity to SARS-CoV-2. Even in the event of apparent elimination, SARS-CoV-2 surveillance should be maintained since a resurgence in contagion could be possible as late as 2024.

<https://science.sciencemag.org/content/early/2020/04/24/science.abb5793>

COVID19: CDCP Urges Wearing Masks and Self-Isolation

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19 #WHO #CDCP #ReleaseData #UrgeWearingMasks #SelfIsolation](#)

[#PresTrumpDeclaresVoluntaryStatesRights](#) 'Pres. Trump said..CDC & P was urging all Americans to wear a mask when they leave their homes, but he immed.undercut the msg. by repeat. calling the recomm. vol. & prom. that he would not wear one himself. Sr. off. at the C.D.C. have been pushing the pres. for days to advise everyone — even people who appear to be healthy — to wear a mask or a scarf that covers their mouth & nose when shopp. at the grocery store or while in other pub. places..The researchers asked 246 people w/ susp. resp. viral inf. to breathe into a machine for 30 minutes to measure the amt. of virus they exhaled. Half of the particip. wore a face mask, while the other half perf. the expt. w/o any face covering. Among 111 people

whose infections were later confirmed with a lab test, masks stopped the spread of all seasonal coronavirus and more than 70% of flu virus infections.. Masks were not as eff. in red. transmission of rhinoviruses, or the common cold. For the current coronavirus pandemic, all health officials, including those at the W.H.O. & C.D.C., agree that masks should be worn by anyone w/ symptoms like a cough or fever, & anyone caring for someone with a confirmed or suspected case.'

- A SIMPLE GUIDE: [How do I protect myself?](#)
- STAYING SAFE: [Who should wear a face mask or face covering?](#)
- DO IT FROM HOME: [How to make your own face mask](#)
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Almost 90% of COVID Patients Placed on Ventilators in New York City Died

Published on April 9, 2020

[Margaretta Colangelo](#)

Co-Founder & Managing Director at Deep Knowledge Ventures

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"The patients in front of me were unlike any patients I've ever seen. Clinically they look more like high-altitude sickness than pneumonia. The real illness may be a disfunction of the oxygenation of the blood. Doctors still need ventilators to treat patients but they should reflect on the treatment strategy because this is an entirely new disease"

<https://www.linkedin.com/pulse/over-80-covid-patients-placed-ventilators-new-york-have-colangelo/>

[A Debate Over Masks Uncovers Deep White House Divisions](#)

[nytimes.com](#)

It's High Time We Fought This Virus the American Way

The administration has all the authority it needs to produce medical supplies and prepare for a potential vaccine. By James E. Baker. Mr. Baker is a former legal adviser to the National Security Council.

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

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[#NYTOpEd](#) [#COVID19](#) [#FrmLegalAdvisorToNSC](#) [#DeployDPA](#) [#Abdication](#)? Gov. & health off. tell us that there is a profound gap bet. the protective equip., hospital equip. & testing res. that are needed (& will be needed) & what is available (or in the pipeline). Bill Gates reminds us that we will need to prod. millions, perhaps billions, of doses of vaccine in 12 to 18 months. This isn't a passing crisis; we will need more of everything in two months, six months and maybe years..

The [D.P.A.'s](#) industry assess. auth. can be used to measure prod. & distrib. capacity, remove blind spots, plan efficiently & recreate a supply chain at home. The federal govt. can determine now which entities could produce vaccines while it plans for their ethical allocation. The govt. can then use the D.P.A.'s Title III incent. [auth.or.](#) to issue loans, offer antitrust protection and guarantee purchases, creating a secure market for masks, tests & vaccines..

If I were advising the president (or the secretaries w/ delegated authority), I would say this: Please, tell the public what the need is & how the need will be met today, next week & in the months to come. What specifically has been contracted for, in how many units & on what timeline? Where there is a gap between need & supply, use the D.P.A. to close it.'

[The Coronavirus Outbreak](#)

[Frequently Asked Questions and Advice \(see Section 1 Introduction\)](#)

Updated April 11, 2020

- What should I do if I feel sick?
- When will this end?
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- Should I wear a mask?
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- What should I do with my 401(k)?

<https://www.nytimes.com/2020/05/02/us/politics/vaccines-coronavirus-research.html>

Via:

[Status is reachable](#)

[Daniel Goldstein, MD • 1st Professor & Vice Chairman, Department of Cardiothoracic Surgery Montefiore Health System. LinkedIn # 1 2020 Top Voice in Healthcare 1d •](#)

[The Coronavirus Is Evolving Before Our Eyes](#)

[The virus is mutating as expected. We can still stop it.](#)

Story by [James Hamblin](#)

In the final, darkest days of the [deadliest](#) year in U.S. history, the world received ominous news of a mutation in the SARS-CoV-2 coronavirus. Scientists in the U.K. had identified a form of the virus that was spreading rapidly throughout the nation. Then, on January 4, Prime Minister Boris Johnson announced a [lockdown](#) that began almost immediately and will last until at least the middle of February. “It’s been both frustrating and alarming to see the speed with which the new variant is spreading,” he [said](#) in an address, noting that “our scientists have confirmed this new variant is between 50 and 70 percent more transmissible” than previous strains.

Those figures, based on an early estimate by British government scientists in late December, made for terrifying [push alerts](#) and headlines. Though this strain of the virus (officially called “B.1.1.7”) quickly became known as “the U.K. variant,” it has already been found in [45 countries](#), suggesting that the opportunity to contain it with travel restrictions has passed. On January 8, Australia [locked down](#) Brisbane, a city of 2.3 million people, after discovering a single case.

Each day, B.1.1.7 is [being found](#) in more people in more places, including [all around](#) the United States. Experts have raised dire [warnings](#) that a 70 percent more transmissible form of the virus

would overwhelm already severely stretched medical systems. Daily deaths have already tripled in recent months, and the virus is killing more than 3,000 Americans every day. From a purely mathematical perspective, considering exponential growth, a significantly more transmissible strain could theoretically lead to tens of thousands of daily deaths, with hospital beds lining sidewalks and filling parking lots.

[Read: The problem with stories about dangerous coronavirus mutations](#)

To make matters worse, the warnings from Britain were followed by headlines about yet another variant, B.1.351, in [South Africa](#). Then *another* concerning variant was identified in [Brazil](#). News reports speculated that these strains may [resist vaccines](#). Some experts cautioned that the mutations [could](#) render current treatments less effective. Scott Gottlieb, the former director of the FDA, [said](#) last week: “The South Africa variant is very concerning right now because it does appear that it may obviate some of our medical countermeasures, particularly the antibody drugs.” On Tuesday, Anthony Fauci echoed that concern, [calling](#) the variant “disturbing.”

Related Stories

[The Mutated Virus Is a Ticking Time Bomb](#)

[The Next Phase of Vaccination Will Be Even Harder](#)

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These new variants demand to be taken seriously. [Skyrocketing](#) case counts in the U.K. suggest a potential to do enormous damage, and the identification of B.1.1.7 in so many countries is noteworthy. Still, we don’t yet know whether either variant will become as dominant worldwide as they have in their respective countries. They might spread widely and cause tremendous harm. They might also do neither.

The sheer scale and capacity of this virus are challenging many things we thought we knew, but the basic laws governing its evolution are not among them. All viruses are constantly evolving and changing, just as human populations are. When a virus is spreading as widely and rapidly as SARS-CoV-2, spinning through trillions of generations each minute, adaptation is inevitable. The transmissibility of the virus will change. The severity of the disease it causes will change. Its ability to evade our immune system will change. It very well may evolve to circumvent our current vaccines.

Thanks to genetic-sequencing technology, we can watch this evolution in real time. We can see the changes in a virus’s genes before we even know what they mean for the spread of disease. Charting the course of this evolution, and assessing its significance, has quickly become a foremost challenge of the pandemic. The peril is not that the virus will suddenly change in an extraordinary way that transforms the pandemic, but that it is changing in small, ordinary ways that are playing out on a vast scale, and whose significance we may not appreciate until it’s too late.

<https://www.theatlantic.com/health/archive/2021/01/coronavirus-mutations-variants/617694/>

The Coronavirus Is Mutating. What Does That Mean for a Vaccine?

<https://www.nytimes.com/interactive/2020/04/16/opinion/coronavirus-mutations-vaccine-covid.html?smid=li-share>

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NYT:

'A lot will depend on how the virus mutates. Broadly, there are two ways mutations can play out.

Scenario 1: The coronavirus is unable to evade a vaccine

A successf. vaccine could stop the virus dead in its tracks, but only if the virus doesn't mutate its way around the shot.

Like all viruses, SARS-CoV-2 is mutat. as it passes from person to person..Most mutations don't really change how the virus fxns.

Scenario 2: Mutations make vaccines less effective over time

But what if the virus doesn't get cornered like measles? If the virus mutates in a way that prevents antibodies from binding, it could make a lasting, universal vaccine difficult to create.

Antibodies, which the body produces in response to a vaccine or an infection, work by binding to specific spots on a virus called antigens. If random viral mutations alter the shape of an antigen, it can make a vaccine less effective against the virus.

The takeaway: We'll have to wait and see

Scientists know that SARS-CoV-2 is mutating.'

LSINJ: Long term commitm. for systematiz., surveilli. & controlling networks of genes & mechan. maintaining the genome in real time. Their failure inserts genetic disease lesions into genomes.

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[Via:](#)

[Andrea C. Love, Ph.D. • 1st Immunologist | Microbiologist | Biotechnology Applications Scientist | Public Health Consultant | Cytometry Expert 1w •](#)

[1 week ago](#)

Let's discuss the UK news stories, reporting a new mutation in SARS-CoV-2.

Viruses are always mutating. These mutations occur at the level of the genetic material, which may or may not translate into detectable changes in the virus.

By sequencing viral isolates, we can assess viral evolution. This identified a new variant of the virus in the UK, currently called VUI – 202012/01. About 1100 cases involving this variant have been identified.

Reports stating it is linked to increased transmission are correlative – yes, there is a case surge in UK, and this variant is being isolated in these areas. It is **CORRELATION**, not causation. We cannot say this variant is the CAUSE of increased cases yet.

The mutation led to a slight change in the spike protein. Vaccines account for these types of changes, as we know viruses mutate over time. SARS-CoV-2 mutates relatively slowly compared to other RNA viruses, and there are variants always circulating. Right now, there is NO EVIDENCE that this will affect the efficacy of vaccines.

In summary

There are lots of variants of the virus out there. A new one has been identified in the UK and warrants further investigation. There is no cause for alarm yet.

NEWS BRIEFING

Covid-19: New coronavirus variant is identified in UK

England's health secretary, Matt Hancock, has told parliament that a new variant of covid-19 has been identified and may be driving infections in the south east, leading to headlines about "mutant covid." Jacqui Wise answers some common questions

thebmj| BMJ2020;371:m4857 | doi: 10.1136/bmj.m4857

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<https://www.bmj.com/content/bmj/371/bmj.m4857.full.pdf>

[Unbiased Science Podcast](#)

[#covidvaccine](#)

'No evidence' virus recovery stops reinfection, says WHO

Getty ImagesCopyright: Getty Images

The [World Health Organization](#)

(WHO) says that there is "currently no evidence that people who have recovered from Covid-19 and have antibodies are protected from a second infection".

It has been [suggested that people](#) who survive an infection may develop antibodies that can attack the virus and prevent reinfection.

In the UK, antibody blood testing and surveillance to determine the rate of infection among the public is one of "five pillars" of the government's testing strategy, designed to suppress the virus.

Antibody testing - to show if someone has had the virus in the past - is considered crucial in providing an exit pathway from the current lockdown, as well as providing data to those developing a vaccine.

[Read more about these links.](#)

<https://www.bbc.com/news/live/world-52424263/page/4>

South Korea says recovered coronavirus patients who tested positive again did not relapse: Tests picked up 'dead virus fragments'

- Experts in South Korea said that recovered coronavirus patients who tested positive again were not reinfected and that their virus was not reactivated, as was previously feared.
- More than 260 people who recovered and tested negative subsequently tested positive again. The Korea Centers for Disease Control and Prevention worried that the virus had reactivated after going dormant.
- But the country's infectious-disease experts said on Thursday that the tests were detecting dead fragments of the virus left in patients' bodies.
- South Korea was one of the first countries to report a virus outbreak but quickly implemented widespread testing and contact tracing. It had reported 247 deaths as of Thursday.

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Coronavirus: How exposed is your job?

- 14 May 2020

[Coronavirus pandemic](#)

Millions of workers are doing their day jobs from makeshift set-ups in their living rooms and kitchens, while those in England who can't work from home are now encouraged to go back in if they can do so safely.

But how exposed to coronavirus might you be in your job? And how does that compare to others?

Data from the UK's Office for National Statistics, based on a US survey, puts into context the risk of exposure to disease, as well as the amount of close human contact workers had before social distancing and other safety measures were introduced.

See how your job ranks by using the search below.

While most jobs require people to work relatively closely to others - somewhere in the range between arm's length and a shared office environment - there are very few that typically involve exposure to disease more than once a year.

It's important to note that the data on both exposure to disease at work and how close people are to others is based on interviews that took place with US workers before the pandemic broke out and social distancing recommendations were introduced.

Some jobs may find it easier to adjust than others and there may be slightly different working practices and conditions in the US for certain occupations. The results can be expected to be broadly the same in most developed countries.

Almost all the jobs that have a high exposure to both disease and other people are healthcare

professions, while those who scored low on both measures include artists, lawyers and those in more typical office jobs like marketing, HR and financial advisers.

Cleaners, prison officers and undertakers are among those who have relatively high exposure to disease without so much close interaction with other people.

But the people who might be most at risk to a new infectious disease like Covid-19, are those who have lots of close contact with people, but aren't used to being exposed to disease.

Bar staff, hairdressers and actors fall into this category, as well as taxi drivers and bricklayers.

What do I need to know about the coronavirus?

- A SIMPLE GUIDE: [How do I protect myself?](#)
- STAYING SAFE: [Who should wear a face mask or face covering?](#)
- DO IT FROM HOME: [How to make your own face mask](#)
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- VIDEO: [The 20-second hand wash](#)
- LOOK-UP TOOL: [Check cases in your area](#)

Other figures released by the ONS this week showed that [deaths in the healthcare sector in the UK are no higher on average than those in the wider community](#), although social care workers were dying at higher rates. Given that these healthcare occupations are so exposed to both disease and other people, why have there not been more deaths?

This could be because [workers in these jobs are more likely to be using personal protective equipment \(PPE\)](#) like masks and gloves, says Ben Humberstone, deputy director for health analysis at the ONS. They also follow regular hygiene measures like washing hands.

One of the jobs which had many more coronavirus deaths than the average was taxi drivers. That's a job which scores highly in terms of closeness to other people, particularly among those jobs which are still actually possible to do at the moment. Bar staff, hairdressers and fitness instructors all score higher, but with bars, gyms and hair salons shut, most of these people will be isolating.

As taxi drivers are less exposed to disease in normal times, there may not be an existing culture of regular hand-washing and wearing PPE. [Some firms are trialling partition screens](#) and distributing gloves and masks to protect their drivers and customers.

Methodology

The data in the look-up comes from [this release by the ONS](#).

The figures on proximity to others and exposure to disease come from a survey carried out by the Occupational Information Network (O*NET) in which they asked respondents in the US to place themselves on a 1-5 scale for the following two questions.

1. How physically close to other people are you when you perform your current job?
2. How often does your current job require you to be exposed to diseases or infection?

For exposure to disease, a score of one means they are never exposed, while a score of five means they are exposed daily. It's referring to any disease, not coronavirus specifically.

For the physical closeness question, one means the respondent works more than 100ft away from the nearest other person, while five means they need to touch or be near to touching other people at work. The survey was carried out before social distancing measures were introduced and workers in certain jobs will of course find it easier to adjust than others.

The responses for people in the same jobs were averaged together and extrapolated to form a score of 100. We've looked at these scores out of 100 and given each job a ranking.

If any two jobs had the same score we've given them a tied ranking.

By Daniel Dunford, Sean Willmott, Marcos Gurgel and Katie Hassell.

<https://www.nytimes.com/2020/04/03/opinion/defense-protection-act-covid.html>

<https://www.bbc.com/news/uk-52637008>

(iv) Lack of: Pandemic containment research labs, availability of PPEs, Ventilators, Testing kits and Vaccines development, results and the known the leakage of masks were thought to be serious impediments to managing crises in its early days and directly responsible for magnitude of infections and fatalities of Pandemic,

How to suppress further COVID-19 outbreaks

The only plausible way to achieve herd immunity is through mass vaccination, argues a *Nature Biomedical Engineering* editorial. The alternative — letting the virus spread naturally at an infection fatality rate of something around 0.5–1% — implies that millions would die before transmission slows down. The journal outlines why widespread testing, technology-aided contact tracing, case isolation and the quarantining of contacts will continue to be essential to sustainedly suppress further outbreaks. (Nature Biomedical Engineering | 7 min read)

https://www.nature.com/articles/s41551-020-0567-0?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

[Experts worry that the coronavirus will go on spreading in a 'slow burn' in the U.S.](#)

https://www.google.com/search?source=hp&ei=4fHLXufiFaup_Qbj7LboBA&q=Experts+worry+that+the+coronavirus+will+go+on+spreading+in+a+%E2%80%99slow+burn%E2%80%99+in+the+U.S.&q=Experts+worry+that+the+coronavirus+will+go+on+spreading+in+a+%E2%80%99slow+burn%E2%80%99+in+the+U.S.&gs_lcp=CgZwc3ktYWlQAZoOCAAQ6glQAIQmgEQ5QJQ1cSLAVjVxIsBYMHJiwFoAXAAeACAAUuIAUuSAQExmAEOAECoAEBqgEHZ3dzLXdperABBg&scient=psy-ab&ved=0ahUKEwinvbOct8_pAhWrVN8KHWO2DU0Q4dUDCag&uact=5

VIA:

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

COVID-19: NYC is the Epicenter

[#COVID19](#) [#NYC](#) [#Epicenter](#) [#DPA](#)!? 'NY, the increasingly battered epicenter of the nation's coronavirus outbreak, on Friday reported its highest number of deaths in a single day, prompting state officials to beg the rest of the United States for assistance and to enact an emergency order designed to stave off medical catastrophe.

In the 24 hours through 12 a.m. on Friday, 562 people..died from the virus in NY State, bringing the

total~3,000, double..three days before..same period, 1,427 newly sick..poured into the hosp..although the rate of increase in hospitalizations seemed to stabilize, suggesting that the extreme social-distancing measures put in place last month may have started working..Despite the glimmer..new statistics..reminder of the gale-force strength of the crisis that is thr NY, where >102,000 people — nearly as many as in Italy and Spain.. — have now tested positive for the virus. The situation, as it has been for wks, was part. dire in NYC, where some hospitals have reported running out of body bags & others..plan for the unthinkable prosp. of rationing care. "It is hard to put fully into words what we are all grappling with as we navigate our way through this pandemic," Vicki L. LoPachin, the chief medical officer of the Mount Sinai Health System,'

Coronavirus in N.Y.: Toll Soars to Nearly 3,000 as State Pleads for Aid

nytimes.co

[VIA:](#)

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[#WHO](#) [#CDCP](#) [#ReleaseData](#) [#UrgeWearingMasks](#) [#Selfisolation](#) [#PresTrumpDeclaresVoluntaryStatesRights](#)
 'Pres. Trump said..CDC & P was urging all Americans to wear a mask when they leave their homes, but he [immed.undercut](#) the msg. by repeat. calling the recomm. vol. & prom. that he would not wear one himself. Sr. off. at the C.D.C. have been pushing the pres. for days to advise everyone — even people who appear to be healthy — to wear a mask or a scarf that covers their mouth & nose when shopp. at the grocery store or while in other pub. places..The researchers asked 246 people w/ susp. resp. viral inf. to breathe into a machine for 30 minutes to measure the amt. of virus they exhaled. Half of the particip. wore a face mask, while the other half perf. the expt. w/o any face covering. Among 111 people whose infections were later confirmed with a lab test, masks stopped the spread of all seasonal coronavirus and more than 70% of flu virus infections.. Masks were not as eff. in red. transmission of rhinoviruses, or the common cold. For the current coronavirus pandemic, all health officials, including those at the W.H.O. & C.D.C., agree that masks should be worn by anyone w/ symptoms like a cough or fever, & anyone caring for someone with a confirmed or suspected case.'

COVID19: CDCP Urges Wearing Masks and Self-Isolation

[VIA:](#)

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Illinois Governor J.B. Pritzker faults White House for shortages in coronavirus testing

Washington — Illinois Governor J.B. Pritzker said Sunday he believes the White House should have stepped in earlier to ensure states have the supplies needed for coronavirus testing, especially as states begin looking toward a reopening of their economies and an easing of restrictions.

"Much of what came out of the White House for many weeks was not helpful," Pritzker, a Democrat, said Sunday on "Face the Nation." "We needed the White House to lead on the Defense Production Act to help us get swabs, to help us get VTM, to help us get reagents. That really hasn't much happened."

Transcript: Illinois Governor J.B. Pritzker on "Face the Nation"

Pritzker, a Democrat, said the White House has informed his office the state will receive 600,000 swabs, which he said he is "very grateful for." But he said it is his fellow governors who have "risen to the challenge" to meet the needs of states battling the [coronavirus](#) pandemic.

Illinois governor faults White House for testing supply shortages

A Debate Over Masks Uncovers Deep White House Divisions

[nytimes.com](#)

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public what the need is & how the need will be met today, next week & in the months to come. What specifically has been contracted for, in how many units & on what timeline? Where there is a gap

The Coronavirus Outbreak

- **Frequently Asked Questions and Advice (see Section 1 Introduction)**

Updated April 11, 2020

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<https://www.nytimes.com/2020/05/02/us/politics/vaccines-coronavirus-research.html>

The Coronavirus Is Mutating. What Does That Mean for a Vaccine?

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#NYT #COVID19 ##Mutations #MayAffVaccineEffect #LSINJCoreMission #AsInDeepSpace #OrSubatomicOrg

NYT:

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Can You Get Covid-19 Again? It's Very Unlikely, Experts Say

Reports of reinfection instead may be cases of drawn-out illness. A decline in antibodies is normal after a few weeks, and people are protected from the coronavirus in other ways.

Megan Kent of Salem, Mass., tested positive for coronavirus in March 30 after feeling sick. She got better, went back to work and then felt sick again in May, testing positive a second time for the virus.Credit...

Kayana Szymczak for The New York Times

By [Apoorva Mandavilli](#)

- Published July 22, 2020Updated July 23, 2020, 3:33 a.m. ET

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Given these more likely scenarios, Dr. Mina had choice words for the physicians who caused the panic over reports of reinfections. "This is so bad, people have lost their minds," he said. "It's just sensationalist click bait."

In the early weeks of the pandemic, some people in China, Japan and South Korea tested positive twice, [sparking similar fears](#). South Korea's Centers for Disease Control and Prevention [investigated 285 of those cases](#), and found that several of the second positives came two months after the first, and in one case 82 days later. Nearly half of the people had symptoms at the second test. But the researchers were unable to grow live virus from any of the samples, and the infected people hadn't spread the virus to others.

[Continue reading the main story](#)

"It was pretty solid epidemiological and virological evidence that reinfection was not happening, at least in those people," said Angela Rasmussen, a virologist at Columbia University in New York.

Most people who are exposed to the coronavirus [make antibodies](#) that can destroy the virus; the more severe the symptoms, the

stronger the response. (A few people don't produce the antibodies, but that's true for any virus.) Worries about reinfection have been fueled by recent studies suggesting that these antibody levels plummet.



Image

Medical workers administering an antibody test. While antibodies get a lot of attention, scientists say immunity also has a lot to do with a person's pathogen-fighting memory T and B cells. Credit...Shannon Stapleton/Reuters

For example, a study published in June found that antibodies to one part of the virus [fell to undetectable levels](#) within three months in 40 percent of asymptomatic people. Last week, a study that has not yet been published in a peer-reviewed journal showed that neutralizing antibodies — the powerful subtype that can stop the virus from infecting cells — [declined sharply](#) within a month.

"It's actually incredibly depressing," said Michael Malim, a virologist at King's College London. "It's a huge drop."

But other work suggests that the antibody levels decline — and then stabilize. In [a study of nearly 20,000 people](#) posted to the online server MedRxiv on July 17, the vast majority made plentiful antibodies, and half of those with low levels still had antibodies that could destroy the virus.

"None of this is really surprising from a biological point of view," said Florian Krammer, an immunologist at the Icahn Mount Sinai School of Medicine who led that study.

[Continue reading the main story](#)

Dr. Mina agreed. "This is a famous dynamic of how antibodies develop after infection: They go very, very high, and then they come back down," he said.

He elaborated: The first cells that secrete antibodies during an infection are called plasmablasts, which expand exponentially into a pool of millions. But the body can't sustain those levels. Once the infection wanes, a small fraction of the cells enters the bone marrow and sets up shop to create long-term immunity memory, which can churn out antibodies when they're needed again. The rest of the plasmablasts wither and die.

[The Coronavirus Outbreak >](#)

Frequently Asked Questions

Updated July 22, 2020

[You May Have Antibodies After Coronavirus Infection. But Not for Long.](#)

[June 18, 2020](#)

[After Recovery From the Coronavirus, Most People Carry Antibodies](#)

[May 7, 2020](#)

[Prototype Vaccine Protects Monkeys From Coronavirus](#)

[May 20, 2020](#)



[They Recovered From the Coronavirus. Were They Infected Again?](#)

[Feb. 29, 2020](#)



Apoorva Mandavilli is a reporter for The Times, focusing on science and global health. She is the 2019 winner of the Victor Cohn Prize for Excellence in Medical Science Reporting. [@apoorva_nyc](#)

https://www.nytimes.com/2020/07/22/health/covid-antibodies-herd-immunity.html?campaign_id=9&emc=edit_nn_20200723&instance_id=20544&nl=the-morning®i_id=89889947&segment_id=34125&te=1&user_id=a511a498d5c17d0f827c2229ec77f22f

'No evidence' virus recovery stops reinfection, says WHO

Getty ImagesCopyright: Getty Images

The [World Health Organization](#)

(WHO) says that there is "currently no evidence that people who have recovered from Covid-19 and have antibodies are protected from a second infection". It has been [suggested that people](#) who survive an infection may develop antibodies that can attack the virus and prevent reinfection.

In the UK, antibody blood testing and surveillance to determine the rate of infection among the public is one of "five pillars" of the government's testing strategy, designed to suppress the virus.

Antibody testing - to show if someone has had the virus in the past - is considered crucial in providing an exit pathway from the current lockdown, as well as providing data to those developing a vaccine.

[Read more about these links.](#)

<https://www.bbc.com/news/live/world-52424263/page/4>

South Korea says recovered coronavirus patients who tested positive again did not relapse: Tests picked up 'dead virus fragments'

- Experts in South Korea said that recovered coronavirus patients who tested positive again were not reinfected and that their virus was not reactivated, as was previously feared.
- More than 260 people who recovered and tested negative subsequently tested positive again. The Korea Centers for Disease Control and Prevention worried that the virus had reactivated after going dormant.
- But the country's infectious-disease experts said on Thursday that the tests were detecting dead fragments of the virus left in patients' bodies.
- South Korea was one of the first countries to report a virus outbreak but quickly implemented widespread

testing and contact tracing. It had reported 247 deaths as of Thursday.

[Visit Business Insider's homepage for more stories](#)

Coronavirus: How exposed is your job?

- 14 May 2020

📄 [Coronavirus pandemic](#)

Millions of workers are doing their day jobs from makeshift set-ups in their living rooms and kitchens, while those in England who can't work from home are now encouraged to go back in if they can do so safely.

But how exposed to coronavirus might you be in your job? And how does that compare to others?

Data from the UK's Office for National Statistics, based on a US survey, puts into context the risk of exposure to disease, as well as the amount of close human contact workers had before social distancing and other safety measures were introduced.

See how your job ranks by using the search below.

h exposure to disease without so much close interaction with other people.

But the people who might be most at risk to a new infectious disease like Covid-19, are those who have lots of close contact with people, but aren't used to being exposed to disease. Bar staff, hairdressers and actors fall into this category, as well as taxi drivers and bricklayers.

What do I need to know about the coronavirus?

- A SIMPLE GUIDE: [How do I protect myself?](#)
- STAYING SAFE: [Who should wear a face mask or face covering?](#)
- DO IT FROM HOME: [How to make your own face mask](#)
- AVOIDING CONTACT: [The rules on self-isolation and exercise](#)
- VIDEO: [The 20-second hand wash](#)
- LOOK-UP TOOL: [Check cases in your area](#)

Other figures released by the ONS this week showed that

[deaths in the healthcare sector in the UK are no higher on average than those in the wider community](#), although social care workers were dying at higher rates. Given that these healthcare occupations are so exposed to both disease and other people, why have there not been more deaths?

This could be because [workers in these jobs are more likely to be using personal protective equipment \(PPE\)](#) like masks and gloves, says Ben Humberstone, deputy director for health analysis at the ONS. They also follow regular hygiene measures like washing hands.

One of the jobs which had many more coronavirus deaths than the average was taxi drivers. That's a job which scores highly in terms of closeness to other people, particularly among those jobs which are still actually possible to do at the moment. Bar staff, hairdressers and fitness instructors all score higher, but with bars, gyms and hair salons shut, most of these people

will be isolating.

As taxi drivers are less exposed to disease in normal times, there may not be an existing culture of regular hand-washing and wearing PPE. [Some firms are trialling partition screens](#) and distributing gloves and masks to protect their drivers and customers.

Methodology

The data in the look-up comes from [this release by the ONS](#).

The figures on proximity to others and exposure to disease come from a survey carried out by the Occupational Information Network (O*NET) in which they asked respondents in the US to place themselves on a 1-5 scale for the following two questions.

1. How physically close to other people are you when you perform your current job?
2. How often does your current job require you to be exposed to diseases or infection?

For exposure to disease, a score of one means they are never exposed, while a score of five means they are exposed daily.

It's referring to any disease, not coronavirus specifically. For the physical closeness question, one means the respondent works more than 100ft away from the nearest other person, while five means they need to touch or be near to touching other people at work. The survey was carried out before social distancing measures were introduced and workers in certain jobs will of course find it easier to adjust than others.

The responses for people in the same jobs were averaged together and extrapolated to form a score of 100. We've looked at these scores out of 100 and given each job a ranking. If any two jobs had the same score we've given them a tied ranking.

By Daniel Dunford, Sean Willmott, Marcos Gurgel and Katie Hassell.

between need & supply, use the D.P.A. to close it.'

<https://www.bbc.com/news/uk-52637008>

Coronavirus: Hospitals in Brazil's São Paulo 'near collapse'

The mayor of Brazil's largest city, São Paulo, has said its health system could collapse as demand grows for emergency beds to deal with coronavirus cases. Bruno Covas said the city's public hospitals had reached 90% capacity and could run out of space in two weeks. He accused those who flouted lockdown rules of playing "Russian roulette" with people's lives. São Paulo is one of the country's worst-hit regions, with almost 3,000 deaths so far. The health ministry reported 7,938 new cases in the past 24 hours, taking the total above 241,000. Only the US, Russia and the UK have higher numbers. The death toll in Brazil over 24 hours was 485, meaning that the total number of deaths is 16,118 - the world's sixth-highest figure.

- [Coronavirus pandemic: Tracking the global outbreak](#)
- ['Undocumented virus explosion' sweeps Brazil](#)
- [Brazil records highest daily rise in virus deaths](#)

Health experts have warned that the real number of confirmed infections in the country may be far higher than the official records, due to a lack of testing.

<https://www.bbc.com/news/world-latin-america-52701524>

Part 5: Entire CNN coronavirus town hall (April 30)

Bill Gates explains the next steps ahead for a coronavirus vaccine with CNN's Anderson Cooper and Dr. Sanjay Gupta during a CNN town hall on the coronavirus pandemic.

[Source: CNN](#)

https://www.cnn.com/videos/media/2020/05/01/entire-april-30-coronavirus-town-hall-part-5-sot-vpx.cnn?hpt=ob_blogfooterold

(v) Projection of aerosols beyond the current 6 feet (even continuing beyond 12 feet to 16 feet) of social distancing; (viral) matter,

Model suggests how airborne coronavirus particles spread in grocery store aisles

By [Rachael Rettner - Senior Writer](#) April 09, 2020

Based on their findings, the researchers recommend avoiding busy indoor spaces.

Scientists in Finland have modeled how small airborne viral particles spread in a grocery store setting, which may help us better understand the spread of the new coronavirus

[VIA:](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19](#) [#Dispersal](#) [#Aerosols](#) [#GroceryStoreAisles](#) 'Scientists in Finland have modeled how small airborne viral particles spread in a grocery store setting, which may help us better understand the spread of the new coronavirus.'

For the study, researchers at Aalto University, the Finnish Meteorological Institute, the VTT Technical Research Centre of Finland and the University of Helsinki used a supercomputer to simulate the spread of small viral particles leaving a person's respiratory tract through coughing. They simulated a scenario in which a person coughs in a store aisle between shelves, and took into account ventilation.

They found that, in this situation, an aerosol "cloud" spreads outside the immediate vicinity of the person coughing, and diluted as it spreads, the authors said. But this process takes up to several minutes, and in the meantime, a person who walks by could in theory inhale the small particles.'

https://www.livescience.com/how-coronavirus-spreads-grocery-stores.html?utm_source=Selligent&utm_medium=email&utm_campaign=9160&utm_content=LVS_newsletter+&utm_term=4003045&m_i=U87NyAu143V2AYBZwWnflKi4IW%2B0mWKRcQIWvx%2Bbug7IvTIV03XDI_VZeHx4Ld7HwOj4NjljGWuxK33oVMkOTn%2BagCx4cyN_xbC5v4UUi

See how a mask affects how a cough travels

[Newsroom](#)

A lab at Florida Atlantic University is simulating a human cough to understand how far and fast cough droplets can spread.

[Source: CNN](#)

Glycerin/Water mixture forced out of 'mouth' of a 'dummy' with a pump

This generates an aerosol of 10 – 20 micron (μ) droplets (size of aerosols in a cough).

MEASURED WITH NO MASKS, MASKS, INSIDE & OUTSIDE.

The rate and extent of travel of the aerosol is followed with a laser activated green light (fluoresces) against distance markers:

NO MASK RATES:

3 feet in 5 secs

6 feet (LIMIT OF SOCIAL DISTANCING GUIDELINES)

9 feet in 10 secs

12 feet in additional 30 – 40 secs

At 9 feet droplets hang for 2 – 3 minutes but at a ~8x lower concentration at 6 feet

Hung droplets can carry disease

MASKED EXPERIMENTS:

Does not travel but emerges from the sides of the masks, disperses and hangs

Covered with fist/hand disperses further

<https://www.cnn.com/videos/health/2020/05/04/cough-coronavirus-masks-kaye-vpx.cnn>

Via Richard Millman:

Efficacy of Face Shields Against Cough Aerosol Droplets from a Cough Simulator

[William G. Lindsley](#),¹ [John D. Noti](#),¹ [Francoise M. Blachere](#),¹ [Jonathan V. Szalajda](#),² and [Donald H. Beezhold](#)¹

Abstract

Health care workers are exposed to potentially infectious airborne particles while providing routine care to coughing patients. However, much is not understood about the behavior of these aerosols and the risks they pose. We used a coughing patient simulator and a breathing worker simulator to investigate the exposure of health care workers to cough aerosol droplets, and to examine the efficacy of face shields in reducing this exposure. Our results showed that 0.9% of the initial burst of aerosol from a cough can be inhaled by a worker 46 cm (18 inches) from the patient. During testing of an influenza-laden cough aerosol with a volume median diameter (VMD) of 8.5 μm, wearing a face shield reduced the inhalational exposure of the worker by 96% in the period immediately after a cough. The face shield also reduced the surface contamination of a respirator by 97%. When a smaller cough aerosol was used (VMD = 3.4 μm), the face shield was less effective, blocking only 68% of the cough and 76% of the surface contamination. In the period from 1 to 30 minutes after a cough, during which the aerosol had dispersed throughout the room and larger particles had settled, the face shield reduced aerosol inhalation by only 23%. Increasing the distance between the patient and worker to 183 cm (72 inches) reduced the exposure to influenza that occurred immediately after a cough by 92%. Our results show that health care workers can inhale infectious airborne particles while treating a coughing patient. Face shields can substantially reduce the short-term exposure of health care workers to large infectious aerosol particles, but smaller particles can remain airborne longer and flow around the face shield more easily to be inhaled. Thus, face shields provide a useful adjunct to respiratory protection for workers caring for patients with respiratory infections. However, they cannot be used as a substitute for respiratory protection when it is needed.

[Supplementary materials are available for this article. Go to the publisher's online edition of *Journal of Occupational and Environmental Hygiene* for the following free supplemental resource: tables of the experiments performed, more detailed information about the aerosol measurement methods, photographs of the experimental setup, and summaries of the experimental data from the aerosol measurement devices, the qPCR analysis, and the VPA.]

Keywords: airborne particulate matter, health care workers, infectious disease transmission, protective devices, respiratory infections/prevention, universal precautions

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4734356/>

New preprint of interest on SARS-CoV-2 Aerosol and surface stability #COVID19 #Coronavirus

By [Jonathan Eisen](#) Posted in [Built Environment Topics](#) [Coronavirus](#)

Posted on [March 11, 2020](#)

There is a new preprint of interest to those interested in SARS-CoV-2, the novel coronavirus spreading around the world.

Details:

[Aerosol and surface stability of HCoV-19 \(SARS-CoV-2\) compared to SARS-CoV-1](#)

Neeltje van Doremalen, Trenton Bushmaker, Dylan Morris, Myndi Holbrook, Amandine Gamble, Brandi Williamson, Azaibi Tamin, Jennifer Harcourt, Natalie Thornburg, Susan Gerber, Jamie Lloyd-Smith, Emmie de Wit, Vincent Munster

doi: <https://doi.org/10.1101/2020.03.09.20033217>

Abstract:

HCoV-19 (SARS-2) has caused >88,000 reported illnesses with a current case-fatality ratio of ~2%. Here, we investigate the stability of viable HCoV-19 on surfaces and in aerosols in comparison with SARS-CoV-1. Overall, stability is very similar between HCoV-19 and SARS-CoV-1. We found that viable virus could be detected in aerosols up to 3 hours post aerosolization, up to 4 hours on copper, up to 24 hours on cardboard and up to 2-3 days on plastic and stainless steel. HCoV-19 and SARS-CoV-1 exhibited similar half-lives in aerosols, with median estimates around 2.7 hours. Both viruses show relatively long viability on stainless steel and polypropylene compared to copper or cardboard: the median half-life estimate for HCoV-19 is around 13 hours on steel and around 16 hours on polypropylene. Our results indicate that aerosol and fomite transmission of HCoV-19 is plausible, as the virus can remain viable in aerosols for multiple hours and on surfaces up to days.

It is important to remember this is a non peer reviewed preprint. But I think there is some interesting material in here worth checking out.

<http://microbe.net/2020/03/11/new-preprint-of-interest-on-sars-cov-2-aerosol-and-surface-stability-covid19-coronavirus/>

(vi) Viability of the virus on hard or inanimate (hard, wooden and metallic) surfaces for upto 72 hours

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(vii) Testing kits and vaccine development: reliability of tests and accuracy of numbers recovered from testing,

Oxford coronavirus vaccine safe and promising, according to early human trial results published in the Lancet

By [William Booth](#) and [Carolyn Y. Johnson](#)

July 20, 2020 at 2:52 PM EDT

LONDON — A University of Oxford group and the British-Swedish pharmaceutical company [AstraZeneca](#) reported Monday that their coronavirus vaccine candidate, on which the U.S. and European governments have placed substantial bets, was shown in early-stage human trials to be safe and to stimulate a strong immune response.

The study, published in the British [medical journal the Lancet](#) and involving 1,077 volunteers, was described as promising. A [second report](#) in the same publication on a Chinese vaccine showed what researchers not involved in the study described as modest positive results.

The two vaccines are among 23 candidates now being tested in human trials, according to a running tally kept by the World Health Organization. More than 130 others are in preclinical studies. None have yet been proved to protect people from infection or illness. And scientists caution that no one yet knows what level of immune

response will be a shield against the virus in the real world through a cross section of humanity — young to old, healthy to those with preexisting conditions.

But with hopes soaring that a number of vaccines will soon emerge to quiet the global pandemic, governments are making massive investments and pharmaceutical companies are readying production.

China [approved the use of its vaccine](#) within its military in late June.

The U.S. government has pledged up to \$1.2 billion toward the Oxford effort and secured a promise of 300 million doses by October. A European alliance has claimed 400 million doses, while the British government has dibs on 100 million doses, alongside another possible candidate being developed by Imperial College London.

British Prime Minister Boris Johnson was enthusiastic about the early-stage Oxford results.

“This is very positive news. A huge well done to our brilliant, world-leading scientists & researchers at @UniofOxford,” [Johnson tweeted](#) Monday. “There are no guarantees, we’re not there yet & further trials will be necessary — but this is an important step in the right direction.”

The record-breaking pace of vaccine developers has heartened many who want to see the virus tamed in the new year and life return to normal.

But much about this novel pathogen remains unknown. Last week, British researchers reported that people infected with the virus may see defensive antibodies against it fade within months, raising the possibility that long-term protection may be elusive — and that treatments may offer more promise than vaccines.

Still, vaccine researchers at Oxford and elsewhere are optimistic they can stimulate the production of T cells that can stay in circulation for years and serve as a permanent praetorian guard against infection.

“We hope this means the immune system will remember the virus, so that our vaccine will protect people for an extended period,” Andrew Pollard, lead author of the Oxford study, said in a statement. “However, we need more research before we can confirm the vaccine effectively protects against SARS-CoV-2 infection, and for how long any protection lasts.”

Large-scale, real-world trials of the Oxford vaccine — named ChAdOx1 nCoV-19 — are underway in Britain, Brazil and South Africa. The United States plans to test it later this summer, along with a handful of other candidates, in clinical trials, each with about 30,000 volunteers.

The Oxford vaccine was made from a weakened and non-replicating version of a [common cold](#) virus, an adenovirus. It has been engineered to express a bit of the [coronavirus](#) that produces the spike protein that the virus uses to enter and infect human cells.

The early trials found no serious side effects.

Paul Offit, director of the Vaccine Education Center at Children’s Hospital of Philadelphia, said it is still unclear how protective the immune memory in T cells will be against the coronavirus, in part because immune memory is typically more valuable against pathogens that have a longer incubation period than the coronavirus.

His biggest concern about the Oxford study was that while the vaccine triggered the immune system best when a second shot was administered, that two-dose regimen was only tested in 10 patients.

“I’d want to see, in a Phase 2 trial, two doses consistently inducing a neutralizing antibody response, and that it’s relatively long-lived — not months, not a few weeks,” Offit said.

Infectious-disease experts caution that vaccines must be widely administered to protect the general population, and in an era of widespread skepticism and even overt hostility toward research and scientists, any vaccine that underperforms or causes serious side effects will set back the effort.

An [editorial in the Lancet](#) warned, “The race for a vaccine moves fast, as the need for a solution is evident, but we cannot forget that safety is of the highest importance.”

In a reflection of how widely anticipated even very early vaccine results have become during the pandemic, results from the Oxford trial were leaked to news outlets in the days before publication, and the hype continued to build over the weekend.

“To me, the message is it looks like it warrants further study. There’s no showstopper here,” said Peter Hotez, dean of the National School of Tropical Medicine at the Baylor College of Medicine. “The bottom line is there’s maybe some promise, but definitely you cannot declare victory by any means on these two vaccines. There’s nothing here that would cause me to say we can now release this to the public.”

The Chinese candidate was tested in 500 people and shown to be relatively safe, causing side effects such as pain at the injection site, fevers and headaches, but with some severe reactions. It induced an immune response in most participants. However, the vaccine’s early performance has been disappointing to some scientists, and there have been worries that there may already be a reason it will not work on many people. There is substantial immunity in the human population to the technology at the core of the vaccine — a harmless virus that is used to ferry in a gene that triggers the immune response to the coronavirus.

The vaccine triggered the production of neutralizing antibodies that can block the virus in only about half the test subjects — 59 percent of those given a high dose and 47 percent given a lower dose. Older people tended to respond less favorably.

The ultimate proof of whether any vaccine works will be large-scale clinical trials that use a flip of the coin to randomly decide whether thousands of people receive the experimental vaccine or a placebo shot — and then wait to see whether the vaccinated group is protected against infection or severe disease.

The immune system uses a multi-pronged approach to defeat any pathogen, and it is not yet known exactly what protects against a coronavirus infection.

Much public attention has focused on antibodies that block and neutralize the virus. Experimental vaccines from biotechnology company Moderna and pharmaceutical giant Pfizer have been shown to trigger antibodies at similar or greater levels than people who are naturally recovering from coronavirus infections, a benchmark that many scientists consider a hopeful sign.

But there are other forms of immune memory, including T cells, that are an area of increasing interest as evidence accumulates that antibody levels can drop off quickly in people naturally recovering from an infection. The Oxford and Chinese studies, like studies from [Moderna](#) and [Pfizer](#), measured some T-cell responses.

One type of T cell, helper T cells, can be compared to “the football coach, where the coach calls the play,” said Angela Rasmussen, a virologist at Columbia University. “They’re coordinating the immune response of all the other cells in the immune system — those are really important.” The helper T cells can instruct the immune system to produce virus-fighting antibodies.

There are also “killer,” or cytotoxic, T cells, which are capable of destroying infected cells.

“It is unclear the role that cytotoxic T cells play in amelioration of covid-19 disease,” Offit said. “It is, in a sense, a second line of defense.”

Johnson reported from Boulder, Colo.

[U.S., Britain and Canada say Russian cyberspies are trying to steal coronavirus vaccine research](#)

[Elegant but unproven, RNA experiments leap to the front in coronavirus vaccine race. Will they work?](#)

[Coronavirus vaccine developers have a ‘bizarre’ problem. There’s not enough sick people.](#)

Coronavirus: What you need to read

The Washington Post is providing some coronavirus coverage free, including:

Updated July 21, 2020

The latest: [Coronavirus in the U.S.](#)

Coronavirus maps: [Cases and deaths in the U.S.](#) | [Cases and deaths worldwide](#) | [Which states are reopening and closing again](#)

What you need to know: [Summertime activities & coronavirus](#) | [Your life at home](#) | [Personal finance guide](#) | [Make your own fabric mask](#) | Follow all of our [coronavirus coverage](#) and [sign up for our free newsletter](#).

How to help: [Your community](#) | [Seniors](#) | [Restaurants](#) | [Keep at-risk people in mind](#)

Have you been **hospitalized for covid-19**? [Tell us whether you've gotten a bill](#).

[William Booth](#)

William Booth is The Washington Post's London bureau chief. He was previously bureau chief in Jerusalem, Mexico City, Los Angeles and Miami. [Follow](#)

[Carolyn Y. Johnson](#)

Carolyn Johnson is a science reporter. She previously covered the business of health and the affordability of health care to consumers. [Follow](#)

https://www.washingtonpost.com/cdn.ampproject.org/c/s/www.washingtonpost.com/world/europe/oxford-coronavirus-vaccine-phase-1-lancet/2020/07/20/12fbbc92-c857-11ea-a825-8722004e4150_story.html?outputType=amp

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

likes this

[Peter Schellinck • 2nd SIA at EBRD, EFQM, Board AFL BCTE, Member Chatham House, IoD, ECGL, GDPR Institute, Club of Rome, ESG expert 1d •](#)

The race is on to get a vaccine approved and into circulation. A separate report published today finds that a Chinese candidate also produces an immune response, while American biotech firm Moderna revealed last week that its candidate produces a strong immune response.

VACCINES ARE EFFECTIVE: DELIVERY IS SKETCHY (IN THE US)

Coronavirus Vaccine Tracker









By [Carl Zimmer](#), [Jonathan Corum](#) and [Sui-Lee Wee](#) Updated Dec. 29, 2020

Vaccines typically require years of research and testing before reaching the clinic, but in 2020, scientists embarked on a race to produce safe and effective coronavirus vaccines in record time. Researchers are currently testing **64 vaccines** in clinical trials on humans, and 19 have reached the final stages of testing. At least 85 preclinical vaccines are under active investigation in animals.

New additions and recent updates

Dec. 28	Novavax begins a Phase 3 trial in the United States.
Dec. 27	Kazakhstan moves to Phase 3.
Dec. 24	Iran enters Phase 1.
Dec. 23	Canada approves the Moderna vaccine.
Dec. 22	Maryland-based Altimmune enters Phase 1.
Dec. 21	The European Union authorizes the Pfizer-BioNTech vaccine.
Dec. 19	Kazakhstan moves to Phase 2.
Dec. 18	The F.D.A. authorizes Moderna 's vaccine for emergency use.
Dec. 18	Cuba's Soberana 2 vaccine moves to Phase 2.
Dec. 17	Japan's Shionogi launches a Phase 1/2 trial.
Dec. 17	South Korea's GeneOne enters Phase 1/2.

Leading vaccines

Developer	Type	Phase	Status
 Pfizer-BioNTech	mRNA	23	Approved in Canada and other countries. Emergency use in U.S. and other countries.
 Moderna	mRNA	3	Approved in Canada. Emergency use in U.S.
 Gamaleya	Adenovirus	3	Early use in Russia. Emergency use in Belarus, Argentina.
 CanSino	Adenovirus	3	Limited use in China.
 Johnson & Johnson	Adenovirus	3	
 Oxford-AstraZeneca	Adenovirus	23	
 Vector Institute	Protein	3	Early use in Russia.
 Novavax	Protein	3	
 Sinovac	Inactivated	3	Limited use in China.
 Sinopharm-Beijing	Inactivated	3	Approved in U.A.E., Bahrain. Limited use in China.



Sinopharm-
Wuhan

Inactivated

3

Limited use in China, U.A.E.

Below is a list of all vaccines that have reached trials in humans, along with a selection of promising vaccines being tested in animals. For an overview of treatments for Covid-19, see our [Coronavirus Drug and Treatment Tracker](#).

<https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html>

World-leading Oxford coronavirus vaccine produces immune response

[Dave Lawler](#), author of [World](#)

https://www.nytimes.com/2020/07/22/us/politics/pfizer-coronavirus-vaccine.html?campaign_id=9&emc=edit_nn_20200723&instance_id=20544&nl=the-morning®i_id=89889947&segment_id=34125&te=1&user_id=a511a498d5c17d0f827c2229ec77f22f



Illustration: Eniola Odetunde/Axios

A coronavirus vaccine from Oxford University and AstraZeneca, perhaps the most promising candidate currently in development, appears to be safe and produces an immune response, according to [preliminary findings](#) published in *The Lancet*.

Why it matters: The race is on to get a vaccine approved and into circulation. A separate report published today finds that a Chinese candidate also produces an immune response, while American biotech firm Moderna revealed last week that its candidate produces a strong immune response.

State of play: The Oxford vaccine is in phase three trials, the last step before possible approval. [According to the Economist](#), it could be cleared for emergency use as early as October.

- Moderna's vaccine is moving into phase three now, while another candidate from Pfizer is believed to be relatively close behind.
- China has at least six candidates currently in trials, one of which is in phase three.
- Russia says a candidate from its state-run Gamaleya Institute will enter phase three trials next month.
- According to the Milken Institute's [tracker](#), there are 197 candidate vaccines in development, 19 of which are in some stage of clinical trials.

What to watch: While it seems increasingly likely that a vaccine will be available by early next year — the timeline suggested by Anthony Fauci — it remains unclear who will get it first.

- The U.K. announced today that it had [bought up](#) millions of doses not only of the Oxford vaccine, but of candidates from France and Germany.
- That's another sign that this could play out as a bidding war, rather than the sort of equitable distribution European leaders have discussed.

- President Trump, meanwhile, has at times described the vaccine race in America First terms. The U.S. is pouring billions of dollars into developing and manufacturing vaccines and expects to claim millions of doses if and when they are approved.

https://www.axios.com/oxford-coronavirus-vaccine-produces-immune-response-633a2c97-3109-4f88-83ac-b66535935e49.html?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosworld&stream=world

Pfizer Gets \$1.95 Billion to Produce Coronavirus Vaccine by Year's End

Two pharmaceutical companies announced a nearly \$2 billion contract for 600 million doses of a vaccine, with the first 100 million promised before the end of the year.

The first patient enrolled in Pfizer's Covid-19 vaccine trial receiving an injection at the University of Maryland School of Medicine in Baltimore in May. Credit...University of Maryland School of Medicine, via Associated Press

By [Noah Weiland](#), [Denise Grady](#) and [David E. Sanger](#)

- July 22, 2020

WASHINGTON — As nations around the world race to lock up [coronavirus vaccines](#) even before they are ready, the Trump administration on Wednesday made one of the largest investments yet, announcing a nearly \$2 billion contract with Pfizer and a German biotechnology company for 100 million doses by December.

The contract is part of what the White House calls the Warp Speed project, an effort to drastically shorten the time it would take to manufacture and distribute a working [vaccine](#). So far, the United States has put money into more than a half dozen efforts, hoping to build manufacturing ability for an eventual breakthrough.

Europe has a parallel effort underway. Germany recently took a 23 percent stake in a German firm, CureVac, that [President Trump once tried to lure](#) to American shores in hopes that its vaccine, if successful, would be distributed in the United States first. A [European-led fund-raising effort in May](#) brought \$8 billion in pledges from the world's governments, philanthropists and leaders for coronavirus vaccine research, even with the United States sitting out the conference.

China, meantime, has militarized the effort: Researchers associated with the Academy of Military Medical Sciences have developed one of China's leading vaccine candidates, and another Chinese firm, Sinopharm Group, announced in June that it was beginning Phase 3 trials in the United Arab Emirates.

[Continue reading the main story](#)

The Pfizer contract, an agreement to ensure the pharmaceutical giant has a market for its work, is the biggest splash yet by the Americans. No vaccine has yet been developed, and it is not clear whether the Pfizer version will work. But if the vaccine being produced by Pfizer and BioNTech, the German firm, proves to be safe and effective in clinical trials, the companies say they could manufacture those first 100 million doses by the end of the year.

Under [the arrangement](#), the federal government would obtain that first batch for \$1.95 billion, or about \$20 a dose, with the rights to acquire up to 500 million more, or 600 million total. Americans would receive the vaccine for free. Before it could be distributed, it would need emergency approval by the Food and Drug Administration. But the U.S. government does not pay the nearly \$2 billion until the drug is approved and the first 100 million doses are delivered.

Pfizer said that large-scale safety and efficacy trials were to begin this month, with regulatory review set for as early as October, although nothing was guaranteed.

“Depending on success in clinical trials, today’s agreement will enable the delivery of approximately 100 million doses of vaccine being developed by Pfizer and BioNTech,” Alex M. Azar II, the health secretary, said in a statement announcing the deal.

On Monday, Pfizer and [AstraZeneca](#), a British-Swedish drug company developing a potential [vaccine](#) with Oxford University, [released data](#) suggesting that their vaccines could stimulate strong immune responses with only minor side effects.

[Editors’ Picks](#)

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But unlike AstraZeneca, which has also obtained funding from the U.S. government, Pfizer did not receive a contract for its earlier research and development efforts — only for the doses and their distribution.

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By refusing funding up until now, Pfizer was able to avoid drawn-out contractual negotiations and get its vaccine to trials, company officials say.

“We didn’t accept the federal government funding solely for the reason that we wanted to be able to move as quickly as possible with our vaccine candidate into the clinic,” John Young, Pfizer’s chief business officer, said on Tuesday at [a congressional hearing](#) with executives from five vaccine manufacturers.

Pfizer and BioNTech are developing a [vaccine](#) candidate that uses genetic material from the virus, [known as messenger RNA](#), to stimulate the immune system without making the recipient sick. The technology can create a vaccine quickly, but has not yet produced one that has been approved and marketed.

Moderna, a Massachusetts biotech company, received \$483 million from the U.S. government for its vaccine development and is also using mRNA technology. By putting the might of an industry giant behind it, Pfizer is making the technology mainstream.

The lack of a track record has prompted some skepticism about this approach, but Dr. Kathrin Jansen, a senior vice president and the head of vaccine research and development at Pfizer, dismissed the criticism.

“That’s not a scientific mind-set — that just because it’s new, it will fail,” she said in an interview.

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Earlier in her career, Dr. Jansen worked for Merck, where she led its development of a vaccine to prevent cervical cancer, which is caused by a virus. The vaccine, Gardasil, has been successful. It, too, used a technology that was new at the time and faced considerable skepticism.

Dr. Jansen said Pfizer had placed its bet on messenger RNA not just because the technology could produce a vaccine quickly, but also because its review of previous work by BioNTech on experimental cancer vaccines suggested the approach could cause a powerful immune response. Before the coronavirus pandemic, the two companies had been collaborating on flu vaccines.

Vaccines using mRNA consist of genetic material from part of the virus, encased in tiny particles made of fat that help it get into human cells. The messenger RNA then prompts the cells to churn out a tiny piece of the virus, causing the immune system to attack the real virus if the person is exposed. In essence, the patient's cells become factories for a harmless fragment of the virus.

These vaccines set off several different kinds of immune responses, Dr. Jansen said, which is important because scientists do not know yet which type will be most potent against the coronavirus.

Dr. Jansen described making such a vaccine as a clean, fast process that required a relatively small footprint to produce many doses.

FDA Releases Performance Data of COVID-19 Antibody Tests

FDA has published validation data on 12 antibody tests approved with emergency authorization. Experiments were performed to determine the sensitivity and specificity of the tests, and the Positive and Negative Predictive values (PPV and NPV). These studies were carried out by the tests' manufacturers using their own samples, and now government laboratories including FDA, NIH, CDC, and BARDA are comparing all tests with the same set of samples. Among the antibody tests evaluated some detected IgG alone, IgG and IgM, or total antibody. The tests used a variety of approaches to obtain readouts, from ELISAs with different throughput, to lateral flow with or without readers. As expected, lateral flow tests displayed lower sensitivity and PPVs than ELISA tests. Some of the tests' performance values were notoriously low, rendering the results of little value in areas of low prevalence (prevalence was estimated at 5% to calculate PPV/NPV). Roche's Elecsys, Mount Sinai's test, and Euroimmun's assay (all ELISAs) were among the top performers. This is a list worth checking if you decide to get an antibody test.

#coronavirus #COVID19 #health #globalhealth #publichealth #medicine #biotechnology #pharmaceuticals #infectiousdiseases #pandemic #FDA #WHO #CDC #diagnostics

<https://www.scoop.intopic/virusworld/p/4118350035/2020/05/09/fda-releases-performance-data-of-covid-19-antibody-tests>

[The Coronavirus Outbreak](#)

Frequently Asked Questions

Updated July 22, 2020

- **Why do masks work?**
 - The coronavirus clings to wetness and enters and exits the body through any wet tissue (your mouth, your eyes, the inside of your nose). That's why people are wearing masks and eyeshields: they're like an umbrella for your body: They keep your droplets in and other people's droplets out. But masks only work if you are [wearing them properly](#). The mask

should cover your face from the bridge of your nose to under your chin, and should stretch almost to your ears. Be sure there are no gaps — that sort of defeats the purpose, no?

- **Is the coronavirus airborne?**
 - The coronavirus [can stay aloft for hours in tiny droplets in stagnant air](#), infecting people as they inhale, mounting scientific evidence suggests. This risk is highest in crowded indoor spaces with poor ventilation, and may help explain super-spreading events reported in meatpacking plants, churches and restaurants. [It's unclear how often the virus is spread](#) via these tiny droplets, or aerosols, compared with larger droplets that are expelled when a sick person coughs or sneezes, or transmitted through contact with contaminated surfaces, said Linsey Marr, an aerosol expert at Virginia Tech. Aerosols are released even when a person without symptoms exhales, talks or sings, according to Dr. Marr and more than 200 other experts, who [have outlined the evidence in an open letter to the World Health Organization](#).
- **What are the symptoms of coronavirus?**
 - Common symptoms [include fever, a dry cough, fatigue and difficulty breathing or shortness of breath](#). Some of these symptoms overlap with those of the flu, making detection difficult, but runny noses and stuffy sinuses are less common. [The C.D.C. has also](#) added chills, muscle pain, sore throat, headache and a new loss of the sense of taste or smell as symptoms to look out for. Most people fall ill five to seven days after exposure, but symptoms may appear in as few as two days or as many as 14 days.
- **What's the best material for a mask?**
 - Scientists around the country [have tried to identify everyday materials that do a good job of filtering microscopic particles](#). In recent tests, HEPA [furnace filters](#) scored high, as did vacuum cleaner bags, fabric similar to flannel pajamas and those of 600-count pillowcases. Other materials tested included layered coffee filters and scarves and bandannas. These scored lower, but still captured a small percentage of particles.
- **Does asymptomatic transmission of Covid-19 happen?**
 - So far, the evidence seems to show it does. A widely cited [paper](#) published in April suggests that people are most infectious about two days before the onset of coronavirus symptoms and estimated that 44 percent of new infections were a result of transmission from people who were not yet showing symptoms. Recently, a top expert at the World Health Organization stated that transmission of the coronavirus by people who did not have symptoms was "very rare," [but she later walked back that statement](#).

She added that it "has the potential to be fast to produce a product that is very well defined and very pure."

Several other companies are also making such vaccines, and each has its own formulation of the genetic material and types of fat used to encase it.

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The large vaccine studies set to begin this month will each include 30,000 people, with some getting placebo shots. The [Food and Drug Administration has said](#) that to be considered effective, a coronavirus vaccine should protect 50 percent of the people who receive it.

Companies hope to show proof of effectiveness by the fall, but that will depend on enrolling enough volunteers in areas where the infection rate is high enough to see a significant difference between the vaccinated people and the placebo group.

"We think we will see the end points, given that the infection rates are going up, up, up," Dr. Jansen said. "If the stars are aligned, it could be next fall. But everything has to be right."

Dr. Amesh Adalja, an infectious disease physician and senior scholar at the Johns Hopkins University Center for Health Security, said that Pfizer, unlike some smaller pharmaceutical companies that the government had contracted with, did not need research money because it was likely to have the infrastructure and early data it needed to speed its vaccine to trials without federal assistance.

“Pfizer is a company that has a lot of expertise in making vaccines,” he said. “They knew that any negotiation with the government could have delayed the start” of trials, which he said the company knew how to set up rapidly.

He added that the \$1.95 billion agreement was a way to guarantee a market for the vaccine at the end of production, since prominent drugmakers have historically been hesitant to spend on infectious disease outbreaks.

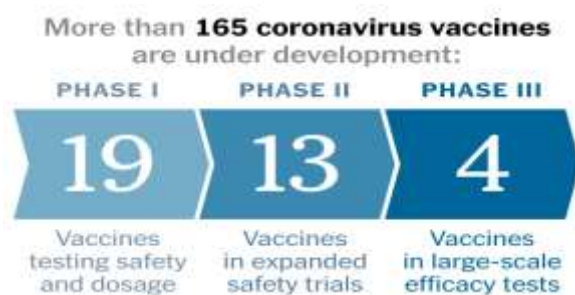
“Advance purchase agreements have been one way we’ve been able to acquire vaccines and countermeasures against certain threats that pharmaceutical companies have traditionally stayed away from,” he said.

The agreement with Pfizer, which the company and the Department of Health and Human Services announced Wednesday morning, is the largest one yet for Operation Warp Speed. The federal government announced this month that it would pay the Maryland-based company [Novavax](#) \$1.6 billion to expedite the development of a [coronavirus vaccine](#).

“We’ve been committed to making the impossible possible by working tirelessly to develop and produce in record time a safe and effective vaccine to help bring an end to this global health crisis,” Dr. Albert Bourla, Pfizer’s chairman and chief executive officer, said in a news release.

The Race for a Vaccine

[Coronavirus Vaccine Tracker, June 10, 2020](#)



[Can a Vaccine for Covid-19 Be Developed in Record Time?](#)

[June 9, 2020](#)



[Three Coronavirus Vaccine Developers Report Promising Initial Results](#)

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[Some Vaccine Makers Say They Plan to Profit From Coronavirus Vaccine](#)

[July 21, 2020](#)

[Pfizer Begins Human Trials of Possible Coronavirus Vaccine](#)

[May 5, 2020](#)

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Denise Grady has been a science reporter for The Times since 1998. She wrote “Deadly Invaders,” a book about emerging viruses. [@nytDeniseGrady](#)

David E. Sanger is a national security correspondent. In a 36-year reporting career for The Times, he has been on three teams that have won Pulitzer Prizes, most recently in 2017 for international reporting. His newest book is “The Perfect Weapon: War, Sabotage and Fear in the Cyber Age.” [@SangerNYT](#) • [Facebook](#)

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[Via Founding Managing Director Of Deep Learning Margaretta Colangelo LinkedIn Biotech](#)

Why coronavirus testing isn’t so simple

At a COVID-19 testing site in downtown, registered nurse Amanda Price (right), working for a company called COVID Clinic, draws blood from Cindy Stirling for an antibody test Thursday in San Diego, California.

(Eduardo Contreras /The San Diego Union-Tribune)

[Access to testing is growing, but so are concerns over the reliability of results.](#)

By [Jonathan Wosen](#) Biotech reporter

May 3, 2020

5:30 AM

It's hard to make evidence-based decisions without evidence. That's what public officials, doctors and scientists have argued in their calls for increased coronavirus testing. But growing evidence demonstrates that performing tests is one thing — accurately interpreting results is another.

Scores of companies have rushed forward with tests to detect past or present infection with the novel coronavirus. The real-world use of these tests can be surprisingly error-prone. Test quality is an issue, but it's not the only one; it's inherently difficult to test for a virus that most of us have not been exposed to.

Why no test is perfect

Ideally, a viral test would always detect those who've been infected, as well as the unexposed.

"If you could achieve 100 percent on both, you would have the perfect test," said Ingo Chakravarty, CEO and president of Mesa Biotech, a local company that [produces a rapid](#) coronavirus molecular test. "That, though, doesn't exist."

Test makers face real-world trade-offs. For molecular tests, that means identifying the genetic material of the coronavirus from a nose or throat swab without picking up similar-looking genetic bits from other viruses. And for antibody tests, this means detecting low amounts of [antibodies](#) to the novel coronavirus without detecting antibodies to related viruses.

When test makers, for lack of a better phrase, test their test, they use samples scientists know are negative or positive. For a molecular test, that means testing a sample with random shards of genetic material or one spiked with viral molecules. These samples tell researchers how often a test produces false positive and false negative results.

In general, a good test correctly identifies known positives and negatives at least 95 percent of the time, says Chakravarty. Many of the new tests have been cleared for use without the usual lengthy Food and Drug Administration review process. And while that has sped things up, it may be causing some issues. Abbott's rapid molecular test, which the company claims can detect the virus in as little as five minutes, has come under fire [after reports](#) that the test fails to detect the virus about 15 percent of the time.

Real-world dilemmas

Testing people is complicated because, of course, we aren't confirmed positive and negative samples. Those who get tested don't know if they're positive — that's why they're getting tested.

The odds that you're infected or have viral antibodies based on a positive test result depend both on how well the test works and how common the disease is.

Think of it this way. Say that 5 percent of people have been infected, and you test 100 random people for antibodies. On average, 5 people should have antibodies and will test positive. Now say that this test has a 2.5 percent false positive rate, which is [about the rate](#) for a test made by Diazyme, a local company that produces the antibody tests used by UC San Diego Medical Center. That means you'd expect nearly 2.5 false positives; in other words, a third of total positives (roughly 7.5) could be wrong. Now imagine testing tens or hundreds of thousands of people knowing that a third of all positive results could be errors.

This is the basic math behind a [firestorm debate](#) ignited after a Stanford study tested 3,300 people in Santa Clara County for antibodies to the coronavirus. The study concluded that the rate of infection in the county may have been between 50 to 85 times greater than previous reports, which would also mean that the death rate of COVID-19 is drastically lower than the [3 percent](#) rate estimated by the World Health Organization.

But very few study participants tested positive, suggesting that the rate of infection is low by any measure. [Experts have pointed out](#) that a third or more of these positive results could have been the result of testing error.

"When you have a large number of people who don't have the disease, and even a small false positive rate, you're going to get a lot of false positives just because there weren't that many people who actually have the disease," said Kristin Sainani, a Stanford biostatistician.

Playing it safe

If the infection rate were high, then a positive test result would be a more reliable sign of infection. But that likely isn't the case in San Diego County. Dr. David Pride, director of UC San Diego's molecular biology lab, says that about 3 percent of his team's molecular tests have come back positive, and he doesn't see any sign of an uptick.

"Right around the end of March, beginning of April, is where we saw our highest number of cases," Pride said. "It's looking like on a daily basis that this curve has flattened out."

Pride says that the numbers suggest that each infected person is, on average, infecting closer to one other person than three or four. But he's also quick to point out that the situation is extremely fluid, and these numbers could easily change.

As long as the infection rate remains at current levels, Pride's team estimates that about 97 percent of negative tests are true negatives. But the researchers will often re-test a negative if a doctor strongly suspects their patient has COVID-19. The team has molecular tests from six different developers and will run a sample on multiple machines to confirm a negative finding. Sometimes the issue is simply that the original swab didn't collect many infected cells, meaning that only the most sensitive tests will detect the virus's genetic material.

With positive results, however, Pride errs on the side of caution.

"If any of our results are positive, we treat the patient as if they've had disease," Pride said. "That's frankly the safest way to move forward."

Since no test is perfect, what's better — a false positive or a false negative? For molecular testing, a false negative risks allowing someone who's infected to go out and get others sick. That's what Pride's team wants to avoid.

For antibody testing, it's a bit more complicated. Want to identify everyone with antibodies because you think these people are now protected and can go back to work? Then avoid false negatives. But what if you don't want to overestimate the number of COVID-19 survivors and underestimate the disease's fatality rate? Then false positives are the problem.

"It depends on the question you're trying to answer," Sainani said.

Testing a given sample several times on multiple machines — as UCSD does with its molecular tests — is probably a good idea in general, says Sainani, because a consistent result is more reliable. And there are plenty of tests out there — over 70 antibody tests nationally and new molecular tests popping up regularly, including [several here](#) in San Diego.

But for every question testing can help us answer — who's infected, who has recovered — there's a question (or two) that these tests can't resolve: Does having antibodies to the virus prevent re-infection — and, if so, how long does protection last? Why are some people asymptomatic while others end up in intensive care units fighting for their lives? Will COVID-19 cases surge in the fall, as they do for flu every year?

"We really do not have much data for this new virus," said Chong Yuan, managing director of Diazyme. "We're still in the data collection (stage) right now."

<https://www.sandiegouniontribune.com/business/biotech/story/2020-05-03/why-coronavirus-testing-isnt-so-simple>

Access to testing is growing, but so are concerns over the reliability of results.

By [Jonathan Wosen](#)

Biotech reporter

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The world needs Covid-19 vaccines. It may also be overestimating their power

By [Helen Branswell @HelenBranswell](#)

May 22, 2020



Hyacinth Empinado/STAT

With a little luck and a lot of science, the world might in the not-too-distant future get [vaccines against Covid-19](#). But those vaccines won't necessarily prevent all or even most infections.

In the public imagination, vaccines are often seen effectively as cure-alls, like inoculations against measles.

Rather than those vaccines, however, the Covid-19 vaccines in development may be more like those that protect against influenza — reducing the risk of contracting the disease, and of experiencing severe symptoms should infection occur, a number of experts told STAT.

The future of clinical trials is now – bringing new medicines and better healthcare

The world has changed for clinical trials and patients. Parexel explores the positive solutions and innovations that have emerged from the COVID-19 era. Find out more.

BY PAREXEL

"We all recognize that flu vaccine, in a year when it's efficacious, you have what, 50% protection? And in a year when it's poor you have 30% or less than that — and still we use that," said Marie-Paule Kieny, who is chairing a committee advising the French government on vaccines to prevent Covid-19.

[Related:](#)

Ideally, vaccines would prevent infection entirely, inducing what's known as "sterilizing immunity." But early work on some of the vaccine candidates suggests they may not stop infection in the upper respiratory tract — and they may not stop an infected person from spreading virus by coughing or speaking.

A [recently released study](#) in which macaques were vaccinated with one vaccine candidate — this one being developed by Oxford University and AstraZeneca — showed the primates were protected from Covid-induced pneumonia. But the macaques still had high levels of virus replicating in their upper airways. (The paper was a pre-print, meaning it hasn't yet been peer-reviewed and published in a journal.)

Vincent Munster, who leads the team that conducted that study, said a vaccine that could mitigate the severity of the Covid-19 pandemic would still be a significant contribution in a world struggling to co-exist with a dangerous new virus.

"If we push the disease from pneumonia to a common cold, then I think that's a huge step forward," said Munster, chief of the virus ecology unit at the National Institute of Allergy and Infectious Diseases' Rocky Mountain Laboratories in Hamilton, Mont.

The rush to develop vaccines means that ideal solutions may be out of reach in the immediate term; Munster said he anticipates seeing second-generation vaccines that could be more protective. Other scientists, though, are cautious about how much the world can expect from vaccines against this pathogen.

Michael Mina, an infectious diseases epidemiologist at Harvard's T.H. Chan School of Public Health, thinks achieving sterilizing immunity with a vaccine will not be possible for Covid-19. Experience with human coronaviruses — and with multiple pathogens that cause colds — shows immunity that develops after infection with respiratory tract infections is not lifelong. In some cases, the duration is measured in months, not years.

"If [infection with] natural coronaviruses doesn't do it, I don't think that we should necessarily expect or have the anticipation that we'll be able to get there with the vaccine," said Mina, who is also associate medical director of clinical microbiology at Boston's Brigham and Women's Hospital.

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[Two years of halting progress and high turnover preceded Atul Gawande's exit as Haven CEO](#)

Munster agreed trying to develop vaccines that confer sterilizing immunity would be a heavy lift with this coronavirus. "I think we really need to focus on what are the fastest achievable true public health goals of the vaccine, which is protecting the vulnerable people against pneumonia and protecting health care workers as well," he said.

Earlier this week Moderna, the Cambridge, Mass.-based biotech, said eight people in a Phase 1 trial of its Covid-19 vaccine developed neutralizing antibodies to the virus.

Neutralizing antibodies should protect against severe Covid-19 disease, Kanta Subbarao, a vaccine expert who is director of the World Health Organization's influenza collaborating center in Melbourne, Australia, recently wrote in a [commentary](#) in the journal Cell Host and Microbe.

But Subbarao told STAT she wouldn't be surprised if neutralizing antibodies don't protect against infection in the upper airways. Like Munster, she doesn't think that's reason not to pursue these vaccines.

"Converting this infection to a upper respiratory illness would be, I think, quite a lot better than where we are today," said Subbarao, who worked on vaccines for SARS, a closely related coronavirus that caused an international outbreak in 2003.

Subbarao said setting public expectations of what these vaccines will be able to achieve is critical.

It would not be helpful if the type of perception that exists about flu vaccines — that they don't work very well — sets in with Covid-19 vaccines. People don't credit flu vaccines for what they prevent; they deride flu shots for not protecting them on the occasions when they contract influenza, even though they have been vaccinated.

“We can’t leave all that messaging until we know how good the vaccines are,” Subbarao said. “I think that will be the messaging, that we’re not going to prevent all infection. We’re going to prevent disease.”

The fact that the macaques that Munster’s group vaccinated and then infected had virus in their upper airways was [viewed with dismay](#) by some. But Munster noted the animals were infected with large doses of virus; whether the same will be true in people remains to be seen.

Some experts hope that even if the vaccines don’t prevent infection in the upper airways, they may reduce the amount of virus a vaccinated person generates and emits.

“Hopefully it would diminish — although we don’t know this — the levels of replication on the mucosal surfaces,” said Mark Feinberg, CEO of the International AIDS Vaccine Initiative, which is working to develop an orally administered Covid-19 vaccine. That route of administration may improve the vaccine’s capacity to protect the mucus membranes of the upper airways.

Mina sees a potential upside to Covid-19 vaccines that don’t stop infection and transmission, saying low-level circulation of the virus could act as a natural “booster” to keep people’s immunity levels high.

“Then you don’t necessarily have to keep going and getting a vaccine every year, for example. You could rely on some level of natural exposure as long as all the people who are at particular risk have been given the opportunity to be vaccinated as well,” he said.

But there’s the rub, warned Sarah Fortune, chair of the department of immunology and infectious diseases at Harvard’s School of Public Health.

“It’s a little bit sobering to see that, while we may get protection against disease [and] protect people from getting sick, we may not get nearly as effective protection against transmission,” Fortune said during a briefing Thursday for reporters. “Which means that to protect the population, we’re going to have to be vaccinating many, many more people, because we can’t rely on getting to a lot of people and having the epidemic die out through herd effects.”

Andrew Joseph contributed reporting.

[Helen Branswell](#)

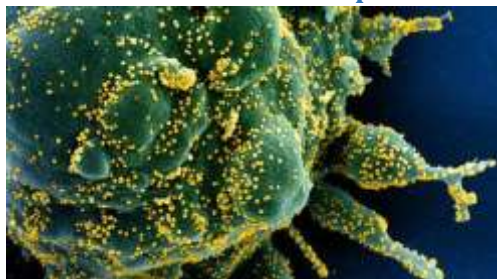
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[@HelenBranswell](#)

<https://www.statnews.com/2020/05/22/the-world-needs-covid-19-vaccines-it-may-also-be-overestimating-their-power/>

T cells found in COVID-19 patients ‘bode well’ for long-term immunity



Immune hunters called T cells can seek and destroy a cell (green) infected with and making copies of SARS-CoV-2 (yellow).

NIAID

T cells found in COVID-19 patients 'bode well' for long-term immunity

By [Mitch Leslie](#) May. 14, 2020, 9:00 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

Immune warriors known as T cells help us fight some viruses, but their importance for battling SARS-CoV-2, the virus that causes COVID-19, has been unclear. Now, two studies reveal that infected people harbor T cells that target the virus—and may help them recover. Both studies also found that some people never infected with SARS-CoV-2 have these cellular defenses, most likely because they were previously infected with other coronaviruses.

"This is encouraging data," says virologist Angela Rasmussen of Columbia University. Although the studies don't clarify whether people who clear a SARS-CoV-2 infection can ward off the virus in the future, both identified strong T cell responses to it, which "bodes well for the development of long-term protective immunity," Rasmussen says. The findings could also help researchers create better vaccines.

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The more than 100 COVID-19 vaccines in development mainly focus on another immune response: antibodies. These proteins are made by B cells and ideally latch onto SARS-CoV-2 and prevent it from entering cells. T cells, in contrast, thwart infections in two different ways. Helper T cells spur B cells and other immune defenders into action, whereas killer T cells target and destroy infected cells. The severity of disease can depend on the strength of these T cell responses.

Using bioinformatics tools, a team led by Shane Crotty and Alessandro Sette, immunologists at the La Jolla Institute for Immunology, predicted which viral protein pieces would provoke the most powerful T cell responses. They then exposed immune cells from 10 patients who had recovered from mild cases of COVID-19 to these viral snippets.

[All of the patients carried helper T cells that recognized the SARS-CoV-2 spike protein](#), which enables the virus to infiltrate our cells. They also harbored helper T cells that react to other SARS-CoV-2 proteins. And the team detected virus-specific killer T cells in 70% of the subjects, they report today in *Cell*. "The immune system sees this virus and mounts an effective immune response," Sette says.

The results jibe with those of a study posted as a preprint on medRxiv on 22 April by immunologist Andreas Thiel of the Charité University Hospital in Berlin and colleagues. They [identified helper T cells targeting the spike protein in 15 out of 18 patients](#) hospitalized with COVID-19.

The teams also asked whether people who haven't been infected with SARS-CoV-2 also produce cells that combat it. Thiel and colleagues analyzed blood from 68 uninfected people and found that 34% hosted helper T cells that recognized SARS-CoV-2. The La Jolla team detected this crossreactivity in about half of stored blood samples collected between 2015 and 2018, well before the current pandemic began. The researchers think these cells were likely triggered by past infection with one of the four human coronaviruses that cause colds; proteins in these viruses resemble those of SARS-CoV-2.

The results suggest "one reason that a large chunk of the population may be able to deal with the virus is that we may have some small residual immunity from our exposure to common cold viruses," says viral immunologist Steven Varga of the University of Iowa. However, neither of the studies attempted to establish that people with crossreactivity don't become as ill from COVID-19.

Before these studies, researchers didn't know whether T cells played a role in eliminating SARS-CoV-2, or even whether they could provoke a dangerous immune system overreaction. "These papers are really helpful because they start to define the T cell component of the immune response," Rasmussen says. But she and other scientists caution that the results do not mean that people who have recovered from COVID-19 are protected from reinfection.

To spark production of antibodies, vaccines against the virus need to stimulate helper T cells, Crotty notes. "It is encouraging that we are seeing good helper T cell responses against SARS-CoV-2 in COVID-19 cases," he says. The results have other significant implications for vaccine design, says molecular virologist Rachel Graham of the University of North Carolina, Chapel Hill. Most vaccines under development aim to elicit an immune response against spike, but both studies determined that T cells reacted to several viral proteins, suggesting that vaccines that sic the immune system on these proteins as well could be more effective. "It is important to not just concentrate on one protein," Graham says.

<https://www.sciencemag.org/news/2020/05/t-cells-found-covid-19-patients-bode-well-long-term-immunity#>

Via Dr. Thomas Wilckens on LinkedIn

SARS-CoV-2–Fighting T Cells Found in Recovered Patients <https://bit.ly/2ASSNxV> Good news re [#covid19](#) [#vaccine](#) development; there might also be background immunity in not-infected people, read more here <https://bit.ly/2VqUYjY>

While the finding doesn't prove people become immune to the virus after infection, it is good news for vaccine development.

Even as researchers around the world rush to [develop a vaccine](#) against the virus that causes COVID-19, and some pin their hopes on the idea that enough people will recover from infections to achieve herd immunity in the meantime, questions about whether exposure to the virus induces immunity to it have lingered. If the virus itself does not prompt immunity, a vaccine against it might not either.

Although it doesn't provide a conclusive answer, a study published yesterday (May 14) in [Cell](#) appears to be good news on the immunity front. Researchers at the La Jolla Institute for Immunology in California took blood from 20 adults who'd recovered from COVID-19 and exposed the samples to proteins from the SARS-CoV-2 virus. All of the patients had CD4⁺ helper T cells that recognized the virus's [spike protein](#), and 70 percent of them had CD8⁺ killer T cells that responded to the same protein. "Our data show that the virus induces what you would expect from a typical, successful antiviral response," says coauthor Shane Crotty in an institute [press release](#).

The authors also tested blood samples collected between 2015 and 2018 to see whether people who were never exposed to SARS-CoV-2 might nevertheless have some immunity to it. They detected CD4⁺ T cell responses to SARS-CoV-2 in about half of those samples, which they suggest could be due to exposure to other coronaviruses that cause a cold.

[Science](#) notes that the results align with those of another study, led by researchers at Charité University Hospital in Berlin and reported in a [preprint](#) last month, that found CD4⁺ T cells that recognized the spike protein in blood from 83 percent of COVID-19 patients and 34 percent of healthy people tested.

"This is encouraging data," Columbia University virologist Angela Rasmussen, who was not involved in either study, tells [Science](#). Although not conclusive, the T cell response "bodes well for the development of long-term protective immunity" among people who have recovered from COVID-19, she says, and could be useful in designing vaccines.

The results suggest that "one reason that a large chunk of the population may be able to deal with the virus is that we may have some small residual immunity from our exposure to common cold viruses," viral immunologist Steven Varga of the University of Iowa tells [Science](#). But neither study tested whether that is the case.

“What Do Antibody Tests For SARS-CoV-2 Tell Us About Immunity?”

https://www.the-scientist.com/news-opinion/sars-cov-2fighting-t-cells-found-in-recovered-patients-67540?utm_campaign=TS_OTC_2020&utm_medium=email&_hsmt=88313440&_hsenc=p2ANqtz-z0yXLYbu7Vt26wziLlf-5Jz0qRZVuKVNymv8IQlet9WJtG4n3A1T184miSPH6B2OzahXGM5CwlOnbF7IbEIIscb5H9d7dDDXNyvy5dhF0QknHxps&utm_content=88313440&utm_source=hs_email

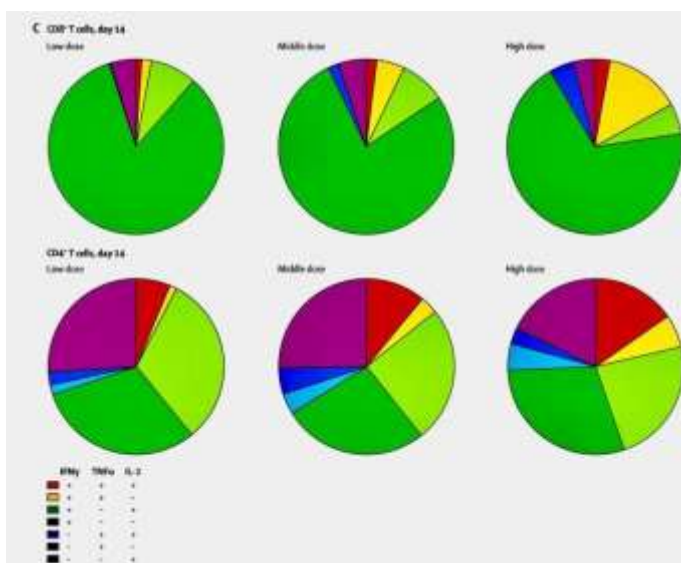
Via

Managing Co-Founder & Director at Deep Knowledge Ventures Margaretta Colangelo on LinkedIn

Making some progress on the vaccine front -- The first peer-reviewed paper on a vaccine for SARSCoV2 was published today in [The Lancet](#). This first-in-human phase 1 clinical study suggests that there is potential for further investigation of the Ad5 vectored vaccine for prevention of COVID. Although none of the participants in this study were older than 60, the researchers plan to include people over 60 in phase 2. This is crucial considering people over 60 are an important target population for a COVID vaccine.

- 1) study was conducted in Wuhan
- 2) 108 healthy adults aged 18 to 60 enrolled in the study
- 3) 51% male and 49% female
- 4) mean age was 36 years
- 5) onset of detectable immune responses was rapid
- 6) T-cell responses peaked at day 14 after vaccination
- 7) antibodies peaked at day 28 after vaccination
- 8) 108 participants had a favorable response neutralizing antibody & T cell
- 9) vaccine was tolerated in all 3 dose groups
- 10) most common adverse reactions were fever, fatigue, headache, muscle pain
- 11) most adverse events were mild or moderate in severity

Peer reviewed paper in The Lancet: <https://lnkd.in/gnnvXpr>
[#coronavirus](#) [#longevity](#) [#datascience](#) [#drugdevelopment](#) [#economy](#)



Summary

Background

A vaccine to protect against COVID-19 is urgently needed. We aimed to assess the safety, tolerability, and immunogenicity of a recombinant adenovirus type-5 (Ad5) vectored COVID-19 vaccine expressing the spike glycoprotein of a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) strain.

Interpretation

The Ad5 vectored COVID-19 vaccine is tolerable and immunogenic at 28 days post-vaccination. Humoral responses against SARS-CoV-2 peaked at day 28 post-vaccination in healthy adults, and rapid specific T-cell responses were noted from day 14 post-vaccination. Our findings suggest that the Ad5 vectored COVID-19 vaccine warrants further investigation.

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31208-3/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31208-3/fulltext)

Via Prof. Mathias Goyen, MD

[Mathias Goyen, Prof. Dr.med. 2nd degree connection 2nd Chief Medical Officer Europe at GE Healthcare](#)

Hi [Margaretta](#). Great summary. Thanks a lot for sharing. The study found that one dose of the vaccine, tested at three different levels, appeared to induce a good immune response in some subjects. But about half of the volunteers — people who already had immunity to the backbone of the vaccine — had a dampened immune response. —> <https://www.statnews.com/2020/05/22/early-study-of-covid-19-vaccine-developed-in-china-sees-mixed-results/>

Early study of Covid-19 vaccine developed in China sees mixed results

By [Helen Branswell @HelenBranswell](#)

May 22, 2020

A Covid-19 vaccine candidate being developed by a Chinese drug maker appeared to induce an immune response in subjects, but also showed some concerning although not unexpected results.

Data on the vaccine, made by CanSino Biologics, were [published Friday in the Lancet](#), the first time Phase 1 trial data from any Covid-19 vaccine have been published in a scientific journal. The results are likely to be closely examined, particularly in Canada, which [recently announced](#) it would test the vaccine and produce it there if results of the early studies were positive.

The study found that one dose of the vaccine, tested at three different levels, appeared to induce a good immune response in some subjects. But about half of the volunteers — people who already had immunity to the backbone of the vaccine — had a dampened immune response...

But many people have had previous infections with adenovirus 5, raising concerns that the immune system would focus on the Ad5 parts of the vaccine rather than the SARS-Cov-2 part. Many research groups that work on viral-vectored vaccines stopped using Ad5 because of concerns about preexisting immunity, which can run to 70% or higher in some populations...

In the study, Chinese scientists reported that while people who had high levels of preexisting immunity to Ad5 responded to the vaccine, the rise in antibodies to the SARS-Cov-2 virus was less robust than among those in the study who had low or no preexisting antibodies to Ad5. They also showed antibodies to the

adenovirus itself soared among people who had prior immunity, suggesting their systems views the vaccination as a boost of their Ad5 immunity...

"This probably wouldn't be a vaccine that you would want to give to the people over 65, because they may have higher levels [of pre-existing immunity]," said Kathryn Edwards, scientific director of the Vanderbilt Vaccine Research Program in Nashville, Tenn.

"This was the assumption and they are just demonstrating that the assumption was correct," he told STAT, adding that he doesn't expect this vaccine to succeed.

Kobinger said CanSino — which also produced an Ebola vaccine using this viral vector — has argued it could override the problem of preexisting immunity by using higher doses of the vaccine or using an intra-nasal delivery mechanism, rather than injecting the vaccine into muscle. (In this study, the vaccine was injected.)

But in the highest of the three doses used in this study, the number of side effects was high — 75% of the people in the highest dose arm reported at least one side effect. The authors said the Phase 2 trial, which is already underway, is not using the highest of the three doses.

"This is the story of Ad5," Edwards said. "It's the concern with Ad5 that's been there from the beginning: That if you have antibody to the vector, then you don't get as good a [vaccine] take."

"Maybe this level of antibody is enough? I don't know," she added. "I think it's reasonable to look at this and see what it does. It's only a Phase 1 study."

The problem with pre-existing immunity is not the potential issue with the Ad5 vaccine vector.

In 2007 a trial of an HIV vaccine using an Ad5 backbone was halted when it was seen that more people in the vaccine arms of the trial were becoming infected with HIV than those in the placebo arm. It remains unclear why that happened.

The authors of the Phase 1 Covid-19 trial noted the earlier troubling outcome, and said they will be monitoring for similar safety signals as they continue to study this vaccine..."Although the association between HIV-1 acquisition risk and Ad5-vectored vaccine is controversial and its mechanism is unclear, the potential risks should be taken into account in studies with this viral vector delivery platform," they wrote. "We plan to monitor the participants in our upcoming phase 2 and phase 3 studies to assess the indication for any such acquisition."

<https://www.statnews.com/2020/05/22/early-study-of-covid-19-vaccine-developed-in-china-sees-mixed-results/>

SARS-CoV-2 infection protects against rechallenge in rhesus macaques

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Science 20 May 2020:
eabc4776

DOI: 10.1126/science.abc4776

VIA Dr. Neil Bodie on LinkedIn

SARS-CoV-2 infection protects against rechallenge in rhesus macaques

<https://lnkd.in/g8gQuej>

An understanding of protective immunity to SARS-CoV-2 is critical for vaccine and public health strategies aimed at ending the global COVID-19 pandemic. A key unanswered question is whether infection with SARS-CoV-2 results in protective immunity against re-exposure. We developed a rhesus macaque model of SARS-CoV-2 infection and observed that macaques had high viral loads in the upper and lower respiratory tract, humoral and cellular immune responses, and pathologic evidence of viral pneumonia. Following initial viral clearance, animals were rechallenged with SARS-CoV-2 and showed 5 log₁₀ reductions in median viral loads in bronchoalveolar lavage and nasal mucosa compared with primary infection. Anamnestic immune responses following rechallenge suggested that protection was mediated by immunologic control. These data show that SARS-CoV-2 infection induced protective immunity against re-exposure in nonhuman primates.

[#covid19](#) [#cytokinestorm](#) [#infectiousdiseases](#) [#vaccinedevelopment](#) [#immunity](#) [#publichealth](#) [#NHP](#) [#protectiveimmunity](#) [#invivo](#) [#Anamnesticimmuneresponses](#)

One more time (because it's important!)...

Imbalanced Host Response to SARS-CoV-2 Drives Development of [#COVID19](#)

<https://lnkd.in/gKag3-G>

Highlights

- ⊙ SARS-CoV-2 infection induces low IFN-I and -III levels with a moderate ISG response
- ⊙ Strong chemokine expression is consistent across in vitro, ex vivo, and in vivo models
- ⊙ Low innate antiviral defenses and high pro-inflammatory cues contribute to COVID-19

In Brief

In comparison to other respiratory viruses, SARS-CoV-2 infection drives a lower antiviral transcriptional response that is marked by low IFN-I and IFN-III levels and elevated chemokine expression, which could explain the pro-inflammatory disease state associated with COVID-19.

[#covid19](#) [#interferon](#) [#cytokinestorm](#) [#inflammation](#) [#proinflammatorydisease](#) [#infectiousdiseases](#) [#sarscov2](#)

<https://science.sciencemag.org/content/early/2020/05/19/science.abc4776>

Imbalanced Host Response to SARS-CoV-2 Drives Development of COVID-19

Graphical Abstract

Highlights dSARS-CoV-2 infection induces low IFN-I and -III levels with a moderate ISG response Strong chemokine expression is consistent across in vitro, ex vivo, and in vivo models Low innate antiviral defenses and high pro-inflammatory cues contribute to COVID-19

Authors Daniel Blanco-Melo, Benjamin E. Nilsson-Payant, Wen-Chun Liu, ..., Jean K. Lim, Randy A. Albrecht, Benjamin R. ten Oever

SUMMARY

Viral pandemics, such as the one caused by SARS-CoV-2, pose an imminent threat to humanity. Because of its recent emergence, there is a paucity of information regarding viral behavior and host response following SARS-CoV-2 infection. Here we offer an in-depth analysis of the transcriptional response to SARS-CoV-2 compared with other respiratory viruses. Cell and animal models of SARS-CoV-2 infection, in addition to transcriptional and serum profiling of COVID-19 patients, consistently revealed a unique and

inappropriate in-inflammatory response. This response is defined by low levels of type I and III interferons juxtaposed to elevated chemokines and high expression of IL-6. We propose that reduced innate antiviral defenses coupled with exuberant inflammatory cytokine production are the defining and driving features of COVID-19.

<https://www.cell.com/action/showPdf?pii=S0092-8674%2820%2930489-X>

Coronavirus vaccine: First evidence jab can train immune system

By James Gallagher Health and science correspondent

18 May 2020

The first hints that a vaccine can train people's immune system to fight coronavirus have been reported by a company in the US.

[Moderna](#) said neutralising antibodies were found in the first eight people who took part in their safety trials.

It also said the immune response was similar to that in people infected with the actual virus.

Larger trials to see whether the jab protects against infection are expected to start in July.

Work on a coronavirus vaccine has been taking place at unprecedented speed, with around 80 groups around the world working on them.

Moderna was the first to test an experimental vaccine, called mRNA-1273, in people.

The vaccine is a small snippet of the coronavirus's genetic code, which is injected into the patient.

It is not capable of causing an infection or the symptoms of Covid-19, but is enough to provoke a response from the immune system.

The vaccine trials, run by the US government's National Institute of Allergy and Infectious Diseases, showed the vaccine led to the production of antibodies which can neutralise the coronavirus.

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However, testing for these neutralising antibodies has only taken place on the first eight, out of 45, people on the trial.

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The people on the trial were taking either a low, middle or high dose. The highest dose was linked to most side-effects.

However, Moderna said that even people taking the lowest dose had antibodies at the same levels seen in patients who recover from Covid-19.

And antibodies "significantly exceeded" those in recovered patients for people on the middle dose.

The study is known as a phase 1 trial as it is designed to test whether the vaccine is safe, rather than whether it is effective.

It will take larger trials to see if people are protected against the virus. However, experiments on mice showed the vaccine could prevent the virus replicating in their lungs.

"These interim phase 1 data, while early, demonstrate that vaccination with mRNA-1273 elicits an immune response of the magnitude caused by natural infection," said Dr Tal Zaks, chief medical officer at Moderna.

"These data substantiate our belief that mRNA-1273 has the potential to prevent Covid-19 disease and advance our ability to select a dose for pivotal trials."

Moderna said it was hoping to start a large-scale trial in July, and that it was already investigating how to manufacture the vaccine at scale.

Oxford vaccine

A vaccine pioneered by the University of Oxford is also being tested in people, but there are no results from those trials yet.

However, concerns have been raised about the results of experiments in monkeys.

Tests showed vaccinated animals had less severe symptoms and did not get pneumonia. However, they were not completely protected from the virus and signs of it were detected at the same level in the monkeys' noses as in unvaccinated animals.

Prof Eleanor Riley, from the University of Edinburgh, said: "If similar results were obtained in humans, the vaccine would likely provide partial protection against disease in the vaccine recipient but would be unlikely to reduce transmission in the wider community."

However, until human trials have been performed it is impossible to know how the vaccine will perform in people.

<https://www.bbc.com/news/health-52677203>

DEVELOPER(S)	VACCINE METHOD	EVIDENCE	STATUS
Moderna and the US government <i>US</i>	Lipid nanoparticles containing mRNAs for the SARS-CoV-2 spike protein are injected into the arm.	Moderna is developing similar vaccines against Zika and other viruses, and other companies have RNA vaccines in clinical trials as well, but to date, no vaccine of this type has been approved for use. The SARS-CoV-2 mRNA-1273 was not tested in animals before the start of the ongoing Phase 1 trial.	Phase 1 clinical trial underway in Seattle; Phase 2 trial has been approved
CanSino Biologics and the Academy of Military Medical Sciences <i>China</i>	Nonreplicating adenovirus 5 (Ad5) vector carrying the gene for the SARS-CoV-2 spike protein is injected into the arm.	Adenoviruses are well-established vaccine vectors, and CanSino produced an Ebola vaccine (approved in China in 2017) using the same Ad5 platform. The company says its Ad5-nCoV vaccine generated "strong immune responses in animal models" and has "a good safety profile."	Phase 1 and Phase 2 clinical trials underway in Wuhan, China
University of Oxford <i>UK</i>	A chimpanzee adenovirus vaccine vector (ChAdOx1) carrying the gene for the SARS-CoV-2 spike	Six macaques that had received a single dose of the vaccine candidate stayed healthy after being exposed to SARS-CoV-2. A	Phase 1/2 trial underway in the UK. Researchers say millions of

	protein is injected into the arm.	Phase 1 trial using the same adenovirus vector to target MERS is ongoing in Saudi Arabia.	doses could be available by September.
Inovio Pharmaceuticals <i>US</i>	A special device administers spike protein–encoding DNA molecules through the skin.	Mice and guinea pigs mounted immune responses against the virus, according to a recent preprint , and the company tells Nature that it is now testing the vaccine in monkeys.	Phase 1 trial underway with plans to manufacture 1 million doses of its candidate this year
Sinovac Biotech <i>China</i>	Inactivated SARS-CoV-2	In animal studies, the vaccine candidate provides protection against virus strains from different countries. Sinovac had used a similar platform to develop a vaccine against SARS in 2004 that showed promising results in early-stage human trials.	Phase 1/2 trial underway
Wuhan Institute of Biological Products and China National Pharmaceutical Group (Sinopharm) <i>China</i>	Inactivated SARS-CoV-2	Studies in monkeys, mice, rabbits, and guinea pigs supported the vaccine candidate's approval for testing in humans.	Early stage trial underway
Symvivo <i>Canada</i>	Orally administered <i>Bifidobacterium</i> probiotic engineered to carry DNA encoding the SARS-CoV-2 spike protein	In addition to this vaccine currently in human testing, two other candidates for COVID-19 are being developed by Symvivo.	Phase 1 clinical trial underway in British Columbia and Nova Scotia
BioNTech and Pfizer <i>Germany and US</i>	RNA vaccine; details not disclosed	BioNTech and Pfizer are also partnering on an RNA vaccine candidate for influenza.	Phase 1/2 trial underway , and the companies plan to supply millions of vaccines by year end
Shenzhen Geno-Immune Medical Institute <i>China</i>	Immune cells (human dendritic cells and T cells, or artificial antigen presenting cells) are engineered to express a synthetic minigene based on SARS-CoV-2 proteins and injected or infused into the patient.	The research institute modifies cells using lentivirus vectors that it has used to develop CAR T cell therapies as well as gene therapies.	Phase 1/2 clinical trial is underway for the dendritic cell and T cell–based vaccines, and a Phase 1 trial is underway for a vaccine using artificial antigen presenting cells.
Multiple organizations <i>International</i>	The Bacille Calmette-Guerin (BCG) vaccine for tuberculosis consists of live attenuated <i>Mycobacterium</i>	Lower rates of COVID-19–related deaths in countries with mandatory BCG vaccination prompted the launch of several clinical trials to test whether the	Several Phase 3 and 4 trials are underway

	<i>bovis</i> .	immune response triggered by the vaccine may protect against SARS-CoV-2.	
CureVac <i>Germany</i>	RNA vaccine; details not disclosed	CureVac reported in January that a Phase 1 trial of a comparable vaccine for rabies induced immune responses with just 1 microgram of mRNA, meaning it could be easy to scale up to produce mass quantities.	Expected to start clinical testing in early summer ; company says it could manufacture 10 million doses by that time.
University of Pittsburgh School of Medicine <i>US</i>	Microneedle patch delivers pieces of the spike protein through the skin.	Vaccinated mice produced antibodies specific to SARS-CoV-2 at levels that would likely neutralize the virus, according to a study published in EBioMedicine on April 2.	Expected to start clinical testing in the next few months
Janssen <i>Belgium</i>	Nonreplicating adenovirus 26 (Ad26) vector carrying undisclosed genetic material of SARS-CoV-2 is administered intranasally.	Janssen is also developing other Ad26-based vaccine candidates, including its Ebola vaccine that was deployed in the Democratic Republic of Congo in November 2019.	Expected to start clinical testing in September 2020 ; with BARDA's support, the company will scale up to produce up to 300 million doses of vaccine in the US each year
Novavax <i>US</i>	Nanoparticles carrying antigens derived from the SARS-CoV-2 spike protein (with Matrix-M adjuvant)	In 2012, the company started development on a SARS vaccine that served as the basis for its new SARS-CoV-2 vaccine candidate.	Expected to start clinical testing in mid-May
Generex Biotechnology <i>Canada</i>	Undisclosed synthetic viral peptides are combined with proprietary Ii-Key immune system activation	The company has had success with the Ii-Key technology for other infectious diseases and for cancer in clinical trials.	Expected to start clinical testing "within 90 days," the company announced on February 27
Clover Biopharmaceuticals <i>China and Australia</i>	The vaccine delivers pieces of the SARS-CoV-2 spike protein.	The Trimer-Tag platform used is the basis for other viral vaccines in development.	Expected to start clinical testing in Australia with the firm Linear Clinical Research within two months
Vaxart <i>US</i>	A pill containing different SARS-CoV-2 antigens	Five vaccine candidates based on different antigen combinations are being tested in animals, with several generating immune responses after a single dose. The company has other oral recombinant vaccine candidates	Expected to start clinical testing early in the second half of 2020

		that have shown success in clinical trials.	
Imperial College London <i>UK</i>	Self-amplifying RNA molecules are injected into the muscle.	The vaccine platform, which is designed to allow researchers to respond quickly to emerging pathogens, received \$8.4 million from CEPI last December. “We cannot predict where or when Disease X will strike, but by developing these kinds of innovative vaccine technologies we can be ready for it,” CEPI CEO Richard Hatchett said at the time.	Expected to start clinical testing in the summer
Medicago <i>US</i>	Virus-like particles that resemble SARS-CoV-2 are produced in a close relative of tobacco.	The company has a rotavirus vaccine in clinical trials that is based on virus-like particles, and another for norovirus in preclinical studies.	Expected to start clinical testing in July or August
Altimune <i>US</i>	Undisclosed vaccination delivered intranasally	The company is using the same technology to develop a flu vaccine that is in clinical trials.	Expected to begin clinical testing in August
Takis Biotech and Applied DNA Sciences <i>Italy and US</i>	The company is exploring five DNA-based candidates based on the SARS-CoV-2 spike protein.	The vaccine candidates contain PCR-produced pieces of linear DNA, as opposed to the more traditional circular plasmids, which could have several advantages including quick production. No vaccines using this approach have yet been tested in humans.	Expected to start clinical testing in the fall
Sanofi and GSK <i>France and UK</i>	Antigen based on SARS-CoV-2 spike protein (with adjuvant)	Sanofi uses the same recombinant DNA technology in a flu vaccine and in a SARS vaccine candidate that never entered clinical trials. Meanwhile, GSK's adjuvant , AS03, was used in vaccines the company made against the H1N1 and H5N1 pandemic flu viruses.	Expected to start clinical testing in the second half of 2020

COVID-19 Vaccine Frontrunners

Several vaccine candidates have been approved for early testing in people. Many more are close on their heels.

[Jef Akst](#)

Apr 7, 2020

ABOVE: © ISTOCK.COM, [MEYER & MEYER](#)

Early last month (March 3), National Institutes of Allergy and Infectious Diseases Director Anthony Fauci stated that it would take at least [a year to a year and a half](#) to get a COVID-19 vaccine approved for use in the US, and that estimate [may be optimistic](#), according to some experts. There are many unknowns this early in the game. How the early candidates will perform, which will be advanced to later stages of clinical development, what safety issues might arise, and how a successful vaccine will be mass produced are among the questions that are now getting attention and funding.

See [“Newer Vaccine Technologies Deployed to Develop COVID-19 Shot”](#)

The Coalition for Epidemic Preparedness Innovations (CEPI), a nonprofit dedicated to the development of vaccines against emerging infectious diseases, has been one source of cash for this endeavor, with a total of nearly \$30 million so far invested in several candidates, including the first to be injected into trial participants. The organization plans to advance the top six of these candidates into larger efficacy trials with thousands of participants.

Another bolus of funds comes from the Biomedical Advanced Research and Development Authority (BARDA), part of the HHS Office of the Assistant Secretary for Preparedness and Response, which is contributing hundreds of millions of dollars to two top vaccine candidates: one made by Johnson & Johnson’s Janssen division and another developed by Moderna in collaboration with the US government that was injected into the first [trial participants](#) last month at the Kaiser Permanente Washington Health Research Institute in Seattle. In their [announcement](#) this week, J&J and BARDA said that the funds would be put toward both ushering the potential vaccines through clinical development and setting up manufacturing capacity simultaneously.

See [“US Selects Two COVID-19 Vaccine Candidates for Huge Investments”](#)

Below, *The Scientist* rounds up those vaccine candidates that appear to be furthest along. But there are dozens more in preclinical development, and it’s still very early days. “Nobody knows which vaccines are going to work,” Moderna CEO Stéphane Bancel tells [Science](#) last week (March 31).

See [“Clinical Trial of COVID-19 Vaccine Begins in Seattle”](#)

Editor’s note: This table was updated on May 11, 2020.

The Coronavirus Is Evolving Before Our Eyes

The virus is mutating as expected. We can still stop it.

- Story by [James Hamblin](#)

In the final, darkest days of the [deadliest](#) year in U.S. history, the world received ominous news of a mutation in the SARS-CoV-2 coronavirus. Scientists in the U.K. had identified a form of the virus that was spreading rapidly throughout the nation. Then, on January 4, Prime Minister Boris Johnson announced a [lockdown](#) that began almost immediately and will last until at least the middle of February. “It’s been both frustrating and alarming to see the speed with which the new variant is spreading,” he [said](#) in an address, noting that “our scientists have confirmed this new variant is between 50 and 70 percent more transmissible” than previous strains.

Those figures, based on an early estimate by British government scientists in late December, made for terrifying [push alerts](#) and headlines. Though this strain of the virus (officially called “B.1.1.7”) quickly became known as “the U.K. variant,” it has already been found in [45 countries](#), suggesting that the opportunity to

contain it with travel restrictions has passed. On January 8, Australia [locked down](#) Brisbane, a city of 2.3 million people, after discovering a single case.

Each day, B.1.1.7 is [being found](#) in more people in more places, including [all around](#) the United States. Experts have raised dire [warnings](#) that a 70 percent more transmissible form of the virus would overwhelm already severely stretched medical systems. Daily deaths have already tripled in recent months, and the virus is killing more than 3,000 Americans every day. From a purely mathematical perspective, considering exponential growth, a significantly more transmissible strain could theoretically lead to tens of thousands of daily deaths, with hospital beds lining sidewalks and filling parking lots.

[Read: The problem with stories about dangerous coronavirus mutations](#)

To make matters worse, the warnings from Britain were followed by headlines about yet another variant, B.1.351, in [South Africa](#). Then *another* concerning variant was identified in [Brazil](#). News reports speculated that these strains may [resist vaccines](#). Some experts cautioned that the mutations [could](#) render current treatments less effective. Scott Gottlieb, the former director of the FDA, [said](#) last week: “The South Africa variant is very concerning right now because it does appear that it may obviate some of our medical countermeasures, particularly the antibody drugs.” On Tuesday, Anthony Fauci echoed that concern, [calling](#) the variant “disturbing.”

Related Stories

- [The Mutated Virus Is a Ticking Time Bomb](#)
- [The Next Phase of Vaccination Will Be Even Harder](#)
- [Where Year Two of the Pandemic Will Take Us](#)

These new variants demand to be taken seriously. [Skyrocketing](#) case counts in the U.K. suggest a potential to do enormous damage, and the identification of B.1.1.7 in so many countries is noteworthy. Still, we don’t yet know whether either variant will become as dominant worldwide as they have in their respective countries. They might spread widely and cause tremendous harm. They might also do neither.

The sheer scale and capacity of this virus are challenging many things we thought we knew, but the basic laws governing its evolution are not among them. All viruses are constantly evolving and changing, just as human populations are. When a virus is spreading as widely and rapidly as SARS-CoV-2, spinning through trillions of generations each minute, adaptation is inevitable. The transmissibility of the virus will change. The severity of the disease it causes will change. Its ability to evade our immune system will change. It very well may evolve to circumvent our current vaccines.

Thanks to genetic-sequencing technology, we can watch this evolution in real time. We can see the changes in a virus’s genes before we even know what they mean for the spread of disease. Charting the course of this evolution, and assessing its significance, has quickly become a foremost challenge of the pandemic. The peril is not that the virus will suddenly change in an extraordinary way that transforms the pandemic, but that it is changing in small, ordinary ways that are playing out on a vast scale, and whose significance we may not appreciate until it’s too late.

<https://www.theatlantic.com/health/archive/2021/01/coronavirus-mutations-variants/617694/>

The Coronavirus Is Mutating. What Does That Mean for a Vaccine?

<https://www.nytimes.com/interactive/2020/04/16/opinion/coronavirus-mutations-vaccine-covid.html?smid=li-share>

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NYT:

'A lot will depend on how the virus mutates. Broadly, there are two ways mutations can play out.

Scenario 1: The coronavirus is unable to evade a vaccine

A successf. vaccine could stop the virus dead in its tracks, but only if the virus doesn't mutate its way around the shot.

Like all viruses, SARS-CoV-2 is mutat. as it passes from person..Most mutations don't really change how the virus fxns.

Scenario 2: Mutations make vaccines less effective over time

But what if the virus doesn't get cornered like measles? If the virus mutates in a way that prevents antibodies from binding, it could make a lasting, universal vaccine difficult to create.

Antibodies, which the body produces in response to a vaccine or an infection, work by binding to specific spots on a virus called antigens. If random viral mutations alter the shape of an antigen, it can make a vaccine less effective against the virus.

The takeaway: We'll have to wait and see

Scientists know that SARS-CoV-2 is mutating.'

LSINJ: Long term commitm. for systematiz., surveilli. & controlling networks of genes & mechan. maintaining the genome in real time. Their failure inserts genetic disease lesions into genomes.

<https://www.nytimes.com/interactive/2020/04/16/opinion/coronavirus-mutations-vaccine-covid.html?smid=li-share>

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By Debora Patta CBS News January 22, 2021, 10:29 AM

COVID strain in South Africa shows huge resistance to antibodies from original virus

Durban, South Africa — The race to vaccinate people against COVID-19 has been made even more urgent by the emergency of new, more contagious variants of the [coronavirus](#). CBS News got rare access to a lab in South Africa studying one of the [more worrying new strains](#) of the virus, which appears to have at least some resistance to the antibodies that vaccines create in the human body to fend off the bug.

Virus hunters in the high-risk biohazard lab in Durban are hot on the trail of the mutant strain spreading at breakneck speed across South Africa. The virus has mutated to attach itself more easily to human cells, making the disease no more deadly, but helping it spread a lot more easily.

- [U.K. COVID strain unlikely to "escape" Pfizer vaccine](#)

"We do believe that we are going through a new pandemic with this variant that not only transmits much faster, but that also potentially has less neutralization," genetic scientist Tulio de Oliveira tells CBS News.

De Oliveira discovered the new variant after observing a dramatic uptick in infections in November. His colleagues in the highly secured lab have developed a live culture of the strain to speed up their research.

Alex Sigal is a senior researcher at the Africa Health Research Institute and at Germany's Max Planck Institute for Infection Biology. He says the new strain discovered in South Africa appears to have the ability to reduce the effectiveness of antibodies in people infected with the original version of the virus significantly.

"Ten-fold would be conservative," he tells CBS News, but "you can also have complete knock-out," meaning a person's natural defenses to the original strain of the virus could prove useless against the variant in South Africa.

A researcher investigating the new strain of the COVID-19 virus discovered in South Africa works at a lab in Durban. CBS News

That means those infected in the first wave could have little protection from the new strain, and even more troubling, it could render some of the vaccines less effective.

"It's clear that we've underestimated this virus," he says. "On the other hand, the evidence is not there yet that vaccines will be affected, and certainly people should keep vaccinating because that's the solution to this pandemic."

At the country's central lab, scientists stress that immunity is only part of the picture. Data on just how effective the vaccines are against the new strain won't be available for a couple weeks, but in the future, vaccines may have to be tweaked every so often to protect against mutant strains — much as the annual flu shot has been for years.

<https://www.cbsnews.com/news/south-africa-covid-strain-resistance-antibodies-coronavirus-vaccine-latest-research/>

'No evidence' virus recovery stops reinfection, says WHO

Getty ImagesCopyright: Getty Images

The [World Health Organization](#)

(WHO) says that there is "currently no evidence that people who have recovered from Covid-19 and have antibodies are protected from a second infection".

It has been [suggested that people](#) who survive an infection may develop antibodies that can attack the virus and prevent reinfection.

In the UK, antibody blood testing and surveillance to determine the rate of infection among the public is one of "five pillars" of the government's testing strategy, designed to suppress the virus.

Antibody testing - to show if someone has had the virus in the past - is considered crucial in providing an exit pathway from the current lockdown, as well as providing data to those developing a vaccine.

[Read more about these links.](#)

<https://www.bbc.com/news/live/world-52424263/page/4>

South Korea says recovered coronavirus patients who tested positive again did not relapse: Tests picked up 'dead virus fragments'

- Experts in South Korea said that recovered coronavirus patients who tested positive again were not reinfected and that their virus was not reactivated, as was previously feared.
- More than 260 people who recovered and tested negative subsequently tested positive again. The Korea Centers for Disease Control and Prevention worried that the virus had reactivated after going dormant.
- But the country's infectious-disease experts said on Thursday that the tests were detecting dead fragments of the virus left in patients' bodies.
- South Korea was one of the first countries to report a virus outbreak but quickly implemented widespread testing and contact tracing. It had reported 247 deaths as of Thursday.

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Opinion

How Long Will a Vaccine Really Take?

April 30, 2020



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A version of this article appears in print on May 3, 2020, Section A, Page 1 of the New York edition with the headline: Profits and Pride at Stake, Race to Vaccine Intensifies. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)

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<https://www.nytimes.com/2020/05/02/us/politics/vaccines-coronavirus-research.html>

Profits and Pride at Stake, the Race for a Vaccine Intensifies

Governments, companies and academic labs are accelerating their efforts amid geopolitical crosscurrents, questions about safety and the challenges of producing enough doses for billions of people.

By [David E. Sanger](#), [David D. Kirkpatrick](#), [Carl Zimmer](#), [Katie Thomas](#) and [Sui-Lee Wee](#)

Published May 2, 2020 Updated May 3, 2020, 11:10 a.m. ET

WASHINGTON — Four months after a mysterious new virus began its deadly march around the globe, the search for a vaccine has taken on an intensity never before seen in medical research, with huge implications for public health, the world economy and politics.

Seven of the roughly 90 projects being pursued by governments, pharmaceutical makers, biotech innovators and academic laboratories have reached the stage of clinical trials. With political leaders — not least President Trump — increasingly pressing for progress, and with big potential profits at stake for the industry, drug makers and researchers have signaled that they are moving ahead at unheard-of speeds.

But the whole enterprise remains dogged by uncertainty about whether any coronavirus vaccine will prove effective, how fast it could be made available to millions or billions of people and whether the rush — compressing a process that can take 10 years into 10 months — will sacrifice safety.

In an era of intense nationalism, the [geopolitics](#) of the vaccine race are growing as complex as the medicine. The months of [mutual vilification](#) between the United States and China over the origins of the virus have poisoned most efforts at cooperation between them. The U.S. government is already warning that American innovations must be protected from theft — chiefly from Beijing.

“Biomedical research has long been a focus of theft, especially by the Chinese government, and vaccines and treatments for the coronavirus are today’s holy grail,” John C. Demers, the assistant attorney general for national security, said on Friday. “Putting aside the commercial value, there would be great geopolitical significance to being the first to develop a treatment or vaccine. We will use all the tools we have to safeguard American research.”

The intensity of the global research effort is such that governments and companies are building production lines before they have anything to produce.

“We are going to start ramping up production with the companies involved,” Dr. Anthony S. Fauci, the director of the National Institute of Allergy and Infectious Diseases and the federal government’s top expert on infectious diseases, said on NBC this week. “You don’t wait until you get an answer before you start manufacturing.”

Two of the leading entrants in the United States, [Johnson & Johnson](#) and [Moderna](#), have announced partnerships with manufacturing firms, with Johnson & Johnson promising a billion doses of an as-yet-undeveloped vaccine by the end of next year.

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Not to be left behind, the Britain-based pharmaceutical giant AstraZeneca said this week that it was working with a vaccine development project at the University of Oxford to manufacture tens of millions of doses by the end of this year.



Image

A researcher replicating the coronavirus in order to develop a vaccine in Belo Horizonte, Brazil. Credit...Douglas Magno/Agence France-Presse — Getty Images

With the demand for a vaccine so intense, there are escalating calls for “human-challenge trials” to speed the process: tests in which volunteers are injected with a potential vaccine and then deliberately exposed to the coronavirus.

Because the approach involves exposing participants to a potentially deadly disease, challenge trials are ethically fraught. But they could be faster than simply inoculating human subjects and waiting for them to be exposed along with everyone else, especially as the pandemic is brought under control in big countries.

Even when promising solutions are found, there are big challenges to scaling up production and distribution. Bill Gates, the Microsoft founder, whose foundation is spending \$250 million to help spur vaccine development, has warned about a critical shortage of a mundane but vital component: medical glass.

Without sufficient supplies of the glass, there will be [too few vials](#) to transport the billions of doses that will ultimately be needed.

The scale of the problem and the demand for a quick solution are bound to create tensions between the profit motives of the pharmaceutical industry, which typically fights hard to wring the most out of their investments in new drugs, and the public's need for quick action to get any effective vaccines to as many people as possible.

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So far, much of the research and development has been supported by governments and foundations. And much remains to be worked out when it comes to patents and what national governments will claim in return for their support and pledges of quick regulatory approval.

Given the stakes, it is no surprise that while scientists and doctors talk about finding a “global vaccine,” national leaders emphasize immunizing their own populations first. Mr. Trump said he was personally in charge of “[Operation Warp Speed](#)” to get 300 million doses into American arms by January.

Already, the administration has identified 14 vaccine projects it intends to focus on, a senior administration official said, with the idea of further narrowing the group to a handful that could go on, with government financial help and accelerated regulatory review, to meet Mr. Trump's goal. The winnowing of the projects to 14 was [reported Friday](#) by NBC News.

But other countries are also signaling their [intention to nationalize their approaches](#). The most promising clinical trial in China is financed by the government. And in India, the chief executive of the Serum Institute of India — the world's largest producer of vaccine doses — said that most of its vaccine “would have to go to our countrymen before it goes abroad.”

George Q. Daley, the dean of Harvard Medical School, said thinking in country-by-country rather than global terms would be foolhardy since it “would involve squandering the early doses of vaccine on a large number of individuals at low risk, rather than covering as many high-risk individuals globally” — health care workers and older adults — “to stop the spread” around the world.

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Given the proliferation of vaccine projects, the best outcome may be none of them emerging as a clear winner.

“Let's say we get one vaccine quickly but we can only get two million doses of it at the end of next year,” said Anita Zaidi, who directs the Bill and Melinda Gates Foundation's vaccine development program. “And another vaccine, just as effective, comes three months later but we can make a billion doses. Who won that race?”

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The answer, she said, “is we will need many different vaccines to cross the finish line.”

Speed Versus Safety



Image

Dr. Maurice Hilleman holds the record for the quickest delivery of a vaccine from the lab to the clinic: four years. Credit...Associated Press

At 1 a.m. on March 21, 1963, a 5-year-old girl named Jeryl Lynn Hilleman woke up her father. She had come down with the mumps, which had made her miserable with a swollen jaw.

It just so happened that her father, Maurice, was a vaccine designer. So he told Jeryl Lynn to go back to bed, drove to his lab at Merck to pick up some equipment, and returned to swab her throat. Dr. Hilleman refrigerated her sample back at his lab and soon got to work weakening her viruses until they could serve as a mumps vaccine. In 1967, it was approved by the F.D.A.

To vaccine makers, this story is the stuff of legend. Dr. Hilleman still holds the record for the quickest delivery of a vaccine from the lab to the clinic. Vaccines typically take ten to fifteen years of research and testing. And only six percent of the projects that scientists launch reach the finish line.

For a world in the grips of Covid-19, on the other hand, this story is the stuff of nightmares. No one wants to wait four years for a vaccine, while millions die and economies remain paralyzed.

Some of the leading contenders for a coronavirus vaccine are now promising to have the first batches ready in record time, by the start of next year. They have accelerated their schedules by collapsing the standard vaccine timeline.

They are combining trials that used to be carried out one after the other. They are pushing their formulations into production, despite the risk that the trials will fail, leaving them with millions of useless doses.

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But some experts want to do even more to speed up the conveyor belt. Writing last month in the journal *Vaccines*, the vaccine developer Dr. Stanley A. Plotkin and Dr. Arthur L. Caplan, a bioethicist at NYU Langone Medical Center, proposed infecting vaccinated volunteers with the coronavirus — the method known as challenge trials. The procedure might cut months or years off the development but would put test subjects at risk.

Challenge trials were used in the early days of vaccine research but now are [carried out under strict conditions](#) and only for illnesses, like flu and malaria, that have established treatments.

In [an article](#) in March in *The Journal of Infectious Diseases*, a team of researchers wrote, “Such an approach is not without risks, but every week that vaccine rollout is delayed will be accompanied by many thousands of deaths globally.”

Dr. Caplan said that limiting the trials to healthy young adults could reduce the risk, since they were less likely to suffer serious complications from Covid-19. “I think we can let people make the choice and I have no doubt many would,” he said.



Image

The manufacturing workshop at the Wuhan Institute of Biological Products in China. The U.S. and China have clashed over the origins of the coronavirus, dampening cooperation in developing a vaccine. Credit...China Stringer Network/Reuters

In Congress, Representative Bill Foster, Democrat of Illinois and a physicist, and Representative Donna E. Shalala, Democrat of Florida and the former secretary of the Department of Health and Human Services, organized a bipartisan group of 35 lawmakers to sign a letter asking regulators to approve such trials.

The organizers of a website set up to promote the idea, 1daysooner.org, say they have signed up more than 9,100 potential volunteers from 52 countries.

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Some scientists caution that truly informed consent, even by willing volunteers, may not be possible. Even medical experts do not yet know all the effects of the virus. Those who have appeared to recover might still face future problems.

Even without challenge trials, accelerated testing may run the risk of missing potential side effects. A vaccine for dengue fever, and one for SARS that never reached the market, were abandoned after making some people more susceptible to severe forms of the diseases, not less.

“It will be extremely important to determine that does not happen,” said Michel De Wilde, a former senior vice president of research and development at Sanofi Pasteur, a vaccine maker in France.

When it comes to the risks from flawed vaccines, China’s history is instructive.

The Wuhan Institute of Biological Products was involved in a 2018 scandal in which ineffective vaccines for diphtheria, tetanus, whooping cough and other conditions were injected into hundreds of thousands of babies.

Sign up to receive an email when we publish a new story about the coronavirus outbreak.

The government confiscated the Wuhan institute’s “illegal income,” fined the company, and punished nine executives. But the company was allowed to continue to operate. It is now running a coronavirus vaccine project, and along with two other Chinese groups has been allowed to combine its safety and efficacy trials.

Several Chinese scientists questioned the decision, arguing that the vaccine should be shown to be safe before testing how well it works.

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Nationalism Versus Globalism



Image

Elderly women waiting to see health workers in Mumbai. A powerful vaccine manufacturer in India has made it clear that any vaccine it produces would have to first go to India's 1.3 billion people, at least initially. Credit...Atul Loke for The New York Times

In the early days of the crisis, Harvard was approached by the Chinese billionaire Hui Ka Yan. He arranged to give roughly \$115 million to be split between Harvard Medical School and its affiliated hospitals and the Guangzhou Institute of Respiratory Diseases for a collaborative effort that would include developing coronavirus vaccines.

"We are not racing against each other, we are racing the virus," said Dr. Dan Barouch, the director of the Center for Virology and Vaccine Research at Beth Israel Deaconess Medical Center and a professor at Harvard Medical School who is also working with Johnson & Johnson. "What we need is a global vaccine — because an outbreak in one part of the world puts the rest of the world at risk."

That all-for-one sentiment has become a mantra among many researchers, but it is hardly universally shared.

In India, the Serum Institute — the heavyweight champion of vaccine manufacturing, producing 1.5 billion doses a year — has signed agreements in recent weeks with the developers of four promising potential vaccines. But in [an interview with Reuters](#), Adar Poonawalla, the company's billionaire chief executive, made it clear that "at least initially" any vaccine the company produces would have to go to India's 1.3 billion people.

The tension between those who believe a vaccine should go where it is needed most and those dealing with pressures to supply their own country first is one of the defining features of the global response.

The Trump administration, which in March put out feelers to a German biotech company to acquire its vaccine research or move it to American shores, has awarded grants of nearly half a billion dollars each to two U.S.-based companies, Johnson & Johnson and Moderna.

Johnson & Johnson, though based in New Jersey, conducts its research in the Netherlands.

Paul Stoffels, the company's vice chairman and chief scientific officer, said in an interview that the Department of Health and Human Services understood "we can't pick up our research and move it" to the United States. But it made sure that the company joined a partnership with Emergent BioSolutions — a Maryland biological production firm — to produce the first big batches of any approved vaccine for the United States.

[Continue reading the main story](#)

"The political reality is that it would be very, very hard for any government to allow a vaccine made in their own country to be exported while there was a major problem at home," said Sandy Douglas, a researcher at the University of Oxford. "The only solution is to make a hell of a lot of vaccine in a lot of different places."

The [Oxford vaccine team](#) has already begun scaling up plans for manufacturing by half a dozen companies across the world, including China and India, plus two British manufacturers and the British-based multinational AstraZeneca.

In China, the government's instinct is to showcase the country's growth into a technological power capable of beating the United States. There are nine Chinese Covid-19 vaccines in development, involving 1,000 scientists and the Chinese military.

China's Center for Disease Control and Prevention predicted that one of the vaccines could be in "emergency use" by September, meaning that in the midst of the presidential election in the United States, Mr. Trump might see television footage of Chinese citizens lining up for injections.

"It's a scenario we have thought about," one member of Mr. Trump's coronavirus task force said. "No one wants to be around that day."

Traditional Versus New Methods



Image

Engineers working with monkey kidney cells at a Sinovac laboratory in Beijing. The company announced that its Covid-19 vaccine protected monkeys. Credit...Nicolas Asfour/Agence France-Presse — Getty Images

The more than 90 different vaccines under development work in radically different ways. Some are based on designs used for generations. Others use genetic-based strategies that are so new they have yet to lead to an approved vaccine.

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“I think in this case it’s very wise to have different platforms being tried out,” Dr. De Wilde said.

The traditional approach is to make vaccines from viruses.

When our bodies encounter a new virus, they start learning how to make effective antibodies against it. But they are in a race against the virus as it multiplies. Sometimes they produce effective antibodies quickly enough to wipe out an infection. But sometimes the virus wins.

Vaccines give the immune system a head start. They teach it to make antibodies in advance of an infection.

The first vaccines, against diseases like rabies, were made from viruses. Scientists weakened the viruses so that they could no longer make people sick.

A number of groups are weakening the coronavirus to produce a vaccine against Covid-19. In April, the Chinese company Sinovac announced that their inactivated vaccine protected monkeys.

Another approach is based on the fact that our immune system makes antibodies that lock precisely onto viruses. As scientists came to understand this, it occurred to them that they didn’t have to inject a whole virus into someone to trigger immunity. All they needed was to deliver the fragment of a viral protein that was the precise target.

Today these so-called subunit viral vaccines are used against hepatitis B and shingles. Many Covid-19 subunit vaccines are now in testing.

In the 1990s, researchers began working on vaccines that enlisted our own cells to help train the immune system. The foundation of these vaccines is typically a virus called an adenovirus. The adenovirus can infect our cells, but is altered so that it doesn’t make us sick.

Scientists can add a gene to the adenovirus from the virus they want to fight, creating what’s known as a viral vector. Some viral vectors then invade our cells, stimulating the immune system to make antibodies.

Researchers at the University of Oxford and the Chinese company CanSino Biologics have created a viral vector vaccine for Covid-19, and they’ve started safety trials on volunteers. Others including Johnson & Johnson are going to launch trials of their own in the coming months.

Some groups, including the American company Inovio Pharmaceuticals, are taking a totally different approach. Instead of injecting viruses or protein fragments, they’re injecting pure DNA, which is read by the cell’s machinery, making a copy as an RNA molecule. The RNA is then read by the cell’s protein-building

factories, making a viral protein. The protein in turn comes out of the cell, where immune cells bump into it and make an antibody to it.

Other teams are creating RNA molecules rather than DNA. Moderna and a group at Imperial College London have launched safety trials for RNA vaccines. While experimental, these genetic vaccines can be quickly designed and tested.

Designing Versus Manufacturing

It is one thing to design a vaccine in record time. It is an entirely different challenge to manufacture and distribute one on a scale never before attempted — billions of doses, specially packaged and transported at below-zero temperatures, to nearly every corner of the world.

“If you want to give a vaccine to a billion people, it better be very safe and very effective,” said Dr. Stoffels of Johnson & Johnson. “But you also need to know how to make it in amounts we’ve never really seen before.”

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So the race is on to get ahead of the enormous logistical issues, from basic manufacturing capacity to the shortages of medical glass and stoppers that Mr. Gates and others have warned of.

Researchers at Johnson & Johnson are trying to make a five-dose vial to save precious glass, which might work if a smaller dose is enough for inoculation.

Each potential vaccine will require its own customized production process in special “clean” facilities for drug making. Building from scratch might cost tens of millions of dollars per plant. Equipping one existing facility could easily cost from \$5 million to \$20 million. Ordering and installing the necessary equipment can take months.

Governments as well as organizations like the Gates Foundation and the nonprofit Coalition for Epidemic Preparedness Innovations are putting up money for production facilities well before any particular vaccine is proven effective.

What’s more, some vaccines — including those being tested by the American companies Moderna and Inovio — rely on technology that has never before yielded a drug that was licensed for use or mass-produced.

But even traditional processes face challenges.

Because of staff illnesses and social distancing, the pandemic this spring slashed productivity by 20 percent at the Millipore Sigma facility in Danvers, Mass., that supplies many drug makers with the equipment used for brewing vaccines.

Then, about three weeks ago, the first clinical trials for new proposed vaccines started. Urgent calls poured from customers around the world. Even before the first phase of the first trials, manufacturers were scrambling.

“Demand went through the roof, and everybody wanted it yesterday,” said Udit Batra, MilliporeSigma’s chief executive, who has expanded production and asked other customers to accept delays to avoid becoming a bottleneck.

Treatments Versus Vaccines



Image

Doctors treating a patient infected with Covid-19 in the intensive care unit of the Brooklyn Hospital Center. Some experts are more optimistic about new treatments for sick patients than potential vaccines. Credit...Victor J. Blue for The New York Times

Even as the world waits for a vaccine, a potential treatment for coronavirus is already here — and more could be on the way.

On Friday, [the Food and Drug Administration granted emergency authorization](#) for the use of remdesivir as a treatment of severely ill patients.

Remdesivir showed modest success in a federally funded clinical trial, slowing the progression of the disease, but without significantly reducing fatality rates.

The F.D.A.'s decision to allow its use comes as hundreds of other drugs — mainly existing medicines that are being used for other conditions — are being tested around the world to see if they hold promise. The F.D.A. said there are currently [72 therapies](#) in trial.

Studies of drugs tend to move more quickly than vaccine trials. Vaccines are given to millions of people who are not yet ill, so they must be extremely safe. But in sicker people, that calculus changes, and side effects might be an acceptable risk.

As a result, clinical trials can be conducted with fewer people. And because drugs are tested in people who are already sick, results can be seen more quickly than in vaccine trials, where researchers must wait to see who gets infected.

Public health experts have cautioned there will likely be no magic pill. Rather, they are hoping for incremental advances that make Covid-19 less deadly.

“Almost nothing is 100 percent, especially when you are dealing with a virus that really creates a lot of havoc in the body,” said Dr. Luciana Borio, a former director of medical and biodefense preparedness for the National Security Council under President Trump.

Antiviral drugs like remdesivir battle the virus itself, slowing its replication in the body.

The malaria drug hydroxychloroquine — which has been [enthusiastically promoted](#) by Mr. Trump and also received emergency authorization to be used in coronavirus patients — showed early promise in the laboratory. However, small, limited studies in humans [have so far been disappointing](#).

So have some H.I.V. treatments, including a two-drug cocktail sold as Kaletra, [which failed in a Chinese trial](#).

Daniel O'Day, the chief executive of Gilead Sciences, the manufacturer of remdesivir, in the Oval Office on Friday. Credit...Erin Schaff/The New York Times

Other researchers have focused on identifying immunosuppressant drugs that address the most severe form of Covid-19, [when the body's immune system goes into overdrive](#), attacking the lungs and other organs.

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Many in the medical community are closely watching the development of antibody drugs that could act to neutralize the virus, either once someone is already sick or as a way of blocking the infection in the first place.

Several hospitals [are also administering plasma from recovered patients](#) to people who are sick with Covid-19, in the hopes that the antibodies of survivors will give the patients a boost.

Dr. Scott Gottlieb, a former F.D.A. commissioner, and others said that by the fall, the treatment picture for Covid-19 could look more hopeful.

If proven effective in further trials, remdesivir may become more widely used. One or two antibody treatments may also become available, providing limited protection to health care workers.

Even without a vaccine, Dr. Borio said, a handful of early treatments could make a difference. “If you can protect people that are vulnerable and you can treat people that come down with the disease effectively,” she said, “then I think it will change the trajectory of this pandemic.”

David E. Sanger reported from Washington, David D. Kirkpatrick from London, Carl Zimmer and Katie Thomas from New York and Sui-Lee Wee from Singapore. Denise Grady and Maggie Haberman contributed reporting.

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A version of this article appears in print on May 3, 2020, Section A, Page 1 of the New York edition with the headline: Profits and Pride at Stake, Race to Vaccine Intensifies. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)

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T cells found in COVID-19 patients 'bode well' for long-term immunity



Immune hunters called T cells can seek and destroy a cell (green) infected with and making copies of SARS-CoV-2 (yellow).

NIAID

T cells found in COVID-19 patients 'bode well' for long-term immunity

By [Mitch Leslie](#) May. 14, 2020 , 9:00 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

Immune warriors known as T cells help us fight some viruses, but their importance for battling SARS-CoV-2, the virus that causes COVID-19, has been unclear. Now, two studies reveal that infected people harbor T cells that target the virus—and may help them recover. Both studies also found that some people never infected with SARS-CoV-2 have these cellular defenses, most likely because they were previously infected with other coronaviruses.

“This is encouraging data,” says virologist Angela Rasmussen of Columbia University. Although the studies don’t clarify whether people who clear a SARS-CoV-2 infection can ward off the virus in the future, both identified strong T cell responses to it, which “bodes well for the development of long-term protective immunity,” Rasmussen says. The findings could also help researchers create better vaccines.

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The more than 100 COVID-19 vaccines in development mainly focus on another immune response: antibodies. These proteins are made by B cells and ideally latch onto SARS-CoV-2 and prevent it from entering cells. T cells, in contrast, thwart infections in two different ways. Helper T cells spur B cells and other immune defenders into action, whereas killer T cells target and destroy infected cells. The severity of disease can depend on the strength of these T cell responses.

Using bioinformatics tools, a team led by Shane Crotty and Alessandro Sette, immunologists at the La Jolla Institute for Immunology, predicted which viral protein pieces would provoke the most powerful T cell responses. They then exposed immune cells from 10 patients who had recovered from mild cases of COVID-19 to these viral snippets.

[All of the patients carried helper T cells that recognized the SARS-CoV-2 spike protein](#), which enables the virus to infiltrate our cells. They also harbored helper T cells that react to other SARS-CoV-2 proteins. And the team detected virus-specific killer T cells in 70% of the subjects, they report today in *Cell*. “The immune system sees this virus and mounts an effective immune response,” Sette says.

The results jibe with those of a study posted as a preprint on medRxiv on 22 April by immunologist Andreas Thiel of the Charité University Hospital in Berlin and colleagues. They [identified helper T cells targeting the spike protein in 15 out of 18 patients](#) hospitalized with COVID-19.

The teams also asked whether people who haven't been infected with SARS-CoV-2 also produce cells that combat it. Thiel and colleagues analyzed blood from 68 uninfected people and found that 34% hosted helper T cells that recognized SARS-CoV-2. The La Jolla team detected this crossreactivity in about half of stored blood samples collected between 2015 and 2018, well before the current pandemic began. The researchers think these cells were likely triggered by past infection with one of the four human coronaviruses that cause colds; proteins in these viruses resemble those of SARS-CoV-2.

The results suggest "one reason that a large chunk of the population may be able to deal with the virus is that we may have some small residual immunity from our exposure to common cold viruses," says viral immunologist Steven Varga of the University of Iowa. However, neither of the studies attempted to establish that people with crossreactivity don't become as ill from COVID-19.

Before these studies, researchers didn't know whether T cells played a role in eliminating SARS-CoV-2, or even whether they could provoke a dangerous immune system overreaction. "These papers are really helpful because they start to define the T cell component of the immune response," Rasmussen says. But she and other scientists caution that the results do not mean that people who have recovered from COVID-19 are protected from reinfection.

To spark production of antibodies, vaccines against the virus need to stimulate helper T cells, Crotty notes. "It is encouraging that we are seeing good helper T cell responses against SARS-CoV-2 in COVID-19 cases," he says. The results have other significant implications for vaccine design, says molecular virologist Rachel Graham of the University of North Carolina, Chapel Hill. Most vaccines under development aim to elicit an immune response against spike, but both studies determined that T cells reacted to several viral proteins, suggesting that vaccines that sic the immune system on these proteins as well could be more effective. "It is important to not just concentrate on one protein," Graham says.

<https://www.sciencemag.org/news/2020/05/t-cells-found-covid-19-patients-bode-well-long-term-immunity#>

A human monoclonal antibody blocking SARS-CoV-2 infection

[Chunyan Wang](#), [Wentao Li](#), [Dubravka Drabek](#), [Nisreen M. A. Okba](#), [Rien van Haperen](#), [Albert D. M. E. Osterhaus](#), [Frank J. M. van Kuppeveld](#), [Bart L. Haagmans](#), [Frank Grosveld](#) & [Berend-Jan Bosch](#)

Nature Communications **volume 11**, Article number: 2251 (2020) [Cite this article](#)

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Abstract

The emergence of the novel human coronavirus SARS-CoV-2 in Wuhan, China has caused a worldwide epidemic of respiratory disease (COVID-19). Vaccines and targeted therapeutics for treatment of this disease are currently lacking. Here we report a human monoclonal antibody that neutralizes SARS-CoV-2 (and SARS-CoV) in cell culture. This cross-neutralizing antibody targets a communal epitope on these viruses and may offer potential for prevention and treatment of COVID-19.

<https://www.nature.com/articles/s41467-020-16256-y>

Large trial yields strongest evidence yet that antiviral drug can help COVID-19 patients

By [Jon Cohen](#) Apr. 29, 2020 , 8:30 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

Gilead's remdesivir, designed to stymie viral replication, modestly speeds the recovery of COVID-19 patients, according to a new study.

Gilead

A candidate treatment for COVID-19 has shown convincing—albeit modest—benefit for the first time in a large, carefully controlled clinical trial in hospitalized patients.

The infected people who received remdesivir, an experimental drug made by Gilead Sciences that cripples an enzyme several viruses use to copy their RNA, recovered in an average of 11 days versus 15 in patients who received a placebo. “Although a 31% improvement doesn’t seem like a knockout, 100% [success], it is a very important proof of concept,” said Anthony Fauci, head of the National Institute of Allergy and Infectious Diseases (NIAID), during an [Oval Office meeting](#) in which President Donald Trump was asked by media about a statement Gilead had released on the results. The patients treated with remdesivir also had a lower mortality rate—8% versus 11.6% in the group given the placebo—but this positive trend did not reach statistical significance, Fauci noted. (The full results from the trial have not been made public in a preprint or peer-reviewed paper.)

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SARS-CoV-2 infection displays immense inter-individual clinical variability, ranging from silent infection to lethal disease. The role of human genetics in determining clinical response to the virus remains unclear. Studies of outliers—individuals remaining uninfected despite viral exposure and healthy young patients with life-threatening disease—present a unique opportunity to reveal human genetic determinants of infection and disease.

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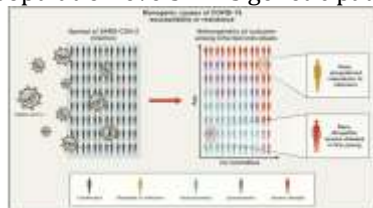
A Global Effort to Define the Human Genetics of Protective Immunity to SARS-CoV-2 Infection

Jean-Laurent Casanova^{1,2,3,4,5,*}, Helen C. Su⁶, and the COVID Human Genetic Effort¹ St. Giles Laboratory of Human Genetics of Infectious Diseases, Rockefeller Branch, The Rockefeller University, New York, NY, USA² Howard Hughes Medical Institute, New York, NY, USA³ Laboratory of Human Genetics of Infectious Diseases, Necker Branch, INSERM, Necker Hospital for Sick Children, Paris, France⁴ University of Paris, Imagine Institute, Paris, France⁵ Pediatric Hematology and Immunology Unit, Necker Hospital for Sick Children, AP-HP, Paris, France⁶ Laboratory of Clinical Immunology and Microbiology, Division of Intramural Research, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, MD, USA*Correspondence:casanova@rockefeller.edu

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SARS-CoV-2 infection displays immense inter-individual clinical variability, ranging from silent infection to lethal disease. The role of human genetics in determining clinical response to the virus remains unclear. Studies of outliers—individuals remaining uninfected despite viral exposure and healthy young patients with life-threatening disease—present a unique opportunity to reveal human genetic determinants of infection and disease. There are seven known human-tropic coronaviruses (CoV), three of which have caused severe epidemics. These three RNA viruses—SARS-CoV-1 (discovered in 2002), MERS-CoV (2012), and SARS-CoV-2 (2019)—are much more virulent than the other four (HCoV-229E, HCoV-NL63, HCoV-OC43, HCoV-HKU1), which cause common colds and only rare cases of severe disease, including pneumonia. In 2002, SARS-CoV-1 caused an epidemic limited to China. In 2012, MERS-CoV caused an epidemic that began in Saudi Arabia, subsequently spreading primarily in the Middle East before containment. SARS-CoV-2 was first detected in China in 2019, but has since become a devastating ongoing global pandemic. Most SARS-CoV-2 infections are asymptomatic or benign, but SARS-CoV-2 infectious disease 2019 (COVID-19) can cause life-threatening disease, which typically begins with pneumonia. Severe COVID-19 occurs much more frequently in patients over the age of 50 years and/or with co-morbid conditions such as pulmonary, cardiovascular, and metabolic disorders (Figure 1). Life-threatening disease probably strikes less than 1 in 1,000 infected individuals below the age of 50 without underlying conditions but more than 1 in 10 infected patients over the age of 80 years with multiple comorbidities. The identification of advanced age and co-morbidities as major risk factors is clinically important and suggests that the decline of the body weakens immunity, which may be difficult to translate into molecular, cellular, and immunological terms. However, there is also a more perplexing, but perhaps less difficult, problem. Why are previously healthy children, adolescents, young, or middle-aged adults being admitted to intensive care for respiratory failure, encephalitis, or Kawasaki disease, due to COVID-19? Why would a 40-year-old man who completed a marathon in October 2019 find himself intubated and ventilated for COVID-19 respiratory failure in April 2020? The COVID Human Genetic Effort (<https://www.covidhge.com/>) proposes that previously healthy, young patients with severe COVID-19 carry causal genetic variants. This hypothesis is not yet supported by specific genetic epidemiological studies of COVID-19, but it follows a long line of classical genetic studies since 1905, relating to diverse infections in plants and animals, including humans (Casanova and Abel, 2020). Three types of human genetic epidemiological studies merit specific comment. Twin studies have shown that concordance rates for some infectious diseases, such as tuberculosis, are much higher for monozygotic than dizygotic twins. Adoption studies have shown that early death from any type of infection is paradoxically correlated with early death from infection of the biological but not the foster parents. Finally, susceptibility to various infectious diseases has been shown, particularly by segregation studies, to be heritable and to reflect the impact of a major gene. Since 1950, genetic and molecular studies have provided an immunological basis for inherited predispositions to infectious diseases. Patient- and family-based studies led to the discovery of autosomal recessive neutropenia and X-linked recessive agammaglobulinemia. These two seminal inborn errors of immunity appeared to be Mendelian, and the pathophysiological mechanism of each was elucidated,

providing proof of principle for genetic predisposition to human infectious diseases. These and many other inborn errors of immunity are individually rare and underlie multiple, recurrent, and often unusual infections in individual patients. Since 1985, molecular genetics studies have confirmed these disorders to be Mendelian (monogenic with complete clinical penetrance). These studies launched a painstaking mission to decipher the genetic basis of susceptibility to infections in humans, from the individual to whole-population levels. This genetic patient-by-patient, 11194 Cell 181, June 11, 2020 © 2020 Elsevier Inc.



family-by-family, disorder-by-disorder approach was highly productive in the few patients studied but seemed unlikely to deliver results of great significance for the general population. First, the phenotype of multiple and familial infections is not observed in most people, who typically display isolated and sporadic infections. Second, populations consist of huge numbers of individuals, so defining the population genetic architecture of infectious diseases through causal analyses and genetics of individual cases is a Herculean task. A more tenable pathway from the population to the individual was proposed, based on associations and biometrics. The ambitious population-based biometrics approach to studying infectious diseases, initiated in the 1950s, highlights the persistent divide between Mendelian geneticists and Galtonian biometricians. The biometric approach began with a spectacular discovery when Anthony Allison found that the sickle cell trait provided 10-fold protection against severe forms of *Plasmodium falciparum* malaria. With hindsight, this discovery told us more about the selective pressure imposed by malaria on the *Homo sapiens* genome than the mechanism by which individual human genomes predispose to malaria. It provided no significant explanation of malaria at the individual level, as it failed to explain why about 1 in 1,000 infected children develop severe malaria, or 1 in 10,000 sickle cell trait carriers. Furthermore, despite this initial breakthrough, the biometric approach fell short of its promise. Other association studies, whether genome-wide or candidate gene based, have not matched Allison's discovery, in terms of effect size or proportion of the variance explained. However, this approach did yield two important results concerning viruses. Some HLA class I alleles are strongly associated with low viral loads in the blood and slower disease progression in individuals infected with human immunodeficiency virus (HIV), and homozygotes for a type III IFN (IFNL3-IFNL4) haplotype are more likely to clear hepatitis C virus spontaneously during primary infection. We can hope that genome-wide association studies for COVID-19 will generate results of similar or greater importance. Nevertheless, this approach is intrinsically limited by genetic and phenotypic heterogeneity and by the need for multiple testing corrections. More importantly, statistical association studies do not provide mechanisms. Without determining the chain of cause and consequence, causality between a candidate genotype and a clinical phenotype remains uncertain, no matter how statistically probable. In human medicine, establishing causality between genotype and phenotype requires the rigorous validation of mechanisms at the molecular, cellular, tissue, and whole-organism levels. The genome of the individual must explain the mechanisms underlying severe COVID-19, and this requires in-depth biochemical and immunological studies. Investigators have thus long been faced with the cruel affecting the TLR3 or snoRNA31 pathways (forebrain infection) or DBP1 (brain-stem infection) (Zhang et al., 2018). These mutations impair neuron-intrinsic immunity to HSV-1 in the CNS. Other examples more closely related to COVID-19 include influenza virus pneumonia, which can be caused by inborn errors impairing antiviral type I and III IFN immunity (IFN- α / β and I), including IRF7, IRF9, and TLR3 deficiencies, in circulating plasmacytoid dendritic cells and/or pulmonary epithelial cells (Ciancanelli et al., 2015; Hernandez et al., 2018; Lim et al., 2019), and rhinovirus pneumonia, which can be caused by a deficiency of IFN-inducing MDA5 (Asgari et al., 2017; Lamborn et al., 2017). These disorders underlie severe viral disease through the impairment of antiviral type I and/or III IFN immunity. Similar immunological scenarios, and even some of the same inborn errors, could underlie severe pulmonary COVID-19 in previously healthy young patients with monogenic disorders. In the absence of known human genetic determinants of susceptibility to other coronaviruses, influenza is likely to provide the best comparison. The threshold levels of type I and/or III IFN for protection against SARS-CoV-2 might be similar to those for the 1918 influenza virus but higher than those for seasonal influenza. IFN-dependent control of the virus could be profoundly impaired during

initial infection in patients with early-onset pneumonia, whereas those whose condition deteriorates later could have milder IFN deficiency or genetically determined excessive inflammation. For example, IL18BP mutations underlie fulminant viral hepatitis because they unleash IL-18-dependent inflammation in the liver, whereas SH2D1A mutations underlie hemophagocytosis following B cell infection with EBV. Inborn errors could impair IFN immunity in leukocytes or pulmonary cells or enhance local or systemic inflammation. It will be interesting to determine whether known inborn errors of inflammation, such as deficiencies of IL-1 or IL-6 immunity, protect against severe forms of COVID-19. Inborn errors of cell-intrinsic immunity in the CNS might be involved in the rarer neurological complications of COVID-19. The anosmia reported by some patients suggests that SARS-CoV-2 may infect the olfactory bulb, from which it may invade the fore-brain, as for HSV-1 in patients with TLR3 mutations. COVID-19 is a completely new disease, and the current pandemic dwarfs previous SARS-CoV-1 and MERS-CoV outbreaks. We can, therefore, study newly infected patients on a massive scale, with minimal interference from vaccines, previous related infections, and herd immunity, in sharp distinction to influenza. COVID-19 provides us with a tragic but unparalleled opportunity to define precisely the genetic requirements for the control of an emerging, virulent, viral infection. The body makes use of the pleiotropic functions of many cells to control infection, including subsets of pulmonary cells and leukocytes. Many genes are also pleiotropic. Genome-wide searches for candidate monogenic, or digenic, disorders should therefore be immunologically agnostic, testing diverse genetic hypotheses. Approaches should include searching not only for highly penetrant rare variants but also for common variants that can be highly penetrant in specific infections, as recently shown for a common monogenic etiology of tuberculosis (Kern et al., 2019). Moreover, highly penetrant monogenic disorders should not be considered only in children, as illustrated by the death of a NOS2-deficient patient over the age of 50 years from primary cytomegalovirus infection (Drutman et al., 2020). Amid the uncertainties concerning the genetic architecture of COVID-19 susceptibility, only one thing is almost certain: as for other infectious diseases, there will be considerable genetic heterogeneity, reflecting the multiple layers of host defense that a virus must overcome to lead to mortality. To understand the genetic requirements for immune control of SARS-CoV-2, in February 2020, we began recruiting COVID-19 patients from as many centers and countries as possible to the COVID Human Genetic Effort. We target young patients (<50 years) with life-threatening disease and no pre-existing medical conditions. Our initiative has been rapidly expanding, with a growing number of centers that recruit patients, take clinical histories, and send blood samples to sequencing hubs. The exome and genome data are analyzed simultaneously locally at the hubs and centrally by the consortium. Hypotheses of genetic heterogeneity (one causal locus per kindred) and genetic homogeneity (a causal locus in two or more kindreds) are being tested in parallel. The large number of patients may facilitate the detection of promising candidate genotypes in single patients or families, including variants of known viral susceptibility genes. More importantly, this initiative will also detect genetic homogeneity, if the same gene is mutated in geographically distant patients. The analysis and comparison of genetic variants from a large number of individuals from diverse backgrounds will be crucial, as we cannot solely rely on current databases of data for “healthy” individuals to identify rare variants, which include individuals never before exposed to SARS-CoV-2. A large sample of genomes may also facilitate the detection of a polygenic background for monogenic mutations or the testing of polygenic signals detected by other studies. Finally, the inclusion of patients of diverse ancestries will make it possible to detect candidate genotypes specific or common to ancestries and to consider the evolutionary forces driving variation at these loci (Quintana-Murci, 2019). Once candidate genotypes have been identified, their contribution to the pathogenicity of severe COVID-19 will be investigated with in-depth molecular, cellular, and immunological approaches. Studies of single patients can be illuminating, but more detailed mechanistic studies are required for firm conclusions (Casanova et al., 2014). In these genetic studies, we aim to discover the pathogenesis of unexplained, severe COVID-19 in young, previously healthy patients. We anticipate that monogenic cases will provide insight into other types of cases, such as severe COVID-19 in elderly patients with several comorbid conditions, suggesting novel therapeutic possibilities for these patients. The pathogenesis may be similar in these patients, with different causes converging on common pathophysiological mechanisms. For example, inborn errors of IFN- γ and IL-17A/F immunity underlie mycobacteriosis and candidiasis, respectively. The same infections occur in patients with autoantibodies against IFN- γ and IL-17A/F, and in patients infected with HIV who have low levels of IFN- γ and IL-17A/F production. *Cell* 181, June 11, 2020 1197

Commentary

by CD4+T cells, providing broader indications for the therapeutic use of the corresponding cytokines. Thus, monogenic cases may clarify pathogenesis more broadly for COVID-19 patients. Such clarification cannot easily be achieved by directly studying patients with acquired immunodeficiencies, due to the many confounding factors and difficulties in determining whether immunological abnormalities in patients are causes or consequences of infection. Genetics provides us with access to the root cause of phenomena. This project will also facilitate the detection of individuals naturally resistant to SARS-CoV-2 infection. Why would the spouse of a patient already ill for days and now in intensive care remain not only healthy but seronegative? How could a health care worker treating contagious COVID-19 patients with insufficient protection remain healthy and seronegative? If such individuals also test negative for T cell responses to SARS-CoV-2, it is plausible that some are genetically resistant to the virus. The first example of such a situation was a regulatory DARC variant discovered in the 1970s and deciphered genetically in 1995. In the homozygous state, this variant confers resistance to *Plasmodium vivax* by abolishing the expression of a parasite receptor on erythrocytes. Two other known monogenic forms of resistance are more directly relevant to COVID-19. Homozygosity for CCR5 null mutations protects against CCR5-tropic HIV, and homozygosity for null FUT2 alleles protects against intestinal norovirus infection. Similarly, we speculate that loss-of-function variants of ACE2, encoding a receptor for SARS-CoV-2, might confer resistance, while hypomorphic variants might protect against severe disease in infected individuals. Identifying the genetic basis of resistance to SARS-CoV-2 would provide a pharmacological target for preventing or reducing viral infection in other individuals. The COVID-19 pandemic has drawn attention to the fact that infections are unique among medical conditions in being able to kill hundreds of thousands of people within a few months. Alas, this fact is well known to developing countries, but the current pandemic provides a tragic but timely reminder to developed countries with short memories. Infections remain the only inevitable, unpredictable, catastrophic medical threat to human-kind. The idea that infections were a problem solved once and for all by Pasteur's germ theory and the advances in hygiene, serotherapy, vaccination, aseptic surgery, and anti-infectious drug treatments that followed, is incorrect, complacent, and dangerous. The COVID-19 pandemic should make us consider an alternative approach to studying infectious diseases. We have all witnessed enormous interindividual clinical variability in response to SARS-CoV-2 exposure, ranging from resistance to death, and everything in between. Similar variability is observed for all human-tropic microbes, whether viruses, bacteria, fungi, or parasites. The proportion of life-threatening cases varies among microbes, from less than one in a million to greater than one in ten. This clinical variability during primary infection is the fundamental "infection enigma," which in 1955, led René Dubos to pen "Second thoughts on the germ theory" (Dubos, 1955). It is now time to test more comprehensively the hypothesis that the clinical manifestations of human infections, including those caused by SARS-CoV-2, can be governed by human genetics, at least in outliers resistant to infection or unusually prone to severe disease. This paradigm shift would open up new avenues for studying host-pathogen interactions in the course of evolution, controlling the current COVID-19 threat in the general population, and developing the infrastructure required to thwart future emerging threats.

CONSORTIUM The members of the COVID Human Genetic Effort include Laurent Abel, Alessandro Aiuti, Saleh Almuhsen, Andres Augusto Arias, Paul Bastard, Catherine Biggs, Dusan Bogunovic, Bertrand Boisson, Stephanie Boisson-Dupuis, Alexandre Bolze, Anastasia Bondarenko, Aziz Bousfiha, Petter Brodin, Jacinta Bustamante, Manish Butte, Giorgio Casari, Michael Ciancanelli, Aurelie Cobat, Antonio Condino-Neto, Megan Cooper, Clifton Dalgard, Sara Espinosa, Hagit Feldman, Jacques Fellay, Jose Luis Franco, David Hagin, Yuval Itan, Emmanuelle Jouanguy, Carrie Lucas, Davood Mansouri, Isabelle Meyts, Joshua Milner, Trine Mogensen, Tomohiro Morio, Lisa Ng, Luigi D. Notarangelo, Satoshi Okada, Tayfun Ozcelik, Pere Soler Palaci'n, Anna Planas, Carolina Prando, Anne Puel, Aurora Pujol, Claire Redin, Laurent Renia, Jose Carlos Rodriguez Gallego, Lluís Quintana-Murci, Vanessa Sancho-Shimizu, Vijay Sankaran, Mikko R.J. Seppanen, Mohammad Shah-rooei, Andrew Snow, Andra's Spaan, Stuart Tangye, Jordi Perez Tur, Stuart Turvey, Donald C. Vinh, Horst von Bernuth, Xiao-chuan Wang, Pawel Zawadzki, Qian Zhang, and Shenyang Zhang.

SUPPLEMENTAL INFORMATION Supplemental Information can be found online at <https://doi.org/10.1016/j.cell.2020.05.016>. **WEB RESOURCES** COVID Human Genetic Effort, <https://www.covidhge.com/ACKNOWLEDGMENTS>. J.L.C. was supported by funding from the Howard Hughes Medical Institute, the Rockefeller University, the St. Giles Foundation, the National Institutes of Health (NIH) (UL1TR001866 and R01AI088364), the French National Research Agency (ANR) "Investments for the Future" program (ANR-10-IAHU-01), Laboratoire d'Excellence Integrative Biology of Emerging Infectious Diseases (ANR-10-LABX-62-IBEID), French Foundation for Medical Research

(FRM)(EQU201903007798), Institut National de la Santé et de la Recherche Médicale (INSERM), and the University of Paris. H.C.S. was supported by funds from the Division of Intramural Research in the National Institute of Allergy and Infectious Diseases, NIH. We thank Yelena Nemirovskaya for editorial assistance. DECLARATION OF INTERESTS Helen Su holds Adjunct Faculty position in the Department of Pathology and Laboratory Medicine, University of Pennsylvania. REFERENCES Akgari, S., Schlapbach, L.J., Anchisi, S., Hammer, C., Bartha, I., Junier, T., Mottet-Osman, G., Pos-fay-Barbe, K.M., Longchamp, D., Stocker, M., et al. (2017). Severe viral respiratory infections in children with IFIH1 loss-of-function mutations. Proc. Natl. Acad. Sci. USA 114, 8342–8347. Casanova, J.L., and Abel, L. (2020). Lethal Infectious Diseases as Inborn Errors of Immunity: Toward a Synthesis of the Germ and Genetic. Cell 181, June 11, 2020 Commentary

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HARVARD CHAN COMMUNITY – LATEST ON COVID-19

<https://www.hsph.harvard.edu/news/hsph-in-the-news/the-latest-on-the-coronavirus/>

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For the Harvard Chan community: Find the latest updates, guidance, useful information, and resources about Coronavirus Disease 2019 (COVID-19) [here](#).

In the wake of an outbreak of [coronavirus](#) that began in China in late December 2019, Harvard T.H. Chan School of Public Health experts have been speaking to a variety of media outlets. We'll be updating this article on a regular basis. Here's a selection of stories in which they offer comments and context:

April 29: [Researchers Built Various Models To Predict Pandemic Shifts. Right Now, They Show 'A Tremendous Amount Of Uncertainty'](#) (WBUR)

There's not much data available for mathematical forecasts of the COVID-19 pandemic because the disease is only a few months old—and that makes it difficult for experts to predict how various policies could affect the severity of the outbreak, said [Caroline Buckee](#), associate professor of epidemiology and associate director of the [Center for Communicable Disease Dynamics](#). "The reality is that we all want answers," she said. "How many hospital beds do I need? When can we start rolling back physical distancing interventions? And people put out models, but they can be misapplied if they're read too literally. That's a tension between the reality of the uncertainty in the science and the public's need to have some sense of what's going to happen."

April 28: [Trump guidance puts burden on states to reach Covid-19 testing targets](#) (The Guardian)

With the Trump administration placing most of the burden on states to ramp up testing for COVID-19, experts say current testing levels are still far from where they need to be. [HHS](#) director [Ashish Jha](#) said that the U.S. should be performing a "bare minimum" of 500,000 tests per day—a threshold it has not reached yet. "Identifying who's infected, who's not is like public health, disease control 101," said Jha. "Without that, you've got nothing. If you can't test people for the virus, you cannot figure out who's infected, you can't keep them away from susceptible people, you can't run your economy."

April 28: [The Immunity Numbers Are Too Low](#) (The Atlantic)

Initial results from antibody surveys—tests that can show if a person has had COVID-19—suggest that there are still too many Americans vulnerable to infection. Even if someone does have antibodies to COVID-19, it's not clear if that makes them immune, or if they were immune, how long it would last. And many antibody tests on the market are unreliable. Further, current antibody surveys are revealing that potential immunity to COVID-19 can vary widely from location to location. So although the pandemic is global, "it is made up of hyperlocal epidemics that are differentially impacting communities," said [Yonatan Grad](#), assistant professor of immunology and infectious diseases. "At some point, we're going to need to think about *How do we all get to the same place?*"

(viii) What does 'Herd Immunity' mean – is it working? Apparently not in France and Spain

Herd immunity is not happening

Despite more than 27,000 confirmed deaths from COVID-19 in France, only 4.4% of people have actually been infected. The percentage is far below the required level — something more than 50% — to achieve herd immunity. Herd immunity would slow — but not stop — the outbreak. Results announced by Spain's health minister show a similar situation: more than 27,000 deaths and just 5% of the population tested had antibodies to the virus. "Population immunity appears insufficient to avoid a second wave" if lockdown measures are removed, say the authors of the French study. (Reuters | 2 min read)
Reference: *Science* paper

https://uk.reuters.com/article/uk-health-coronavirus-france-immunity/only-44-of-french-population-infected-by-coronavirus-pasteur-institute-idUKKBN22Q0RM?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

Part 5: Entire CNN coronavirus town hall (April 30)

Bill Gates explains the next steps ahead for a coronavirus vaccine with CNN's Anderson Cooper and Dr. Sanjay Gupta during a CNN town hall on the coronavirus pandemic.

[Source: CNN](#)

https://www.cnn.com/videos/media/2020/05/01/entire-april-30-coronavirus-town-hall-part-5-sot-vpx.cnn?hpt=ob_blogfooterold

(ix) Slowing the COVID-19 Pandemic with at least 70% of the population attaining immunity to SARS-CoV-2 coronavirus either conferred by vaccines or recovery post-infection by 'Herd Immunity' - which does not mean that a second infection cannot occur

How to suppress further COVID-19 outbreaks

The only plausible way to achieve herd immunity is through mass vaccination, argues a *Nature Biomedical Engineering* editorial. The alternative — letting the virus spread naturally at an infection fatality rate of something around 0.5–1% — implies that millions would die before transmission slows down. The journal outlines why widespread testing, technology-aided contact tracing, case isolation and the quarantining of contacts will continue to be essential to sustainably suppress further outbreaks. (Nature Biomedical Engineering | 7 min read)



https://www.nature.com/articles/s41551-020-0567-0?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

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Pandemic policy should also be climate policy - this is why



It's time to flatten the curve... this time on climate change.

Image: REUTERS/Willy Kurniawan

This article is published in collaboration with [Project Syndicate](#)

04 Aug 2020

1. [Renzo Guinto](#) Senior Fellow, Aspen Institute

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- Just as the world is doing with COVID-19, it's time to now flatten the curve of climate change, writes planetary expert Renzo Guinto.
- By reducing our carbon emissions, we will buy time to enable the development of sustainable systems and processes.

While the world focuses on the COVID-19 crisis, climate change continues to advance. The consequences are devastating and becoming more so – and that includes for the pandemic response itself.

There is no doubt that natural disasters are increasing in frequency and intensity as a result of climate change. This year alone, Australia grappled with its [most destructive bushfires](#) on record. East African countries have been battling the [worst outbreak](#) of desert locusts in decades. The Solomon Islands, Vanuatu, Fiji, and Tonga were hit by a category 5 [tropical cyclone](#). Europe has blistered under a [record-breaking heat wave](#). My country, the Philippines, has faced [intense flooding](#), and typhoon season is far from over.

Such hazards, scientists [warn](#), are likely to intersect with the COVID-19 outbreak and the public-health response, including by compounding stress on health-care systems, depleting emergency-response resources, and undermining people's ability to adhere to social distancing. They will exacerbate and be exacerbated by both the unfolding economic crisis and long-standing socioeconomic disparities, both within countries and across regions.

The recent typhoon in the Philippines illustrates the challenges ahead. Strong winds and severe flooding forced many to break quarantine and flee to cramped evacuation centers, where social-distancing protocols are virtually impossible to maintain. Distancing rules have complicated the rescue of some 200,000 people who are at risk from flooding or landslides. The number of people in need of aid – already significant during lockdown – has increased substantially. And already resource-constrained hospitals are expected to be overwhelmed further by a surge of patients with infectious diseases that are likely to proliferate as climate change progresses, such as [dengue and leptospirosis](#).

To be sure, COVID-19 has, to some extent, curbed humanity's impact on the environment. During the last three months, private cars stayed parked, factories curtailed operations, and power plants stopped burning coal. As a result, carbon dioxide emissions have [fallen dramatically](#) – even returning to 2010 levels. Urban air pollution has [dissipated](#), with many reveling in the return of blue skies over chronically smoggy megacities, and in [reports](#) of wild animals wandering through empty city streets.

Such developments have fed the narrative that the pandemic is giving Mother Earth a much-needed break. But, even if true, the respite will be brief, and do little to change our long-term climate trajectory.

In fact, the same researchers who reported that COVID-19 lockdowns had caused emissions to drop also reported that, when lockdowns have been eased, [emissions immediately rose](#). They predict that the pandemic will reduce total emissions in 2020 by 13%, at most, and only if some restrictions remain in place worldwide until the end of the year. Once we return to the pre-pandemic “normal,” so will emissions.

When lockdowns have been eased, emissions immediately rose.

Image: ICOS

Sustaining lockdowns – which disproportionately hurt the poorest and most vulnerable – is not the answer. A pandemic paralyzes economies, exacerbates inequality, and ends (or upends) people’s lives. It must not be viewed as a chance for the planet to “breathe,” or an environmental blessing in disguise. It certainly isn’t an automatic route to healthy and equitable decarbonization.

Have you read?

- [COVID-19 has thrown our planet a lifeline when it comes to climate change](#)
- [How COVID-19 and the climate are transforming the real estate sector](#)
- [Environmental leadership will be more in demand than ever after COVID-19](#)

But this does not mean that the pandemic cannot spur progress. Securing a healthier, more sustainable, and more equitable future – unmarred by ever-more health crises and other disasters – can be achieved only with gradual, intentional, and planned decarbonization and inclusive resilience-building. Here, the COVID-19 recovery plans and economic-stimulus packages being proposed by governments, businesses, and international organizations are a good place to start.

The pandemic has revealed how woefully unprepared our health systems are for shocks and stresses in all forms, whether the short-term surge in COVID-19 infections or the long-term health consequences of climate change. As governments invest in upgrading and strengthening health systems, they must incorporate climate-adaptation and mitigation objectives.

The same goes for investments, both public and private, in boosting resilience. As global health authorities and environmental advocates have [argued](#), only when leaders and decision-makers ensure that all aspects of the COVID-19 recovery are “healthy and green” can the post-pandemic “new normal” be one that protects the planet and all its people.

Because both the pandemic and climate change are global challenges, with no regard for political borders, international cooperation is essential. The United Nations Climate Change Conference (COP26) that was supposed to take place in Scotland this November was [postponed to 2021](#). But this should not be allowed to impede progress.

Instead, the delay should be regarded as an opportunity for leaders to do their homework and lay the groundwork for a conference that places health considerations at the center of climate negotiations. The 2015 Paris climate agreement mentioned the word “health” only once – in the preamble. COP26 must give rise to an even more ambitious plan combining climate and health imperatives.

“Flatten the curve” was the mantra of the early COVID-19 response. To avoid overwhelming health-care systems and buy time to increase their capacity, populations needed to take action to slow the spread of the virus. We should apply the same logic to climate action today, by flattening the curve of greenhouse-gas emissions and our broader ecological footprint, in order to buy time to build sustainable systems.

The difference, of course, is that, unlike health care, the planet’s thresholds cannot be changed. We are the ones who must adjust. The pandemic won’t save us, but it could be the catalyst we needed to save ourselves.

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Written by

[Renzo Guinto](#), Senior Fellow, Aspen Institute

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The Virus Can Be Stopped, but Only With Harsh Steps, Experts Say

Scientists who have fought pandemics describe difficult measures needed to defend the United States against a fast-moving pathogen.

By [Donald G. McNeil Jr.](#)

- Published March 22, 2020 Updated March 25, 2020

<https://www.nytimes.com/2020/03/22/health/coronavirus-restrictions-us.html>

Crushing coronavirus means ‘breaking the habits of a lifetime.’ Behavior scientists have some tips

By [Warren Cornwall](#)

Apr. 16, 2020 , 10:50 AM

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With no vaccine or medication to cope with the novel coronavirus, people around the world have sought—or been ordered to seek—protection by changing the way they act in ways large and small, from their washing hands more frequently to avoiding almost all physical contact. Now, government and industry leaders are turning to behavioral scientists for advice on how to persuade their citizens and workers to abide by such dramatic changes.

To beat the pandemic, we need “a more rapid change of behavior than I can think of in recent human history,” says Robb Willer, a sociologist at Stanford University. He recently helped recruit more than 40 top behavioral scientists to [summarize their field’s research](#) on how to steer people into certain actions and how it might aid the response to the pandemic.

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Politicians and executives are on the hunt for such advice. Facebook and Twitter have consulted Willer about ways to improve communicating coronavirus-related information and avoid pitfalls. Jay Van Bavel, a psychologist at New York University who led the review with Willer, shared insights from the work with approximately 700 people at an early April teleconference about pandemic misinformation hosted by the World Health Organization. Governments ranging from the United Kingdom to Sierra Leone have reached out to other behavioral researchers.

Their advice is already proving consequential, though not always successful. The government of the United Kingdom initially avoided closing schools and businesses, [citing concerns](#) that restricting movement too soon risked behavioral “fatigue.” But the government reversed course in late March after novel coronavirus infections surged.

In their search for practical guidance, behavioral scientists are plumbing previous research into disease outbreaks such as [the flu](#) and [Ebola](#), as well as seemingly unrelated subjects including [cigarette warning labels](#) and [political campaigns](#). Meanwhile, they are rushing ahead with new studies aimed at improving measures during the current crisis.

Many of their recommendations might seem like common sense and can be distilled to this: Have a unified set of fact-based messages, tailor them to different audiences, and choose your messengers wisely. A common message can help give people confidence to take action, particularly at a moment when fear motivates people, says Shana Gadarian, a political scientist at Syracuse University who has studied how anxieties influence political action in the United States.

Political divides

Even robust messages can lose power, however, when leaders send contradictory signals, or when public health advice gets refracted through a political lens. In the United States, President Donald Trump has repeatedly contradicted recommendations from public health officials, notably saying he probably wouldn’t wear a face mask on the day that both the Centers for Disease Control and Prevention and first lady [Melania Trump](#) urged people to do just that. Early in the pandemic, figures in conservative news outlets had derided calls for an aggressive response to the virus as a “hoax” or an attack on the Trump administration. “When you hear [health] experts saying one thing and the head of your [political] party saying another, that’s a troubling kind of thing to decide,” Gadarian says. In the United States, “What we’re seeing evidence of is that Republicans are basically going with what the president says.”

In a [survey of 3000 people in the United States](#) in mid-March, Gadarian found that political leanings were the strongest predictor of whether someone was likely to follow public health recommendations. Democrats were more inclined than Republicans to wash hands, buy hand sanitizer, and distance themselves from others. As COVID-19 has spread to more parts of the country, that partisan divide has shrunk but not vanished, according [to a poll in late March](#) by the Kaiser Family Foundation. More than 90% of people across the political spectrum reported engaging in some kind of social distancing. But Democrats were more likely to have stayed home, canceled plans for a group gathering, or fully sheltered in place. A [survey in early April](#) by Stanford researchers still found a partisan gap.

That ideological split is stronger in the United States than in the United Kingdom, says Gordon Pennycook, a cognitive psychologist at the University of Regina in Canada. He and collaborators surveyed approximately 650 people in each country to see what influenced misperceptions about the pandemic, such as the coronavirus being no worse than the flu. The study, [published as a preprint this week](#), found that in the United States, misperceptions were correlated with whether someone got their information from conservative news outlets such as Fox News. Although the United Kingdom has conservative newspapers, there’s no comparable TV broadcast station, Pennycook says. “Also, [Prime Minister] Boris Johnson is not treating [the pandemic] the same way that Trump is.”

Whether people respond to public health messages depends partly on who delivers it. That was underscored in Liberia during the deadly Ebola outbreak of 2014 and 2015, which killed [nearly 5000 people](#) in the West African nation. There, efforts by government workers to get people to follow precautions such as social distancing were stymied by suspicions that the disease was a government ploy to win more aid money. But neighborhood volunteers recruited and trained by government officials experienced much more success, says Lily Tsai, a political behavioral scientist at the Massachusetts Institute of Technology [who studied the Ebola response there](#). She concluded that residents found neighbors more credible partly because their connections to the community made them more accountable.

The identity of a trusted messenger depends on the situation. It could be local religious leaders, politicians, sports figures, or celebrities, Gadarian says. Governors leading their states' pandemic responses have [enjoyed a surge in popularity](#). In a late March Instagram chat, basketball star Stephen Curry of California's Golden State Warriors discussed the disease and how to avoid it with Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases. [The video](#) has had nearly half a million views on YouTube.

Small pushes, big results?

Messages can come in more subtle ways as well. Proponents of "nudges" emphasize the ways that small visual cues, brief reminders, or tiny changes in people's surroundings can change their actions. In the case of the coronavirus, it can be as simple as painting lines on a walking path to show what a 2-meter separation looks like, says Susan Michie, a health psychologist at University College London and director of its Centre for Behaviour Change.

She is contemplating how to break people of the habit of touching their faces, because the virus infects people through the mucus membranes that line the nose and airways. She wonders whether software on a person's camera-enabled computer or smartphone could alert them of a face touch. "It's about breaking the habits of a lifetime and setting up slightly different habits," she says.

It will take more than just messages to change behaviors on such a mammoth scale, says Ann Bostrom, who studies risk perception and communication at the University of Washington, Seattle. Often, compliance hinges on giving people the tools they need to easily follow new rules. "The physical context in which you make these decisions is often more important than grand ideological views," Bostrom says. "If there's a mask available from the dispenser at the front of the building, you're probably more likely to put it on." Ditto for easy availability of things like hand sanitizer, others say.

How to prevent backsliding?

Making behavioral changes easy to maintain could become particularly important as lockdowns stretch on and strains build, Michie says. [Past research](#) has found compliance during an epidemic [can decline over time](#). The U.K. government, she adds, might need to take measures to avoid backsliding and make a lockdown tolerable, including opening golf courses and private sports fields so that people can get outside without being crammed together. The government could even provide people with tablet computers and videos to help them pass the time at home.

Tsai, whose behavioral research focuses on people in the developing world, says that in poorer nations, persuading people to obey a lockdown could come down to something as simple as ensuring access to drinking water. She's launching an ambitious project in the West African country of Sierra Leone that uses detailed behavioral data to figure out what tools can best promote social distancing and limited movement there. She's working with a science directorate within the office of the nation's president, for example, to combine cellphone movement data with surveys of almost 3000 people across this country of 6.6 million. The goal is to gauge what messages are most effective, and what incentives would encourage residents to stay home—whether it's information, money, water, food, or a combination.

Eventually, Tsai plans to create a dynamic map, down to the neighborhood level, showing potential hot spots where cooperation could be difficult, and what kinds of actions are likely to help ease acceptance of physical distancing and other measures. She is also hoping to expand the project to some of the continent's largest cities, Lagos, Nigeria, and Nairobi, Kenya, to help prepare them for when the virus gains a foothold there. When the disease arrives in these sprawling cities, she fears, "it's going to be awful."

**Clarification, 17 April, 4:30 p.m.: A sentence referring to advice from the U.K. government's "nudge" unit has been removed, because Science could not confirm other media reports characterizing its role in shaping the government's initial response to the coronavirus pandemic.*

Posted in:

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<https://www.sciencemag.org/news/2020/04/crushing-coronavirus-means-breaking-habits-lifetime-behavior-scientists-have-some-tips>

Ending coronavirus lockdowns will be a dangerous process of trial and error

By [Kai Kupferschmidt](#)

Apr. 14, 2020 , 4:10 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

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The world is holding its breath.

After the novel coronavirus made its way from China around the world, one country after another adopted harsh measures to stop SARS-CoV-2 from spreading and overwhelming hospitals. They have hit the pause button on their economies and their citizens' lives, stopping sports events, religious services, and other social gatherings. School closures in 188 countries affect more than 1.5 billion students. Borders are closed and businesses shuttered. While some countries are still seeing daily case numbers increase, others—first in Asia but increasingly in Europe—have managed to bend the curve, slowing the transmission of COVID-19.

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But what is the exit strategy? “We’ve managed to get to the life raft,” says epidemiologist Marc Lipsitch of the Harvard T.H. Chan School of Public Health (HSPH). “But I’m really unclear how we will get to the shore.”

As they seek a path forward, governments around the world must triangulate the health of their citizens, the freedoms of their population, and economic constraints. Could schools be reopened? Restaurants? Bars? Can people go back to their offices? “How to relax the lockdown is not something around which there is a scientific consensus,” says Caroline Buckee, an epidemiologist at HSPH. Most researchers agree that reopening society will be a long haul, marked by trial and error. “It’s going to have to be something that we’re going to have to take baby steps with,” says Megan Coffee, an infectious disease researcher at New York University.

The number to watch in the next phase may no longer be the actual number of cases per day, but what epidemiologists call the effective reproduction number, or R , which denotes how many people the average infected person infects in turn. If R is above 1, the outbreak grows; below 1 it shrinks. The goal of the current lockdowns is to push R well below 1. Once the pandemic is tamed, countries can try to loosen restrictions while keeping R hovering around 1, when each infected person on average infects one other person, keeping the number of new cases steady.

To regulate R , “Governments will have to realize that there are basically three control knobs on the dashboard,” says Gabriel Leung, a modeler at the University of Hong Kong: isolating patients and tracing their contacts, border restrictions, and social distancing.

Turning the knobs

Singapore, Hong Kong, and South Korea have all managed to keep their epidemics in check through aggressive use of the first control. They identify and isolate cases early and trace and quarantine their contacts, while often imposing only light restrictions on the rest of society. But this strategy depends on massively scaling up testing, which has been hampered by a scarcity of reagents and other materials everywhere. The United States will be able to do millions of tests per week, says Caitlin Rivers of the Johns Hopkins Center for Health Security. “Although our testing capacity has grown a lot in the last couple of weeks, we are not where we need to be yet,” she says.

Contact tracing is another hurdle, and it is labor intensive. Massachusetts is hiring 500 contact tracers, but [a recent report by Rivers and others](#) estimates that the United States as a whole needs to train about 100,000 people.

Mobile phone apps could help by automatically identifying or alerting people who recently had contact with an infected person. (“Public health departments, not generally known anywhere in the world to be at the forefront of technological innovation, will have to adapt very quickly,” Leung says.) But Western countries have yet to implement these systems. Google and Apple have teamed up to incorporate a contact tracing app in their operating systems. Germany, France, and other countries are developing apps based on a protocol called [Pan-European Privacy Preserving Proximity Tracing](#). It relies on short-range Bluetooth signals to gauge the proximity between two devices without logging their exact locations, which helps sidestep some privacy concerns.

But short of making these technologies compulsory, as China has done, how can a country ensure that enough people download an app for it to provide reliable information and influence the spread of disease? And what exactly counts as a contact? “If I live in a big apartment block, am I going to be getting dozens of notifications a day?” asks epidemiologist Nicholas Davies of the London School of Hygiene & Tropical Medicine (LSHTM). Davies adds that widespread use of the apps will further drive up the demand for testing.

As to the second control knob, border restrictions, most countries have already banned entry to almost all noncitizens. Quarantining returning citizens, as New Zealand and Australia began to do in the past few weeks, further minimizes the risk of new introductions of the virus. Such measures are likely to remain in place for a while; the more a country reduces transmission domestically, the greater the risk that any new outbreaks will originate with travelers. And foreign visitors are generally harder to trace than citizens and more likely to

stay at hotels and visit potential transmission hot spots, says Alessandro Vespignani, a disease modeler at Northeastern University. “As soon as you reopen to travelers, that could be something that the contact tracing system is not able to cope with,” he says.

The third dashboard dial, social distancing, is the backbone of the current strategy, which has slowed the spread of the virus. But it also comes at the greatest economic and social cost, and many countries hope the constraints can be relaxed as case isolation and contact tracing help keep the virus in check. In Europe, Austria took the lead by opening small shops today. Other stores and malls are scheduled to follow on 1 May, and restaurants maybe a few weeks later. A [13 April report from the German National Academy of Sciences](#) argued for slowly reopening schools, starting with the youngest children, while staggering break times and making masks mandatory. But French President Emmanuel Macron has said France’s lockdown will remain in place until 11 May.

Choosing a prudent path is difficult, Buckee says, in part because no controlled experiments have compared the effectiveness of different social distancing measures. “Because we don’t have really strong evidence,” she says, “it’s quite hard to make evidence-based policy decisions about how to go back.” But Lipsitch says that as authorities around the world choose different paths forward, comparisons could be revealing. “I think there’s going to be a lot of experimentation, not on purpose, but because of politics and local situations,” he says. “Hopefully the world will learn from that.”

The number to watch

Lockdowns lower the number of new cases as well as R , the effective reproduction number. If R drops below 1, the epidemic shrinks.

50% confidence interval

90% confidence interval

	0	1	2	Effective reproduction number	Daily confirmed cases	Daily confirmed cases
Daily confirmed cases	0	2000	4000	6000	6 Apr.	30 Mar.
Effective reproduction number	0	1	2	6 Apr.	30 Mar.	23 Mar.
	16 Mar.	9 Mar.	2 Mar.	24 Feb.	United Kingdom	0
	50	100	6 Apr.	16 Mar.	2 Mar.	3 Feb.
	17 Feb.	Effective reproduction number	0	1	2	6 Apr.
	30 Mar.	23 Mar.	16 Mar.	9 Mar.	2 Mar.	24 Feb.
	by estimated date of infection	by date of report	0	300	600	900
	6 Apr.	30 Mar.	23 Mar.	16 Mar.	9 Mar.	2 Mar.

Centre for mathematical modeling of infectious diseases/CC BY 4.0; ADAPTED BY X. LIU/SCIENCE

Finding out how any particular measure affects R is not straightforward, because infections that occur today can take weeks to show up in disease reports. In 2004, mathematician Jacco Wallinga of the Dutch National Institute for Public Health and the Environment and colleagues published a statistical method to estimate R in real time, which is now used around the world. Researchers are also incorporating data on mobility patterns and people’s behavior to make the estimates more accurate. Having real-time estimates of R is important, says Adam Kucharski, a modeler at LSHTM: “If governments put a measure in or lift it, they can get a sense of what the immediate implications are, rather than having to wait,” he says.

There’s one other, unknown factor that will determine how safe it is to loosen the reins: immunity. Every single person who becomes infected and develops immunity makes it harder for the virus to spread. “If we get 30% or 40% of the population immune, that really starts to change that whole picture, it helps us a lot,” because it would bring R down by the same percentage, says Michael Osterholm, director of the Center for Infectious Disease Research and Policy at the University of Minnesota, Twin Cities.

Immunity will inevitably build up as more people become infected, but some researchers argue for ramping up immunity more quickly, by letting the virus spread in younger people, who are less susceptible to severe illness, while “cocooning” more at-risk patients, such as the elderly. The United Kingdom floated this “herd immunity” idea in February but backed away from it, as did the Netherlands. “If you get to herd immunity any way other than through widespread vaccination, it is devastating, says Jeremy Konyndyk, a senior policy

fellow at the Center for Global Development. Even briefly considering it left the United Kingdom “in a dramatically worse place than they needed to be,” he says.

But some scientists say other countries should consider it once the strain that the first wave of cases has put on their health care systems eases. “Is it better to have a controlled burn in younger populations right now than it is to prevent it? I think that’s a very important conversation to have,” Osterholm says.

Skeptics doubt that vulnerable populations could really be protected. In many countries, multiple generations live under one roof, and young people work at nursing homes. Nor are scientists certain that COVID-19 produces robust, long-lasting immunity. Several studies seek to address these questions.

Exit strategy

For now, the most likely scenario is one of easing social distancing measures when it’s possible, then clamping down again when infections climb back up, a “suppress and lift” strategy that both Singapore and Hong Kong are pursuing. Whether that approach can strike the right balance between keeping the virus at bay and easing discontent and economic damage remains to be seen.

Even Singapore and Hong Kong have had to toughen some social distancing measures in recent weeks after a surge of cases, Lipsitch notes; Singapore’s social distancing regime is no longer very different from that in New York City or London. And both cities’ strategies are much harder to implement across a big country like the United States. “We have to have every single town and city and county be as good as Singapore for this to work,” he says.

Jeremy Farrar, head of the Wellcome Trust, says a path out of the dilemma now facing the world will come from research. It might take the form of an effective treatment for severely ill patients, or a drug that can prevent infections in health care workers, or—ultimately—a vaccine. “Science is the exit strategy,” Farrar says.

With reporting by Kelly Servick.

doi:10.1126/science.abc2507

<https://www.sciencemag.org/news/2020/04/ending-coronavirus-lockdowns-will-be-dangerous-process-trial-and-error>

Most States That Are Reopening Fail to Meet White House Guidelines

[Via Ferez Soli Nallaseth, M.S., Ph.D.](#)

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[#COVID19](#) [#PayingDearly](#) [#ForStatesJumpingTheGun](#) [#EndageringHealthCommunityAgain!](#) 'More than half of U.S. states have begun to reopen their economies or plan to do so soon. But most fail to meet criteria recommended by the Trump administration to resume business and social activities.

The White House’s guidelines are nonbinding and ultimately leave states’ fates to governors. The criteria suggest that states should have a “downward trajectory” of either documented coronavirus cases or of the percentage of positive tests. Public health experts expressed criticism because “downward trajectory” was not defined and the metrics do not specify a threshold for case numbers or positive rates.

Still, most states that are reopening fail to adhere to even those recommendations: In more than half of states

easing restrictions, case counts are trending upward, positive test results are rising, or both, raising concerns among public health experts.'

[Most States That Are Reopening Fail to Meet White House Guidelines](#)

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[Most States That Are Reopening Fail to Meet White House Guidelines](#)

By [Keith Collins](#) and [Lauren Leatherby](#)

May 7, 2020

[States](#) where new cases have increased

States that have begun to reopen or plan to soon

States that are reopening with more cases than two weeks ago



<https://www.nytimes.com/interactive/2020/05/07/us/coronavirus-states-reopen-criteria.html?smid=li-share>

Via Dr. Neil Bodie

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

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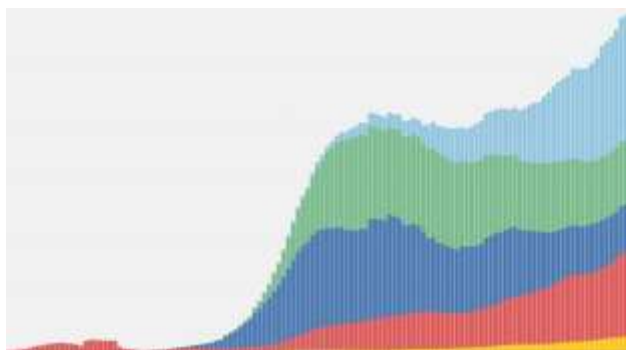
[CEO at Paradigm Immunotherapeutics Inc.](#)

1d •

Confirmed coronavirus cases are rising faster than ever

New cases of the novel coronavirus are rising faster than ever worldwide, at a rate of more than 100,000 a day over a seven-day average.

In April, new cases never topped 100,000 in one day, but since May 21, there have only been less than 100,000 on five days, according to data from Johns Hopkins University. Newly reported cases reached a high of 130,400 on June 3.



Confirmed coronavirus cases are rising faster than ever — CNN

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<https://www.cnn.com/2020/06/05/world/coronavirus-cases-rising-faster-intl/index.html>

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A new study in South Korea suggests that school reopenings will trigger more outbreaks..65,000 people found that children younger than 10 transmit..less often than adults do, but the risk is not zero..ages of 10 and 19 can spread ..as well as adults..findings could mean clusters of infection in children of all ages. The director of the Harvard Global Health Institute called the study “one of the best” to date on the issue. Several school districts around the U.S. announced plans this week to start the academic year online, including Los Angeles, above.

Separately, the Food & Drug Administration issued its 1st emerg. [approv.for](#) pooled testing, a method that allows for much faster tracking of new infections.

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Older Children Spread the Coronavirus Just as Much as Adults, Large Study Finds

The study of nearly 65,000 people in South Korea suggests that school reopenings will trigger more outbreaks.



Students, parents and teachers of Cheondong Elementary School in Daejeon, South Korea, got tested in early July after two students were found to be infected with the virus.Credit...Yonhap, via EPA, via Shutterstock

By [Apoorva Mandavilli](#)

July 18, 2020

In the heated debate over reopening schools, one burning question has been whether and how efficiently children can spread the virus to others.

A [large new study](#) from South Korea offers an answer: Children younger than 10 transmit to others much less often than adults do, but the risk is not zero. And those between the ages of 10 and 19 can spread the virus at least as well as adults do.

The findings suggest that as schools reopen, communities will see clusters of infection take root that include children of all ages, several experts cautioned.

“I fear that there has been this sense that kids just won’t get infected or don’t get infected in the same way as adults and that, therefore, they’re almost like a bubbled population,” said Michael Osterholm, an infectious diseases expert at the University of Minnesota.

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“There will be transmission,” Dr. Osterholm said. “What we have to do is accept that now and include that in our plans.”

Several studies from Europe and Asia have suggested that young children are less likely to get infected and to spread the virus. But most of those studies were small and flawed, said Dr. Ashish Jha, director of the Harvard Global Health Institute.

The new study “is very carefully done, it’s systematic and looks at a very large population,” Dr. Jha said. “It’s one of the best studies we’ve had to date on this issue.”

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Other experts also praised the scale and rigor of the analysis. South Korean researchers identified 5,706 people who were the first to report Covid-19 symptoms in their households between Jan. 20 and March 27, when schools were closed, and then traced the 59,073 contacts of these “index cases.” They tested all of the household contacts of each patient, regardless of symptoms, but only tested symptomatic contacts outside the household.

The first person in a household to develop symptoms is not necessarily the first to have been infected, and the researchers acknowledged this limitation. Children are also less likely than adults to show symptoms, so the study may have underestimated the number of children who set off the chain of transmission within their households.

Still, experts said the approach was reasonable. “It is also from a place with great contact tracing, done at the point interventions were being put in place,” said Bill Hanage, an epidemiologist at the Harvard T.H. Chan School of Public Health.

Children under 10 were roughly half as likely as adults to spread the virus to others, consistent with other studies. That may be because children generally exhale less air — and therefore less virus-laden air — or because they exhale that air closer to the ground, making it less likely that adults would breathe it in.

Even so, the number of new infections seeded by children may rise when schools reopen, the study authors cautioned. “Young children may show higher attack rates when the school closure ends, contributing to community transmission of Covid-19,” they wrote. Other studies have also suggested that the large number of contacts for schoolchildren, who interact with dozens of others for a good part of the day, may [cancel out their smaller risk](#) of infecting others.

The researchers traced the contacts only of children who felt ill, so it’s still unclear how efficiently asymptomatic children spread the virus, said Caitlin Rivers, an epidemiologist at the Johns Hopkins Bloomberg School of Public Health.

“I think it was always going to be the case that symptomatic children are infectious,” she said. “The questions about the role of children are more around whether children who don’t have symptoms are infectious.”

Dr. Rivers was a member of a scientific panel that on Wednesday [recommended reopening schools](#) wherever possible for disabled children and for those in elementary schools, because those groups have the most trouble learning online. She said the new study does not alter that recommendation.

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The study is more worrisome for children in middle and high school. This group was even more likely to infect others than adults were, the study found. But some experts said that finding may be a fluke or may stem from the children's behaviors.

These older children are frequently as big as adults, and yet may have some of the same unhygienic habits as young children do. They may also have been more likely than the younger children to socialize with their peers within the high-rise complexes in South Korea.

[The Coronavirus Outbreak >](#)

Frequently Asked Questions

Updated July 21, 2020

- **I have antibodies. Am I now immune?**
 - [Not very long, a study published in Nature Medicine suggests.](#) Antibodies — [protective proteins made in response to an infection](#) — may last [only two to three months](#), especially in people who never showed symptoms while they were infected. That does not necessarily mean that people can be infected a second time, several experts cautioned. Even low levels of powerful neutralizing antibodies [may be protective](#), as are the immune system's T cells and B cells. But nothing is certain. Experts caution against the idea of "immunity certificates" for [people who have recovered from the illness](#). Also, the [tests aren't entirely accurate](#). Having antibodies just means you had the virus. It doesn't mean you won't again.
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- **What's the best material for a mask?**
 - Scientists around the country [have tried to identify everyday materials that do a good job of filtering microscopic particles](#). In recent tests, HEPA [furnace filters](#) scored high, as did vacuum cleaner bags, fabric similar to flannel pajamas and those of 600-count pillowcases.

Other materials tested included layered coffee filters and scarves and bandannas. These scored lower, but still captured a small percentage of particles.

“We can speculate all day about this, but we just don’t know,” Dr. Osterholm said. “The bottom line message is: There’s going to be transmission.”

He and other experts said schools will need to prepare for infections to pop up. Apart from implementing physical distancing, hand hygiene and masks, schools should also decide when and how to test students and staff — including, for example, bus drivers — when and how long to require people to quarantine, and when to decide to close and reopen schools.

But they face a monumental challenge because the evidence on transmission within schools has been far from conclusive so far, experts said. Some countries like Denmark and Finland have successfully reopened schools, but others, like China, Israel and South Korea, have had to close them down again.

“People, depending on their ideology on school opening, are choosing which evidence to present — and that needs to be avoided,” said Jeffrey Shaman, an epidemiologist at Columbia University’s Mailman School of Public Health in New York.

Although the new study does not offer definitive answers, he said, it does indicate that schools can increase virus levels within a community.

“So long as children are not just a complete dead end — incapable of passing the virus on, which does not seem to be the case — putting them together in schools, having them mix with teachers and other students will provide additional opportunities for the virus to move from person to person,” he said.

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At the same time, Dr. Shaman said, it’s important for children not to miss out on critical years in education and socialization, and school districts have the unenviable task of choosing between those options: “It’s hard trying to find the right balance.”

Children and the Coronavirus

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[Most Big School Districts Aren’t Ready to Reopen. Here’s Why.](#)

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Apoorva Mandavilli is a reporter for The Times, focusing on science and global health. She is the 2019 winner of the Victor Cohn Prize for Excellence in Medical Science Reporting. [@apoorva_nyc](#)

[Newsom Order Would Keep Most California Schools Online](#)

Districts in counties with rising caseloads will be required to teach remotely until conditions improve.



Students at Buena Vista Middle School in San Francisco in February before the coronavirus outbreak forced school buildings to close. Credit...Jim Wilson/The New York Times

By [Jill Cowan](#)

July 17, 2020

📍 📍 LOS ANGELES — Responding to [soaring coronavirus infections](#) and growing concern from teachers, Gov. Gavin Newsom of California announced new rules on Friday that would force many of the state’s districts to teach remotely when school starts next month.

More than 80 percent of the state's population lives in counties that would currently not qualify for schools to reopen based on their surging caseloads and hospitalization rates. The rules would also require most students to wear masks in classrooms and force schools that do hold in-person classes to shut down if enough students or employees test positive for the virus.

"We all prefer in-classroom instruction for all the obvious reasons," Mr. Newsom said, "but only if it can be done safely."

Border Town in a Pandemic

[How the closure of the U.S.-Canada border in March devastated the economy of a Washington town.](#)

The announcement comes at the end of a week in which many school districts across the state and the country, including California's two largest, [Los Angeles and San Diego](#), abandoned plans for in-person instruction, saying they would start the school year remotely, and in which California announced [a sweeping rollback](#) of plans to reopen businesses.

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Education leaders in Houston, Atlanta, Nashville, Arlington, Va., and Broward County, Fla., also said this week that they planned to open the academic year online, despite [pressure from President Trump](#) and some Republican governors who want students in their classrooms five days a week.

In Texas, where state officials had previously put limits on online schooling, [new guidelines](#) were issued Friday that would allow as many as eight weeks of online-only instruction when schools return next month.

And leaders of Chicago's public school system, the nation's third-largest district after New York and Los Angeles, said on Friday that they were planning for a mix of in-person and online classes. But they stressed that the announcement was a tentative framework, with a final plan expected in August. New York City schools are also planning an in-person and online mix.

The California rules announced on Friday would require schools in counties that the state has put on a "watchlist" — [based on indicators](#) that include new infections per capita, the test positivity rate and the hospitalization rate — to teach online until conditions improve. Currently, 33 of the state's 58 counties, including many of the most populated, [are on the list](#).

Counties would have to be off the list for at least two weeks before their classrooms would be allowed to reopen, but the decision would still be up to local officials on whether to resume in-person classes, the governor said.

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Many districts in those counties had already said they would start the academic year online, including San Francisco, Oakland, Sacramento, Long Beach, Santa Ana and San Bernardino. But at least a few districts that had planned to hold in-person classes would be required to switch.

"Quite frankly, we are going to have to pivot, which is my new least favorite word," said Eimear O'Farrell, the superintendent of Clovis Unified School District in Fresno County, which is on the watchlist.

On Wednesday, the [Central Valley district](#) with about 43,000 students [had rolled out](#) what Ms. O'Farrell described as a painstakingly developed plan to welcome students back to classrooms in August.

"It is a challenge and a source of frustration for us," she said in a virtual news conference on Friday afternoon. "Every superintendent has been aiming to get this information out in time."

The statewide rules would also require teachers and staff members in schools that are allowed to reopen to maintain six feet of physical distance with one another and children, and mandate masks for students in third grade and up. Younger children would be encouraged but not required to wear face coverings, and all children would be encouraged to maintain six feet of distance.

The guidelines recommend that school employees be tested regularly for the coronavirus, something teachers across the country have been pushing for, although the federal Centers for Disease Control and Prevention has said doing so [is not necessary](#), and scaling up testing has been a challenge.

Mr. Newsom's unveiling of a statewide framework for schools marked a contrast to his usual reluctance to apply one set of policies for all of California, which he has often described as a kind of [nation-state unto itself](#), with roughly 40 million residents spread across a vast and varied geography.

By and large, [Californians have said they are supportive](#) of restrictions aimed at curbing the spread of the virus. But Mr. Newsom has been hesitant to impose statewide orders, instead repeating that "localism is determinative" and allowing counties to drive much of their own reopening.

The results have been at times confusing for residents attempting to navigate [a patchwork of restrictions](#) — though on Monday, in response to climbing numbers of new cases and shrinking hospital capacity in some areas, he announced the most [sweeping statewide rollback](#) yet of efforts to reopen many businesses.

Still, the state's efforts have met pushback from conservative officials, largely in more rural parts of the state where the virus has hit less hard, but also in some populous counties.

In Orange County, where local officials have taken public stances [against many of the state's restrictions](#), the [Board of Education voted this week to recommend](#) that schools reopen without requiring students to wear masks — a decision that sparked widespread outcry. But the board is largely advisory and does not carry authority over the county's more than two dozen districts, and many education leaders there have said they will adhere to state and county public health recommendations.

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- **What's the best material for a mask?**
 - Scientists around the country [have tried to identify everyday materials that do a good job of filtering microscopic particles](#). In recent tests, HEPA [furnace filters](#) scored high, as did vacuum cleaner bags, fabric similar to flannel pajamas and those of 600-count pillowcases. Other materials tested included layered coffee filters and scarves and bandannas. These scored lower, but still captured a small percentage of particles.

That difficulty is mirrored at the federal level, where guidance on the safety of reopening schools has been unsteady.

On Friday, the C.D.C. postponed releasing new guidance amid a clash with Mr. Trump, who this month criticized the agency's proposed school reopening guidelines as ["very tough and expensive."](#) A copy of the draft rules to which Mr. Trump apparently objected, outlined in a [document obtained by The New York Times](#) and marked "For Internal Use Only," warned that fully reopening schools remained "the highest risk" for spreading the virus.

But without being able to send their children to school, parents must shoulder huge burdens, which affects their ability to work. Tens of millions of school children are [falling behind academically](#), and the trends will widen existing socioeconomic gaps.

Some educators [are fearful and angry about the prospect of returning to schools](#) with unanswered questions. The 310,000-member California Teachers Association [urged state leaders](#) this month to require districts to start the year "under robust distance learning protocols" and described even a hybrid model as "high-risk."

On Friday, the president of the California Federation of Teachers, which represents 120,000 school employees, said the state's new guidelines did not go far enough to protect them. He objected to the state's willingness to allow waivers for some schools in counties on the watchlist, as well as the lack of mandatory social distancing and testing for all students.

"This updated guidance still allows for an 'acceptable amount of harm' to come to our students, their families and our education professionals," the president, Jeff Freitas, said in a statement, demanding that schools across California continue to provide remote learning until "the governor can ensure adequate safety measures throughout the state."

Erin Springer, who teaches fifth grade at a charter school in Inglewood, said that starting the new year with remote learning has felt inevitable since the beginning of summer. She said she wished the call had been made sooner, so that she and her colleagues could have prepared.

“Almost every teacher I know felt like we were just wasting time,” Ms. Springer said.

Mr. Newsom emphasized that education officials across the state would be working hard to ensure that all students would have access to “rigorous distance learning,” including access to devices and connectivity and live interactions every day with teachers and other students.

He added that leaders would pay specific attention to students who are homeless, in the foster care system, or who are English language learners. The state, he said, has put \$5.3 billion in additional money toward those efforts.

“We want to create some sense of equivalency,” Mr. Newsom said.

In Marin County, a Bay Area suburb that is on the state’s watchlist, Brooke Palizi, a mother of two elementary school students, said the district recently announced that parents would be able to choose between letting their children attend socially distant in-person classes, remote learning, and a virtual academy akin to home schooling.

The new guidelines, she said, at least take the guesswork out of her children’s back-to-school plans.

“A decision’s been made, instead of it being up in the air, which is annoying,” she said.

Dan Levin contributed reporting from New York.

Coronavirus in the Classroom

https://www.nytimes.com/2020/07/17/us/california-schools-reopening-newsom.html?campaign_id=9&emc=edit_nn_20200719&instance_id=20443&nl=the-morning®i_id=89889947&segment_id=33788&te=1&user_id=a511a498d5c17d0f827c2229ec77f22f

Part 5: Entire CNN coronavirus town hall (April 30)

Bill Gates explains the next steps ahead for a coronavirus vaccine with CNN's Anderson Cooper and Dr. Sanjay Gupta during a CNN town hall on the coronavirus pandemic.

Source: CNN

https://www.cnn.com/videos/media/2020/05/01/entire-april-30-coronavirus-town-hall-part-5-sot-vpx.cnn?hpt=ob_blogfooterold

(x) Resistance to immune systems in immune-privileged tissues undermined and the mutated virus avoiding vaccines/immune-surveillance subverting a major arm of detection, testing and vaccination



[Raya Khanin • 1st](#) Co-founder, LifeNome | Associate Laboratory Member MSKCC [1d • Edited •](#)

[1 day ago](#)

As [#vaccinations](#) against COVID-19 begin, while many countries are in strict lockdowns, here is a good overview on the power of [#polyphenols](#) for the prevention and therapy of [#covid19](#) as well as other viruses.

Polyphenols are endowed with the redoubtable [#antioxidant](#) and anti-inflammatory actions capable of counteracting redox imbalance and inflammatory processes elicited by [#sarscov2](#) infection

A plethora of evidence underlines the favorable regulation of [#microbiota](#) by polyphenols, which may both amend [#dysbiosis](#) triggered by invading [#sars_cov_2](#) and boost [#antiviral](#) response, thereby turning down [#viral](#) infectivity.

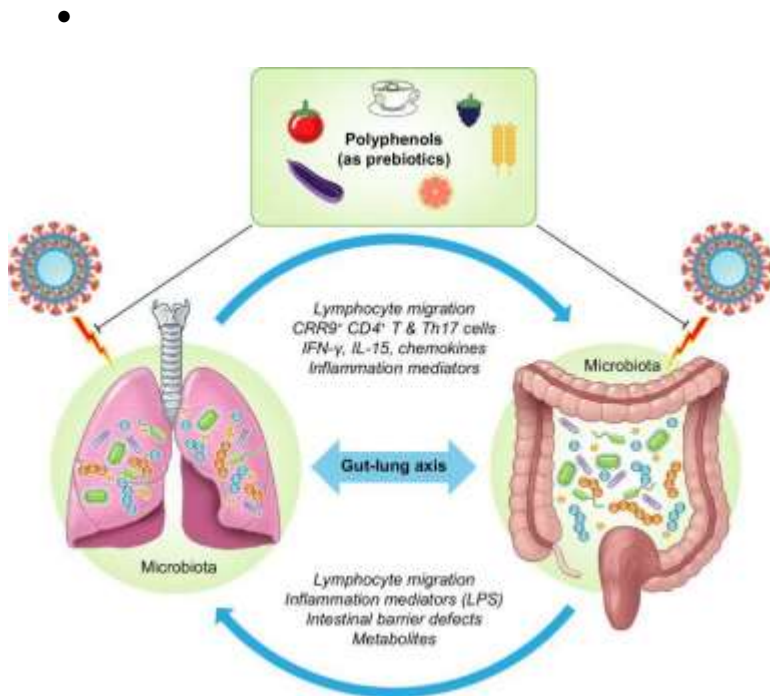
Bioactive polyphenols are known to improve [#cardiometabolic](#) health and alleviate the constellation of the risk factors associated with the metabolic syndrome (e.g., dyslipidemia, [#insulinresistance](#), [#hypertension](#) and [#obesity](#)), which would be most helpful for preexisting cardiometabolic ailments displaying poorer prognosis for the COVID-19 course.

"Can phytotherapy with polyphenols serve as a powerful approach for the prevention and therapy tool of novel coronavirus disease 2019 (COVID-19)

https://lnkd.in/dvk_TfK

[#covid19solutions](#) [#covid19research](#) [#covid19pandemic](#) [#covid19news](#) [#microbiome](#) [#gutmicrobiota](#) [#prebiotics](#)

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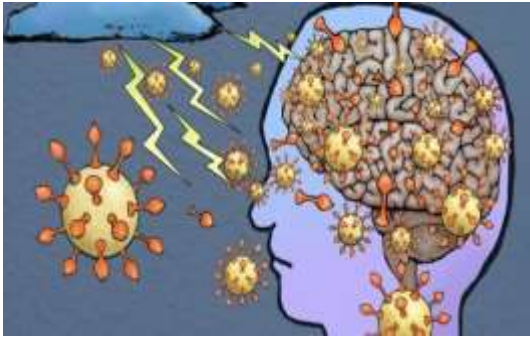


VIA:

[Tatiana Kerentseva • 1st](#) PhD Biological Chemistry. MSc Genetics. Scientist with extensive expertise in Molecular Genetics and Protein Chemistry. [1w • Edited •](#)

[#innovation](#) [#medicine](#)

Research strongly suggests COVID-19 virus enters the brain



Research strongly suggests COVID-19 virus enters the brain

[newsroom.uw.edu • 3 min read](#)

<https://www.nature.com/articles/s41467-020-20188-y>

3 babies in China may have been infected with coronavirus in the womb

By [Rachael Rettner - Senior Writer](#) March 27, 2020

Three babies in China may have contracted the [new coronavirus](#) in the womb shortly before birth, according to two new reports.

However, experts say the evidence in these cases is inconclusive and does not prove the new coronavirus, SARS-CoV-2, can pass from [mother to child during pregnancy](#).

In one report, doctors from Renmin Hospital of Wuhan University in Wuhan, China, describe the case of a woman who gave birth several weeks after she was hospitalized for COVID-19, the disease caused by the new coronavirus. The baby girl was delivered by [cesarean section](#), and the mother wore an N95 mask and did not hold the infant, according to the report, published today (March 26) in the journal [JAMA](#). The newborn was immediately quarantined, but showed no symptoms.

Two hours after birth, tests showed the baby had elevated levels of two types of [antibodies against SARS-CoV-2](#).

But critically, the baby repeatedly tested negative for the SARS-CoV-2 virus itself. This means it's unclear if the baby was ever really infected with the virus, or if there could be another explanation for the positive IgM result.

In a second report, also published in [JAMA](#) on March 26, doctors from Zhongnan Hospital of Wuhan University analyzed blood samples from six newborns, looking for antibodies against SARS-CoV-2. They

found five infants had elevated levels of IgG, and two infants had elevated levels of IgM, like the baby in the first report. But none of these infants tested positive for SARS-CoV-2.

It's also important to note that IgM tests can be prone to both false positive and false negative results, and are not typically used to diagnose infections acquired in utero, according to the editorial.

"Although these two studies deserve careful evaluation, more definitive evidence is needed before the provocative findings they report can be used to counsel pregnant women that their fetuses are at risk from congenital infection with SARS-CoV-2," the editorial concluded.

Earlier this month, a [baby in London reportedly tested positive for SARS-CoV-2](#) minutes after being born to a mother with COVID-19, Live Science previously reported. However, in that case, it's still unclear if the virus passed to the infant during or immediately after birth.

In addition, a preliminary study of [nine pregnant women with COVID-19](#) found no evidence of SARS-CoV-2 passing from mother to child in the womb, Live Science previously reported.

Originally published on [Live Science](#).

https://www.livescience.com/coronavirus-baby-transmit-womb-pregnancy.html?utm_source=Selligent&utm_medium=email&utm_campaign=15904&utm_content=20200328_Coronavirus_Infographic+&utm_term=4003045&m_i=12f10xric5PvySZ6Rjkc7xwpjvwUErcUx12nU5ix_aR7FluWvdDvFcS631s13633SVuJprV9YkIjXkSXLLm8KACI1l8rjLo

Researchers found coronavirus in a patient's eyes — days after it left her nose

Italy's first coronavirus patient traveled from Wuhan, China, to Italy in late January and was admitted to the hospital with coronavirus symptoms days later. A recently published report shows that she had detectable traces of the virus in her eyes days after it had cleared from her nose.

The report demonstrates that the novel coronavirus can exist in an infected person's eye fluids at probable contagious levels, increasing the need for people to be cognizant about their hand hygiene and to keep their hands away from their face, experts say.

The 65-year-old woman, who is not named in the report, arrived in Italy on Jan. 23 after leaving the first hot spot of the virus. By Jan. 29, she was admitted to an isolation unit at an Italian hospital with a dry cough, sore throat, stuffy nose and conjunctivitis, an infection of the lining of the eye commonly known as pinkeye, in both eyes. She tested positive for the virus.

Damn is SARS CoV-2 going to be like Ebola, persisting in immunoprivileged sites like the eyes, CNS and testis for extended periods of time?

I don't know about you, but I'm really starting to really hate everything about COVID-19...

<https://www.washingtonpost.com/health/2020/04/24/researchers-found-coronavirus-patients-eyes-days-after-it-left-her-nose/>

[Experts worry that the coronavirus will go on spreading in a 'slow burn' in the U.S.](#)

[Status is reachable](#)

[Billy Ethridge • 1st Executive Director, "WNE4 LLC" \(international funding for \\$150 million+ projects\) AND Cofounder/ Advisor, "Brain-Body Research Institute"\(nonprofit\)... 6h •](#)

COVID strain in South Africa shows huge resistance to antibodies from original virus

By Debora Patta CBS News January 22, 2021, 10:29 AM

<https://www.cbsnews.com/news/south-africa-covid-strain-resistance-antibodies-coronavirus-vaccine-latest-research/>

The Coronavirus Is Mutating. What Does That Mean for a Vaccine?

<https://www.nytimes.com/interactive/2020/04/16/opinion/coronavirus-mutations-vaccine-covid.html?smid=li-share>

[Via Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey 2d •](#)

[#NYT #COVID19 ##Mutations #MayAffVaccineEffect #LSINJCoreMission #AsInDeepSpace #OrSubatomicOrg](#)

NYT:

'A lot will depend on how the virus mutates. Broadly, there are two ways mutations can play out.

Scenario 1: The coronavirus is unable to evade a vaccine

A successf. vaccine could stop the virus dead in its tracks, but only if the virus doesn't mutate its way around the shot.

Like all viruses, SARS-CoV-2 is mutat. as it passes from person to person..Most mutations don't really change how the virus fxns.

Scenario 2: Mutations make vaccines less effective over time

But what if the virus doesn't get cornered like measles? If the virus mutates in a way that prevents antibodies from binding, it could make a lasting, universal vaccine difficult to create.

Antibodies, which the body produces in response to a vaccine or an infection, work by binding to specific spots on a virus called antigens. If random viral mutations alter the shape of an antigen, it can make a vaccine less effective against the virus.

The takeaway: We'll have to wait and see

Scientists know that SARS-CoV-2 is mutating.'

LSINJ: Long term commitm. for systematiz., surveilli. & controlling networks of genes & mechan. maintaining the genome in real time. Their failure inserts genetic disease lesions into genomes.

<https://www.nytimes.com/interactive/2020/04/16/opinion/coronavirus-mutations-vaccine-covid.html?smid=li-share>

VIA:

Tatiana Kerentseva • 1st PhD Biological Chemistry. MSc Genetics. Scientist with extensive expertise in Molecular Genetics and Protein Chemistry. 1w • Edited •

COVID-19 Patient Zero: Data Analysis Identifies the “Mother” of All SARS-CoV-2 Genomes.
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[COVID-19 Patient Zero: Data Analysis Identifies the “Mother” of All SARS-CoV-2 Genomes](#)

[scitechdaily.com • 9 min read](#)

<https://scitechdaily.com/covid-19-patient-zero-data-analysis-identifies-the-mother-of-all-sars-cov-2-genomes/>

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Tatiana Kerentseva • 1st PhD Biological Chemistry. MSc Genetics. Scientist with extensive expertise in Molecular Genetics and Protein Chemistry.

Coronavirus mutation in minks could threaten vaccine efficacy

Coronavirus mutation in minks could threaten vaccine efficacy

Denmark said that a mutation of the virus had jumped from minks to humans and infected 214 people

The Scandinavian country has warned the new strain could undermine the effectiveness of any future vaccine

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[scmp.com](https://www.scmp.com/news/world/europe/article/3108909/coronavirus-mutation-minks-could-threaten-vaccine-efficacy) • 1 min read

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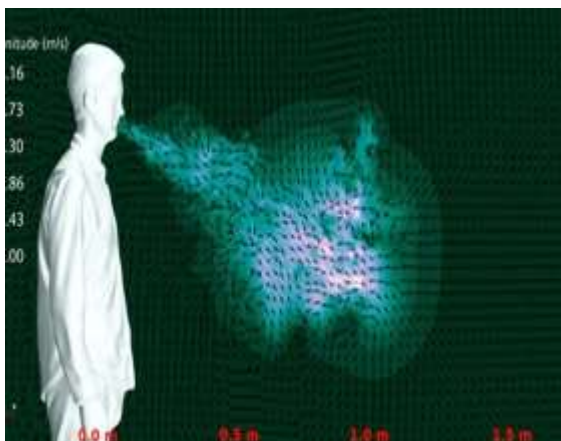
VIA:

Tatiana Kerentseva • 1st PhD Biological Chemistry, MSc Genetics. Scientist with extensive expertise in Molecular Genetics and Protein Chemistry. 1w • Edited •

[1 month ago](#)

COVID-19 Researchers Identify Features of a Virus Super-Spreader.

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COVID-19 Patient Zero: Data Analysis Identifies the “Mother” of All SARS-CoV-2 Genomes.

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[COVID-19 Patient Zero: Data Analysis Identifies the “Mother” of All SARS-CoV-2 Genomes](#)

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<https://scitechdaily.com/covid-19-patient-zero-data-analysis-identifies-the-mother-of-all-sars-cov-2-genomes/>

Coronavirus mutation in minks could threaten vaccine efficacy

Denmark said that a mutation of the virus had jumped from minks to humans and infected 214 people

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#innovation #medicine #COVID19



[Coronavirus mutation in minks could threaten vaccine efficacy](#)

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<https://www.scmp.com/news/world/europe/article/3108909/coronavirus-mutation-minks-could-threaten-vaccine-efficacy>

'No evidence' virus recovery stops reinfection, says WHO

Getty ImagesCopyright: Getty Images

The [World Health Organization](#)

(WHO) says that there is "currently no evidence that people who have recovered from Covid-19 and have antibodies are protected from a second infection".

It has been [suggested that people](#) who survive an infection may develop antibodies that can attack the virus and prevent reinfection.

In the UK, antibody blood testing and surveillance to determine the rate of infection among the public is one of "five pillars" of the government's testing strategy, designed to suppress the virus.

Antibody testing - to show if someone has had the virus in the past - is considered crucial in providing an exit pathway from the current lockdown, as well as providing data to those developing a vaccine.

[Read more about these links.](#)

<https://www.bbc.com/news/live/world-52424263/page/4>

South Korea says recovered coronavirus patients who tested positive again did not relapse: Tests picked up 'dead virus fragments'

- Experts in South Korea said that recovered coronavirus patients who tested positive again were not reinfected and that their virus was not reactivated, as was previously feared.
- More than 260 people who recovered and tested negative subsequently tested positive again. The Korea Centers for Disease Control and Prevention worried that the virus had reactivated after going dormant.
- But the country's infectious-disease experts said on Thursday that the tests were detecting dead fragments of the virus left in patients' bodies.
- South Korea was one of the first countries to report a virus outbreak but quickly implemented widespread testing and contact tracing. It had reported 247 deaths as of Thursday.

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[Via Dr Neil Bodie](#)

• [1st](#)

[CEO at Paradigm Immunotherapeutics Inc.](#)

[21h](#) •

How deadly is the coronavirus? Scientists are close to an answer

Public-health researchers use the infection fatality rate to gauge how to respond to a new disease, but it's tricky to calculate.

<https://lnkd.in/gkjDUng>

Researchers use a metric called [#infection fatality rate](#) ([#IFR](#)) to calculate how deadly a new disease is. It is the proportion of infected people who will die as a result, including those who don't get tested or show symptoms.

"The IFR is one of the important numbers alongside the herd immunity threshold, and has implications for the scale of an epidemic and how seriously we should take a new disease,"

Calculating an accurate IFR is challenging in the midst of any outbreak because it relies on knowing the total number of people infected — not just those who are confirmed through testing.

But the fatality rate is especially difficult to pin down for [#COVID_19](#), the disease caused by the [#SARS CoV_2](#) virus.

That's partly because there are many people with mild or no symptoms, whose infection has gone undetected, and also because the time between infection and death can be as long as two months.

[#IFR](#)

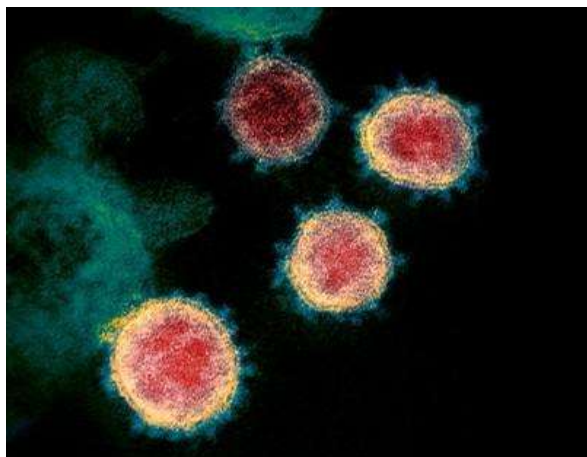


Many countries are struggling to count all their coronavirus deaths. Credit: Michael Dantas/AFP/Getty

One of the most crucial questions about an emerging infectious disease such as the new coronavirus is how deadly it is. After months of collecting data, scientists are getting closer to an answer.

Researchers use a metric called infection fatality rate (IFR) to calculate how deadly a new disease is. It is the proportion of infected people who will die as a result, including those who don't get tested or show symptoms.

"The IFR is one of the important numbers alongside the herd immunity threshold, and has implications for the scale of an epidemic and how seriously we should take a new disease," says Robert Verity, an epidemiologist at Imperial College London.



[Coronavirus and COVID-19: Keep up to date](#)

Calculating an accurate IFR is challenging in the midst of any outbreak because it relies on knowing the total number of people infected — not just those who are confirmed through testing. But the fatality rate is especially difficult to pin down for COVID-19, the disease caused by the SARS-CoV-2 virus, says Timothy Russell, a mathematical epidemiologist at the London School of Hygiene and Tropical Medicine. That's partly because there are many people with mild or no symptoms, whose infection has gone undetected, and also because the time between infection and death can be as long as two months. Many countries are also struggling to count all their virus-related deaths, he says. [Death records suggest](#) that some of those are being missed in official counts.

Data from early in the pandemic overestimated how deadly the virus was, and then later analyses underestimated its lethality. Now, numerous studies — using a range of methods — estimate that in many countries some 5 to 10 people will die for every 1,000 people with COVID-19. "The studies I have any faith in are tending to converge around 0.5–1%," says Russell.

But some researchers say that convergence between studies could just be coincidence. For a true understanding of how deadly the virus is, scientists need to know how readily it kills different groups of people. The risk of dying from COVID-19 can vary considerably depending on age, ethnicity, access to healthcare, socioeconomic status and underlying health conditions. More high-quality surveys of different groups are needed, these researchers say.

IFR is also specific to a population and changes over time as doctors get better at treating the disease, which can further complicate efforts to pin it down.

Getting the number right is important because it helps governments and individuals to determine appropriate responses. "Calculate too low an IFR, and a community could underreact, and be underprepared. Too high, and the overreaction could be at best expensive, and at worst [could] also add harms from the overuse of interventions like lockdowns," says Hilda Bastian, who studies evidence-based medicine, and is a PhD candidate at Bond University in the Gold Coast, Australia.

Bridging the gap

Some of the first indications of the virus's deadliness were gleaned from the total number of confirmed cases in China. In late February, the World Health Organization crudely estimated that [38 people had died for every 1,000 with confirmed COVID-19 diagnoses](#). The death rate among these people — known as the case fatality rate (CFR) — reached as high as 58 out of 1,000 in Wuhan, the city where the virus emerged. But such estimates exaggerated the disease's deadliness because they did not account for the many people who had the virus but were not tested, obscuring the outbreak's true spread.

Researchers tried to address this gap by estimating the IFR from models that projected the virus's spread. The result from these early analyses hovered around 0.9% — 9 deaths for every 1,000 people infected — with a broader range of 0.4–3.6%, says Verity. His own modelling estimated an overall IFR for China of 7 deaths for every 1,000 people infected, increasing to 33 per thousand among those aged 60 or older¹.

HOW DEADLY IS SARS-COV-2?

The infection fatality rate (IFR) is the proportion of people with COVID-19 who will die from the disease. Estimates are for specific regions, and can vary depending on demographics, health-care access and study methodology.



*Estimate based on natural experiment.

†Estimate based on modelling.

‡Estimate based on prevalence data.

©nature

Sources: China*: T. W. Russell et al. *Eurosurveillance* 25, 2000256 (2020); China†: R. Verity et al. *Lancet* 20, 669–677 (2020); France: H. Salje et al. *Science* <https://doi.org/10.1126/science.abc3517> (2020); Brazil: P. Hallal et al. Preprint at medRxiv <https://doi.org/10.1101/2020.05.30.20117531> (2020); Spain: [Spanish Ministry of Health, Consumer Affairs and Social Welfare 2020](#) report.

Russell's team also used data gathered from a large COVID-19 outbreak on the *Diamond Princess* cruise ship in early February to estimate an IFR in China. Almost all of the 3,711 passengers and crew were tested, enabling researchers to count the total number of infections, including asymptomatic ones, and deaths in a known population. From this, his team estimated an IFR of 0.6%, or 6 deaths for every 1,000 infected people².

"The intention of these studies was to gain some ball-park estimates of how deadly COVID-19 is," says Verity.

But researchers also had to make complicated estimates, which still need to be verified, about the number of confirmed cases and the actual number of infected people. "There is value to obtaining rapid early estimates of the IFR, [but] these should be updated as a matter of urgency once better data becomes available," he says.

Antibody surveys

Widespread population surveys that test people for antibodies to the virus, known as seroprevalence surveys, were expected to help refine IFR estimates even further. About 120 seroprevalence surveys are under way worldwide.



[Autopsy slowdown hinders quest to determine how coronavirus kills](#)

But results from the first antibody studies only muddled the water, suggesting that the virus was less deadly than previously thought. “It got a bit messy,” says Russell.

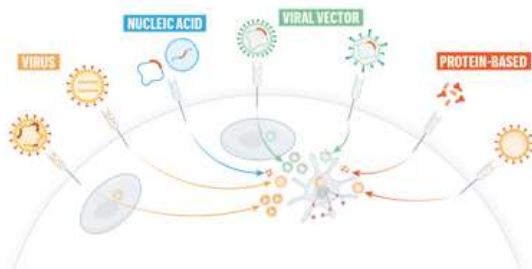
One of the earliest studies tested 919 people in the German town of Gangelt, where a large outbreak had occurred³. Of these people, about 15.5% had antibodies against the virus — five times higher than the percentage of people known to have had COVID-19 in the town at the time. The figure was used to estimate an IFR of 0.28%. But researchers noted that the study was based on a relatively small number of people.

Other early seroprevalence studies did not properly account for the lack of sensitivity and specificity in the antibody test kits that were used, or for discrepancies between the sampled and underlying populations, says Verity.

These issues could have inflated estimates of the total number of infected people and so made the virus seem less deadly, he says. Equally, if COVID-19 deaths go undetected — a problem in many countries that aren’t testing all deceased people for the virus — that, too, can bias the fatality rate, says Gideon Meyerowitz-Katz, an epidemiologist and PhD candidate at the University of Wollongong, Australia.

Some larger seroprevalence studies have emerged in recent weeks, and these estimate a higher fatality rate than do early studies. One survey⁴, posted on medRxiv, of more than 25,000 people across Brazil, estimated an IFR of 1%.

Another survey that tested [more than 60,000 people across Spain](#) reports a prevalence of 5%, although the results have not been formally analysed. The survey team did not calculate a fatality rate themselves, but on the basis of the results, Verity estimates that Spain has an IFR of around 1% — or 10 deaths for every 1,000 infected individuals.



[The race for coronavirus vaccines: a graphical guide](#)

Several researchers, including Russell and Verity, find it interesting that a growing number of studies from different regions have estimated IFRs in the range of 0.5–1%. But other scientists are cautious about suggestions of agreement. “The trend is potentially more luck than anything else,” says Meyerowitz-Katz.

Marm Kilpatrick, an infectious disease researcher at the University of California, Santa Cruz, also notes that most of the serological data haven’t been published in scientific manuscripts. It’s hard to know when and how they were collected, and to properly calculate an IFR that accounts for the delay between people getting infected and dying, he says.

Kilpatrick and others say they are eagerly awaiting large studies that estimate fatality rates across age groups and among those with pre-existing health conditions, which will provide the most accurate picture of how deadly the disease is. One of the first studies to account for the effect of age was [posted on a preprint server last week](#). The study, based on seroprevalence data from Geneva, Switzerland, estimates an IFR of 0.6% for the total population, and an IFR of 5.6% for people aged 65 and older.

The results have not been peer reviewed, but Kilpatrick says the study addresses many of the issues in previous seroprevalence surveys. “This study is fantastic. It’s precisely what should be done with all of the serological data,” he says.

doi: 10.1038/d41586-020-01738-2

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- [Article](#)
- [Google Scholar](#)

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https://www.nature.com/articles/d41586-020-01738-2?utm_source=Nature+Briefing&utm_campaign=e0ea702a3e-briefing-dy-20200616&utm_medium=email&utm_term=0_c9dfd39373-e0ea702a3e-43576073

NEWS FEATURE

28 April 2020

The race for coronavirus vaccines: a graphical guide

Eight ways in which scientists hope to provide immunity to SARS-CoV-2 .

More than 90 vaccines are being developed against SARS-CoV-2 by research teams in companies and universities across the world. Researchers are trialling different technologies, some of which haven't been used in a licensed vaccine before. At least six groups have already begun injecting formulations into volunteers in safety trials; others have started testing in animals. *Nature's* graphical guide explains each vaccine design.

<https://www.nature.com/articles/d41586-020-01221-y>

How does coronavirus kill? Clinicians trace a ferocious rampage through the body, from brain to toes

By [Meredith Wadman](#), [Jennifer Couzin-Frankel](#), [Jocelyn Kaiser](#), [Catherine Maticic](#)

Apr. 17, 2020 , 6:45 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

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On rounds in a 20-bed intensive care unit one recent day, physician Joshua Denson assessed two patients with seizures, many with respiratory failure and others whose kidneys were on a dangerous downhill slide. Days earlier, his rounds had been interrupted as his team tried, and failed, to resuscitate a young woman whose heart had stopped. All shared one thing, says Denson, a pulmonary and critical care physician at the Tulane University School of Medicine. "They are all COVID positive."

As the number of confirmed cases of COVID-19 surges past 2.2 million globally and deaths surpass 150,000, clinicians and pathologists are struggling to understand the damage wrought by the coronavirus as it tears through the body. They are realizing that although the lungs are ground zero, its reach can extend to many organs including the heart and blood vessels, kidneys, gut, and brain.

"[The disease] can attack almost anything in the body with devastating consequences," says cardiologist Harlan Krumholz of Yale University and Yale-New Haven Hospital, who is leading multiple efforts to gather clinical data on COVID-19. "Its ferocity is breathtaking and humbling."

Understanding the rampage could help the doctors on the front lines treat the fraction of infected people who become desperately and sometimes mysteriously ill. Does a dangerous, newly observed tendency to blood clotting transform some mild cases into life-threatening emergencies? Is an overzealous immune response behind the worst cases, suggesting treatment with immune-suppressing drugs could help? What explains the startlingly low blood oxygen that some physicians are reporting in patients who nonetheless are not gasping for breath? "Taking a systems approach may be beneficial as we start thinking about therapies," says Nilam Mangalmurti, a pulmonary intensivist at the Hospital of the University of Pennsylvania (HUP).

Related story



For survivors of severe COVID-19, beating the virus is just the beginning

What follows is a snapshot of the fast-evolving understanding of how the virus attacks cells around the body, especially in the [roughly 5% of patients who become critically ill](#). Despite the more than 1000 papers now spilling into journals and onto preprint servers every week, a clear picture is elusive, as the virus acts like no pathogen humanity has ever seen. Without larger, prospective controlled studies that are only now being launched, scientists must pull information from small studies and case reports, often published at warp speed and not yet peer reviewed. “We need to keep a very open mind as this phenomenon goes forward,” says Nancy Reau, a liver transplant physician who has been treating COVID-19 patients at Rush University Medical Center. “We are still learning.”

The infection begins

When an infected person expels virus-laden droplets and someone else inhales them, the novel coronavirus, called SARS-CoV-2, enters the nose and throat. It finds a welcome home in the lining of the nose, according to a preprint from scientists at the Wellcome Sanger Institute and elsewhere. They found that cells there are [rich in a cell-surface receptor](#) called angiotensin-converting enzyme 2 (ACE2). Throughout the body, the presence of ACE2, which normally helps regulate blood pressure, marks tissues vulnerable to infection, because the virus requires that receptor to enter a cell. Once inside, the virus hijacks the cell’s machinery, making myriad copies of itself and invading new cells.

As the virus multiplies, an infected person may shed copious amounts of it, especially during the first week or so. Symptoms may be absent at this point. Or the virus’ new victim may develop a fever, dry cough, sore throat, loss of smell and taste, or head and body aches.

If the immune system doesn’t beat back SARS-CoV-2 during this initial phase, the virus then marches down the windpipe to attack the lungs, where it can turn deadly. The thinner, distant branches of the lung’s respiratory tree end in tiny air sacs called alveoli, each lined by a single layer of cells that are also [rich in ACE2 receptors](#).

Normally, oxygen crosses the alveoli into the capillaries, tiny blood vessels that lie beside the air sacs; the oxygen is then carried to the rest of the body. But as the immune system wars with the invader, the battle itself disrupts this healthy oxygen transfer. Front-line white blood cells release inflammatory molecules called chemokines, which in turn summon more immune cells that target and kill virus-infected cells, leaving a stew of fluid and dead cells—pus—behind. This is the underlying pathology of pneumonia, with its corresponding symptoms: coughing; fever; and rapid, shallow respiration (see graphic). Some COVID-19 patients recover, sometimes with no more support than oxygen breathed in through nasal prongs.

But others deteriorate, often quite suddenly, developing a condition called acute respiratory distress syndrome (ARDS). Oxygen levels in their blood plummet and they struggle ever harder to breathe. On x-rays and computed tomography scans, their lungs are riddled with white opacities where black space—air—should be. Commonly, these patients end up on ventilators. Many die. Autopsies show their alveoli became stuffed with fluid, white blood cells, mucus, and the detritus of destroyed lung cells.

An invader's impact

In serious cases, SARS-CoV-2 lands in the lungs and can do deep damage there. But the virus, or the body's response to it, can injure many other organs. Scientists are just beginning to probe the scope and nature of that harm. Click on organ name for more.

A cross section shows immune cells crowding an inflamed alveolus, or air sac, whose walls break down during attack by the virus, diminishing oxygen uptake. Patients cough, fevers rise, and breathing becomes labored.

(GRAPHIC) V. ALTOUNIAN/*Science*; (INTERACTIVE) X. LIU/*Science*

Some clinicians suspect the driving force in many gravely ill patients' downhill trajectories is a disastrous overreaction of the immune system known as a "cytokine storm," which other viral infections are known to trigger. Cytokines are chemical signaling molecules that guide a healthy immune response; but in a cytokine storm, levels of certain cytokines soar far beyond what's needed, and immune cells start to attack healthy tissues. Blood vessels leak, blood pressure drops, clots form, and catastrophic organ failure can ensue.

[Some studies](#) have shown [elevated levels](#) of these inflammation-inducing cytokines in the blood of hospitalized COVID-19 patients. "The real morbidity and mortality of this disease is probably driven by this out of proportion inflammatory response to the virus," says Jamie Garfield, a pulmonologist who cares for COVID-19 patients at Temple University Hospital.

But others aren't convinced. "There seems to have been a quick move to associate COVID-19 with these hyperinflammatory states. I haven't really seen convincing data that that is the case," says Joseph Levitt, a pulmonary critical care physician at the Stanford University School of Medicine.

He's also worried that efforts to dampen a cytokine response could backfire. Several drugs targeting specific cytokines are in clinical trials in COVID-19 patients. But Levitt fears those drugs may suppress the immune response that the body needs to fight off the virus. "There's a real risk that we allow more viral replication," Levitt says.

Meanwhile, other scientists are zeroing in on an entirely different organ system that they say is driving some patients' rapid deterioration: the heart and blood vessels.

Striking the heart

In Brescia, Italy, a 53-year-old woman walked into the emergency room of her local hospital with all the classic symptoms of a heart attack, including telltale signs in her electrocardiogram and high levels of a blood marker suggesting damaged cardiac muscles. Further tests showed cardiac swelling and scarring, and a left ventricle—normally the powerhouse chamber of the heart—so weak that it could only pump one-third its normal amount of blood. But when doctors injected dye in the coronary arteries, looking for the blockage that signifies a heart attack, they found none. Another test revealed why: The woman had COVID-19.

How the virus attacks the heart and blood vessels is a mystery, but dozens of preprints and papers attest that such damage is common. A 25 March paper in *JAMA Cardiology* documented [heart damage in nearly 20% of patients](#) out of 416 hospitalized for COVID-19 in Wuhan, China. In another Wuhan study, 44% of 36 patients admitted to the ICU [had arrhythmias](#).

The disruption seems to extend to the blood itself. Among 184 COVID-19 patients in a Dutch ICU, 38% had blood that clotted abnormally, and almost [one-third already had clots](#), according to a 10 April paper in *Thrombosis Research*. Blood clots can break apart and land in the lungs, blocking vital arteries—a condition known as pulmonary embolism, which has reportedly killed COVID-19 patients. Clots from arteries can also lodge in the brain, causing stroke. Many patients have "dramatically" high levels of D-dimer, a byproduct of blood clots, says Behnood Bikdeli, a cardiovascular medicine fellow at Columbia University Medical Center.

"The more we look, the more likely it becomes that blood clots are a major player in the disease severity and mortality from COVID-19," Bikdeli says.

Infection may also lead to blood vessel constriction. Reports are emerging of ischemia in the fingers and toes—a reduction in blood flow that can lead to swollen, painful digits and tissue death.

The more we look, the more likely it becomes that blood clots are a major player in the disease severity and mortality from COVID-19.

Behnood Bikdeli, Columbia University Irving Medical Center

In the lungs, blood vessel constriction might help explain anecdotal reports of a perplexing phenomenon seen in pneumonia caused by COVID-19: Some patients have extremely low blood-oxygen levels and yet are not gasping for breath. It's possible that at some stages of disease, the virus alters the delicate balance of hormones that help regulate blood pressure and constricts blood vessels going to the lungs. So oxygen uptake is impeded by constricted blood vessels, rather than by clogged alveoli. "One theory is that the virus affects the vascular biology and that's why we see these really low oxygen levels," Levitt says.

If COVID-19 targets blood vessels, that could also help explain why patients with pre-existing damage to those vessels, for example from diabetes and high blood pressure, face higher risk of serious disease. Recent Centers for Disease Control and Prevention (CDC) data on hospitalized patients in 14 U.S. states found that about one-third had chronic lung disease—but nearly as many had diabetes, and [fully half had pre-existing high blood pressure](#).

Mangalmurti says she has been "shocked by the fact that we don't have a huge number of asthmatics" or patients with other respiratory diseases in HUP's ICU. "It's very striking to us that risk factors seem to be vascular: diabetes, obesity, age, hypertension."

Scientists are struggling to understand exactly what causes the cardiovascular damage. The virus may directly attack the lining of the heart and blood vessels, which, like the nose and alveoli, are rich in ACE2 receptors. Or perhaps lack of oxygen, due to the chaos in the lungs, damages blood vessels. Or a cytokine storm could ravage the heart as it does other organs.

"We're still at the beginning," Krumholz says. "We really don't understand who is vulnerable, why some people are affected so severely, why it comes on so rapidly ... and why it is so hard [for some] to recover."

Multiple battlefields

The worldwide fears of ventilator shortages for failing lungs have received plenty of attention. Not so a scramble for another type of equipment: dialysis machines. "If these folks are not dying of lung failure, they're dying of renal failure," says neurologist Jennifer Frontera of New York University's Langone Medical Center, which has treated thousands of COVID-19 patients. Her hospital is developing a dialysis protocol with different machines to support additional patients. The need for dialysis may be because the kidneys, abundantly endowed with ACE2 receptors, present another viral target.

According to one preprint, 27% of 85 hospitalized patients in Wuhan [had kidney failure](#). Another reported that 59% of nearly 200 hospitalized COVID-19 patients in China's Hubei and Sichuan provinces had [protein in their urine](#), and 44% had blood; both suggest kidney damage. Those with acute kidney injury (AKI), were more than five times as likely to die as COVID-19 patients without it, the same Chinese preprint reported.

Medical staff work to help a COVID-19 patient in an intensive care unit in Italy.

Antonio Masiello/Getty Images

"The lung is the primary battle zone. But a fraction of the virus possibly attacks the kidney. And as on the real battlefield, if two places are being attacked at the same time, each place gets worse," says Hongbo Jia, a neuroscientist at the Chinese Academy of Sciences's Suzhou Institute of Biomedical Engineering and Technology and a co-author of that study.

[Viral particles were identified](#) in electron micrographs of kidneys from autopsies in one study, suggesting a direct viral attack. But kidney injury may also be collateral damage. Ventilators boost the risk of kidney damage, as do antiviral compounds including remdesivir, which is being deployed experimentally in COVID-19 patients. Cytokine storms also can dramatically reduce blood flow to the kidney, causing often-fatal

damage. And pre-existing diseases like diabetes can increase the chances of kidney injury. “There is a whole bucket of people who already have some chronic kidney disease who are at higher risk for acute kidney injury,” says Suzanne Watnick, chief medical officer at Northwest Kidney Centers.

Buffeting the brain

Another striking set of symptoms in COVID-19 **patients** [centers on the brain and central nervous system](#). Frontera says neurologists are needed to assess 5% to 10% of coronavirus patients at her hospital. But she says that “is probably a gross underestimate” of the number whose brains are struggling, especially because many are sedated and on ventilators.

Frontera has seen patients with the brain inflammation encephalitis, with seizures, and with a “sympathetic storm,” a hyperreaction of the sympathetic nervous system that causes seizurelike symptoms and is most common after a traumatic brain injury. Some people with COVID-19 briefly lose consciousness. Others have strokes. Many report losing their sense of smell. And Frontera and others wonder whether in some cases, infection depresses the brain stem reflex that senses oxygen starvation. This is another explanation for anecdotal observations that some patients aren’t gasping for air, despite dangerously low blood oxygen levels.

ACE2 receptors are present in the neural cortex and brain stem, says Robert Stevens, an intensive care physician at Johns Hopkins Medicine. But it’s not known under what circumstances the virus penetrates the brain and interacts with these receptors. That said, the coronavirus behind the 2003 severe acute respiratory syndrome (SARS) epidemic—a close cousin of today’s culprit—could infiltrate neurons and sometimes caused encephalitis. On 3 April, [a case study](#) in the *International Journal of Infectious Diseases*, from a team in Japan, reported traces of new coronavirus in the cerebrospinal fluid of a COVID-19 patient who developed meningitis and encephalitis, suggesting it, too, can penetrate the central nervous system.

A 58-year-old woman with COVID-19 developed encephalitis, resulting in tissue damage in the brain (arrows).

N. Poyiadji *et al.*, *Radiology*, (2020) doi.org/10.1148/radiol.2020201187

But other factors could be damaging the brain. For example, a cytokine storm could cause brain swelling, and the blood’s exaggerated tendency to clot could trigger strokes. The challenge now is to shift from conjecture to confidence, at a time when staff are focused on saving lives, and even neurologic assessments like inducing the gag reflex or transporting patients for brain scans risk spreading the virus.

Last month, Sherry Chou, a neurologist at the University of Pittsburgh Medical Center, began to organize a [worldwide consortium that now includes 50 centers](#) to draw neurological data from care patients already receive. The early goals are simple: Identify the prevalence of neurologic complications in hospitalized patients and document how they fare. Longer term, Chou and her colleagues hope to gather scans, lab tests, and other data to better understand the virus’ impact on the nervous system, including the brain.

Chou speculates about a possible invasion route: through the nose, then upward and through the olfactory bulb—explaining reports of a loss of smell—which connects to the brain. “It’s a nice sounding theory,” she says. “We really have to go and prove that.”

Most neurological symptoms “are reported from colleague to colleague by word of mouth,” Chou adds. “I don’t think anybody, and certainly not me, can say we’re experts.”

Reaching the gut

In early March, a 71-year-old Michigan woman returned from a Nile River cruise with bloody diarrhea, vomiting, and abdominal pain. Initially doctors suspected she had a common stomach bug, such as *Salmonella*. But after she developed a cough, doctors took a nasal swab and found her positive for the novel coronavirus. A stool sample positive for viral RNA, as well as signs of colon injury seen in an endoscopy, [pointed to a gastrointestinal \(GI\) infection](#) with the coronavirus, according to a paper posted online in *The American Journal of Gastroenterology* (AJG).

Her case adds to a growing body of evidence suggesting the new coronavirus, like its cousin SARS, can infect the lining of the lower digestive tract, where the crucial ACE2 receptors are abundant. Viral RNA has been found in as many as 53% of sampled patients' stool samples. And in a paper in press at *Gastroenterology*, a Chinese team reported [finding the virus' protein shell in gastric, duodenal, and rectal cells](#) in biopsies from a COVID-19 patient. "I think it probably does replicate in the gastrointestinal tract," says Mary Estes, a virologist at Baylor College of Medicine.



Related

[Antibiotic treatment for COVID-19 complications could fuel resistant bacteria](#)

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Recent reports suggest up to half of patients, averaging about 20% across studies, experience diarrhea, says Brennan Spiegel of Cedars-Sinai Medical Center in Los Angeles, co-editor-in-chief of *AJG*. GI symptoms aren't on CDC's list of COVID-19 symptoms, which could cause some COVID-19 cases to go undetected, Spiegel and others say. "If you mainly have fever and diarrhea, you won't be tested for COVID," says Douglas Corley of Kaiser Permanente, Northern California, co-editor of *Gastroenterology*.

The presence of virus in the GI tract raises the unsettling possibility that it could be passed on through feces. But it's not yet clear whether stool contains intact, infectious virus, or only RNA and proteins. To date, "We have no evidence" that fecal transmission is important, says coronavirus expert Stanley Perlman of the University of Iowa. CDC says that based on experiences with SARS and with the virus that causes Middle East respiratory syndrome, another dangerous cousin of the new coronavirus, the risk from fecal transmission is probably low.

The intestines are not the end of the disease's march through the body. For example, up to [one-third of hospitalized patients](#) develop conjunctivitis—pink, watery eyes—although it's not clear that the virus directly invades the eye. Other reports suggest liver damage: [More than half](#) of COVID-19 patients hospitalized in two Chinese centers had [elevated levels](#) of enzymes indicating injury to the liver or bile ducts. But several experts told *Science* that direct viral invasion isn't likely the culprit. They say other events in a failing body, like drugs or an immune system in overdrive, are more likely driving the liver damage.

This map of the devastation that COVID-19 can inflict on the body is still just a sketch. It will take years of painstaking research to sharpen the picture of its reach, and the cascade of cardiovascular and immune effects it might set in motion. As science races ahead, from probing tissues under microscopes to testing drugs on patients, the hope is for treatments more wily than the virus that has stopped the world in its tracks.

**Correction, 20 April, 12:25 p.m.: This story has been updated to correct the description of a sympathetic storm. It has also been updated to more accurately describe the geographic locations of the patients found to have protein and blood in their urine.*

doi:10.1126/science.abc3208

<https://www.sciencemag.org/news/2020/04/how-does-coronavirus-kill-clinicians-trace-ferocious-rampage-through-body-brain-toes>

Part 5: Entire CNN coronavirus town hall (April 30)

Bill Gates explains the next steps ahead for a coronavirus vaccine with CNN's Anderson Cooper and Dr. Sanjay Gupta during a CNN town hall on the coronavirus pandemic.

[Source: CNN](#)

https://www.cnn.com/videos/media/2020/05/01/entire-april-30-coronavirus-town-hall-part-5-sot-vpx.cnn?hpt=ob_blogfooterold

(xi) Dangers of reopening too soon – second and third waves of infections, endemic COVID-19 in pockets of populations allowing 2nd and 3rd waves currently underway and expected to peak in the flu season with the full impact of twin impacts

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Coronavirus cases spiked sharply across the American South and West, particularly in states that loosened restrictions on businesses several weeks ago.

In Florida, Oklahoma, South Carolina and Arizona, daily counts of new coronavirus cases reached their highest levels of the pandemic this week. Texas, which has seen known cases double in the past month, became the sixth state to surpass 100,000 cases, according to a New York Times database of cases in the United States.

Around the country, there were indications that major companies and sports teams were changing their own plans as the new surges emerged."

<https://www.nytimes.com/2020/06/19/us/coronavirus-new-dangerous-phase.html?smid=li-share>

Most States That Are Reopening Fail to Meet White House Guidelines

By [Keith Collins](#) and [Lauren Leatherby](#)

May 7, 2020

More than half of U.S. states have begun to reopen their economies or plan to do so soon. But most fail to meet criteria [recommended by the Trump administration](#) to resume business and social activities.

The White House's guidelines are nonbinding and ultimately leave states' fates to governors. The criteria suggest that states should have a "downward trajectory" of either documented coronavirus cases or of the percentage of positive tests. Public health experts expressed criticism because "downward trajectory" was not defined and the metrics do not specify a threshold for case numbers or positive rates.

Still, most [states that are reopening](#) fail to adhere to even those recommendations: In more than half of states easing restrictions, case counts are trending upward, positive test results are rising, or both, raising concerns among public health experts.

[States](#) where new cases have increased

States that have begun to reopen or plan to soon

States that are reopening with more cases than two weeks ago



Daily new cases, seven-day average

AlaskaAla.Ark.Ariz.Calif.Colo.Conn.Del.Fla.Ga.HawaiiIowaIdahoIll.Ind.Kan.Ky.La.Mass.Md.MaineMich.Minn.Mo.
Miss.Mont.N.C.N.D.Neb.N.H.N.J.N.M.Nev.N.Y.OhioOkla.Ore.Pa.R.I.S.C.S.D.Tenn.TexasUtahVa.Vt.Wash.Wis.W.Va.
Wyo.

After weeks of shutdowns, **30 states** have started or will soon begin to return to work and some parts of public life.

Most of these states are reopening with **more new cases or a higher share of positive tests** than two weeks ago.

The White House said states should have a "downward trajectory" of cases over a 14-day period before reopening. But most of the states reopening have actually had an **increase of daily average cases** in the past two w

<https://www.nytimes.com/interactive/2020/05/07/us/coronavirus-states-reopen-criteria.html?smid=li-share>

Coronavirus: Wuhan in first virus cluster since end of lockdown

New coronavirus clusters have been reported in Wuhan city - where the virus first emerged - and the north-eastern province of Jilin in China.

Wuhan reported five new cases on Monday, after confirming its first case since 3 April on Sunday. Authorities said the small cluster of cases were all from the same residential compound. China has been easing restrictions in recent weeks and cases had been declining.

Health authorities and experts have warned that as countries emerge from strict lockdowns and people move around more freely, a rise in infections is likely.

The small Wuhan cluster is the first to emerge since the end of the strict lockdown on 8 April. One of the five cases reported on Monday was the wife of an 89-year-old man who became the first confirmed case in the city in well over a month on Sunday.

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- [Chinese official admits health system weaknesses](#)
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All of the latest cases were previously classified as asymptomatic - meaning they tested positive for the virus but were not exhibiting clinical signs such as a cough or fever.

Such people can spread the virus despite not being sick, but China does not count asymptomatic cases in its official tally of confirmed infections until they show symptoms.

Hundreds of asymptomatic cases are being monitored by Wuhan health authorities.

Meanwhile over the weekend, Shulan city in Jilin province, near the borders with Russia and North Korea, reported 11 new cases.

What's happening in Shulan?

Chinese state media reported that 11 domestically transmitted cases had been recorded in Shulan on Saturday.

A day later, the city declared martial law and went into lockdown, with the government ordering all public places to be temporarily shut, [said a Global Times report](#).

Shulan has been upgraded to high-risk, the only city in the country with this designation.

<https://www.bbc.com/news/world-asia-china-52613138>

With New Hot Spots Emerging. No Sign of a Respite

[May 5, 2020](#)

Coronavirus in the U.S.: Latest Map and Case Count

[March 3, 2020](#)



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A version of this article appears in print on May 6, 2020, Section A, Page 11 of the New York edition with the headline: Task Force To Wrap Up Even as Virus Bears Down. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)

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Experts worry that the coronavirus will go on spreading in a 'slow burn' in the U.S.

Ending coronavirus lockdowns will be a dangerous process of trial and error

By [Kai Kupferschmidt](#) Apr. 14, 2020 , 4:10 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

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The world is holding its breath.

After the novel coronavirus made its way from China around the world, one country after another adopted harsh measures to stop SARS-CoV-2 from spreading and overwhelming hospitals. They have hit the pause button on their economies and their citizens' lives, stopping sports events, religious services, and other social gatherings. School closures in 188 countries affect more than 1.5 billion students. Borders are closed and businesses shuttered. While some countries are still seeing daily case numbers increase, others—first in Asia but increasingly in Europe—have managed to bend the curve, slowing the transmission of COVID-19.

Related

But what is the exit strategy? "We've managed to get to the life raft," says epidemiologist Marc Lipsitch of the Harvard T.H. Chan School of Public Health (HSPH). "But I'm really unclear how we will get to the shore."

As they seek a path forward, governments around the world must triangulate the health of their citizens, the freedoms of their population, and economic constraints. Could schools be reopened? Restaurants? Bars? Can people go back to their offices? “How to relax the lockdown is not something around which there is a scientific consensus,” says Caroline Buckee, an epidemiologist at HSPH. Most researchers agree that reopening society will be a long haul, marked by trial and error. “It’s going to have to be something that we’re going to have to take baby steps with,” says Megan Coffee, an infectious disease researcher at New York University.

The number to watch in the next phase may no longer be the actual number of cases per day, but what epidemiologists call the effective reproduction number, or R , which denotes how many people the average infected person infects in turn. If R is above 1, the outbreak grows; below 1 it shrinks. The goal of the current lockdowns is to push R well below 1. Once the pandemic is tamed, countries can try to loosen restrictions while keeping R hovering around 1, when each infected person on average infects one other person, keeping the number of new cases steady.

To regulate R , “Governments will have to realize that there are basically three control knobs on the dashboard,” says Gabriel Leung, a modeler at the University of Hong Kong: isolating patients and tracing their contacts, border restrictions, and social distancing.

Turning the knobs

Singapore, Hong Kong, and South Korea have all managed to keep their epidemics in check through aggressive use of the first control. They identify and isolate cases early and trace and quarantine their contacts, while often imposing only light restrictions on the rest of society. But this strategy depends on massively scaling up testing, which has been hampered by a scarcity of reagents and other materials everywhere. The United States will be able to do millions of tests per week, says Caitlin Rivers of the Johns Hopkins Center for Health Security. “Although our testing capacity has grown a lot in the last couple of weeks, we are not where we need to be yet,” she says.

Contact tracing is another hurdle, and it is labor intensive. Massachusetts is hiring 500 contact tracers, but [a recent report by Rivers and others](#) estimates that the United States as a whole needs to train about 100,000 people.

Mobile phone apps could help by automatically identifying or alerting people who recently had contact with an infected person. (“Public health departments, not generally known anywhere in the world to be at the forefront of technological innovation, will have to adapt very quickly,” Leung says.) But Western countries have yet to implement these systems. Google and Apple have teamed up to incorporate a contact tracing app in their operating systems. Germany, France, and other countries are developing apps based on a protocol called [Pan-European Privacy Preserving Proximity Tracing](#). It relies on short-range Bluetooth signals to gauge the proximity between two devices without logging their exact locations, which helps sidestep some privacy concerns.

But short of making these technologies compulsory, as China has done, how can a country ensure that enough people download an app for it to provide reliable information and influence the spread of disease? And what exactly counts as a contact? “If I live in a big apartment block, am I going to be getting dozens of notifications a day?” asks epidemiologist Nicholas Davies of the London School of Hygiene & Tropical Medicine (LSHTM). Davies adds that widespread use of the apps will further drive up the demand for testing.

As to the second control knob, border restrictions, most countries have already banned entry to almost all noncitizens. Quarantining returning citizens, as New Zealand and Australia began to do in the past few weeks, further minimizes the risk of new introductions of the virus. Such measures are likely to remain in place for a while; the more a country reduces transmission domestically, the greater the risk that any new outbreaks will originate with travelers. And foreign visitors are generally harder to trace than citizens and more likely to stay at hotels and visit potential transmission hot spots, says Alessandro Vespignani, a disease modeler at Northeastern University. “As soon as you reopen to travelers, that could be something that the contact tracing system is not able to cope with,” he says.

The third dashboard dial, social distancing, is the backbone of the current strategy, which has slowed the spread of the virus. But it also comes at the greatest economic and social cost, and many countries hope the constraints can be relaxed as case isolation and contact tracing help keep the virus in check. In Europe, Austria took the lead by opening small shops today. Other stores and malls are scheduled to follow on 1 May, and restaurants maybe a few weeks later. A [13 April report from the German National Academy of Sciences](#) argued for slowly reopening schools, starting with the youngest children, while staggering break times and making masks mandatory. But French President Emmanuel Macron has said France's lockdown will remain in place until 11 May.

Choosing a prudent path is difficult, Buckee says, in part because no controlled experiments have compared the effectiveness of different social distancing measures. "Because we don't have really strong evidence," she says, "it's quite hard to make evidence-based policy decisions about how to go back." But Lipsitch says that as authorities around the world choose different paths forward, comparisons could be revealing. "I think there's going to be a lot of experimentation, not on purpose, but because of politics and local situations," he says. "Hopefully the world will learn from that."

The number to watch

Lockdowns lower the number of new cases as well as R , the effective reproduction number. If R drops below 1, the epidemic shrinks.

50% confidence interval

90% confidence interval 0 1 2 Effectivereproduction number Daily confirmed cases Daily confirmed cases
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Centre for mathematical modeling of infectious diseases/CC BY 4.0; ADAPTED BY X. LIU/SCIENCE

Finding out how any particular measure affects R is not straightforward, because infections that occur today can take weeks to show up in disease reports. In 2004, mathematician Jacco Wallinga of the Dutch National Institute for Public Health and the Environment and colleagues published a statistical method to estimate R in real time, which is now used around the world. Researchers are also incorporating data on mobility patterns and people's behavior to make the estimates more accurate. Having real-time estimates of R is important, says Adam Kucharski, a modeler at LSHTM: "If governments put a measure in or lift it, they can get a sense of what the immediate implications are, rather than having to wait," he says.

There's one other, unknown factor that will determine how safe it is to loosen the reins: immunity. Every single person who becomes infected and develops immunity makes it harder for the virus to spread. "If we get 30% or 40% of the population immune, that really starts to change that whole picture, it helps us a lot," because it would bring R down by the same percentage, says Michael Osterholm, director of the Center for Infectious Disease Research and Policy at the University of Minnesota, Twin Cities.

Immunity will inevitably build up as more people become infected, but some researchers argue for ramping up immunity more quickly, by letting the virus spread in younger people, who are less susceptible to severe illness, while "cocooning" more at-risk patients, such as the elderly. The United Kingdom floated this "herd immunity" idea in February but backed away from it, as did the Netherlands. "If you get to herd immunity any way other than through widespread vaccination, it is devastating, says Jeremy Konyndyk, a senior policy fellow at the Center for Global Development. Even briefly considering it left the United Kingdom "in a dramatically worse place than they needed to be," he says.

But some scientists say other countries should consider it once the strain that the first wave of cases has put on their health care systems eases. “Is it better to have a controlled burn in younger populations right now than it is to prevent it? I think that’s a very important conversation to have,” Osterholm says.

Skeptics doubt that vulnerable populations could really be protected. In many countries, multiple generations live under one roof, and young people work at nursing homes. Nor are scientists certain that COVID-19 produces robust, long-lasting immunity. Several studies seek to address these questions.

Exit strategy

For now, the most likely scenario is one of easing social distancing measures when it’s possible, then clamping down again when infections climb back up, a “suppress and lift” strategy that both Singapore and Hong Kong are pursuing. Whether that approach can strike the right balance between keeping the virus at bay and easing discontent and economic damage remains to be seen.

Even Singapore and Hong Kong have had to toughen some social distancing measures in recent weeks after a surge of cases, Lipsitch notes; Singapore’s social distancing regime is no longer very different from that in New York City or London. And both cities’ strategies are much harder to implement across a big country like the United States. “We have to have every single town and city and county be as good as Singapore for this to work,” he says.

Jeremy Farrar, head of the Wellcome Trust, says a path out of the dilemma now facing the world will come from research. It might take the form of an effective treatment for severely ill patients, or a drug that can prevent infections in health care workers, or—ultimately—a vaccine. “Science is the exit strategy,” Farrar says.

With reporting by Kelly Servick.

doi:10.1126/science.abc2507

<https://www.sciencemag.org/news/2020/04/ending-coronavirus-lockdowns-will-be-dangerous-process-trial-and-error>

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

America: are we about to witness a second historic failure of leadership from Trump?

[#COVID19 #CurrentNumber680000cases34000deaths #ImpendingCatastrophe](#) "W/o mass testing, contact tracing, & protective equip. for health workers – all in critically short supply – the presid. plan could be disastrous. D. Trump..dec. that he was leading America in a “historic battle against the invisible enemy” that amounted to the “greatest national mobilisation since WWII”.

Beyond the cloistered confines of the White House an alternative interpretation of events was gathering force. On a day the US suffered its highest death toll from Covid-19, with a total of more than 680,000 confirmed cases and 34,000 deaths, public health experts..coming to rather different conclusions.

“This isn’t a plan, it’s barely a powerpoint,” spluttered Ron Klain on Twitter. Klain, the US government’s Ebola tsar during the last health crisis to test the White House, in 2014, said the proposals contained “no provision to ramp up testing, no standard on levels of disease before opening, no protections for workers or customers”.

<https://lnkd.in/erpAAjK>

https://www.theguardian.com/us-news/2020/apr/18/operation-reopen-america-are-we-about-to-witness-a-second-historic-failure-of-leadership-from-trump?utm_term=RWRpdG9yaWFsX0d1YXJkaWFuVG9kYXIVUy0yMDA0MTg%3D&utm_source=esp&utm_medium=Email&CMP=GTUS_email&utm_campaign=GuardianTodayUS

[David A. Sinclair Ph.D., A.O.](#)

[Harvard professor working to extend healthy life. Author of Lifespan.](#)

Even if 10% of the U.S. has been infected, which is on the high side and 30X the reported cases, “it still isn’t enough to stop this virus from roaring back.”

Full article here: <https://bit.ly/3cf4Z9X>

<https://elemental.medium.com/what-if-covid-19-and-flu-both-flare-up-this-fall-7be70e2c68f2> .

Reactions Top of Form

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[Ferez Soli Nallaseth, M.S., Ph.D. You Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

Thank You. Reemergence of COVID-19 in Wuhan reported today supports the idea. Even with 70% of the population immunized by ‘Herd Immunity’ mutant virions, demonstrated re-infections and susceptibility of putative resistant age groups support this post. Thanks

[Thomas Wilckens \(托馬斯\) 1st degree connection 1st MD #PrecisionMedicine 精密医学 thought & technology leader, Keynote Speaker, industry advisor 29.000+ Followers](#)

Reactions

🗨 262 Comments: Comments on Thomas Wilckens (托馬斯)’s article

[Technology](#)

How Hong Kong Did It

With the government flailing, the city’s citizens decided to organize their own coronavirus response.

[Zeynep Tufekci](#)

May 12, 2020

[Via Margaretta Colangelo](#)

[Co-Founder & Managing Partner at Deep Knowledge Ventures](#)

Hong Kong has had only 4 COVID deaths without a lockdown. How they did it -- With over 7 million people Hong Kong is densely populated, has more cross-border traffic with China than anywhere else in the world, and has a crowded mass-transportation system. Hong Kong is connected to Wuhan via a high-speed-train and many daily flights. More than 2.5 million people came to Hong Kong from mainland China in January of 2020. When the initial outbreak occurred, Hong Kong's citizens acted swiftly, collectively, and efficiently against the virus. The organizational capacity and the civic infrastructure built by the protest movement played a central role in Hong Kong's grassroots response. Groups of organized citizens built a website to track COVID cases, monitor hot spots, warn people of places selling fake PPE, and report hospital wait times and other relevant information. Hong Kongers were so successful in their efforts that even the flu season ended 6 weeks earlier than usual. Life is returning to normal in Hong Kong.

#artificialintelligence #datascience #innovation #coronavirus #economy The Atlantic Zeynep Tufekci

<https://www.theatlantic.com/technology/archive/2020/05/how-hong-kong-beating-coronavirus/611524/>

CNN Coronavirus Town Hall (15 Videos)

<https://www.cnn.com/videos/health/2020/05/01/anthony-fauci-states-reopening-coronavirus-gupta-cooper-vpx.cnn/video/playlists/cnn-coronavirus-town-hall/>

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19](#) [#SurgingBackInNations](#) [#TampedDown](#) [#ChinaSKorea](#) [#StatesInUSA](#)

[#AgainItsTheEconomyStupid!](#)? "CHICAGO — The world has entered a “new and dangerous phase” of the coronavirus pandemic, a top official from the World Health Organization said on Friday, a stark warning that came as the United States struggled to control spiraling outbreaks and as business leaders signaled growing unease with the country's ability to effectively contend with the virus.

Coronavirus cases spiked sharply across the American South and West, particularly in states that loosened restrictions on businesses several weeks ago.

In Florida, Oklahoma, South Carolina and Arizona, daily counts of new coronavirus cases reached their highest levels of the pandemic this week. Texas, which has seen known cases double in the past month, became the sixth state to surpass 100,000 cases, according to a New York Times database of cases in the United States.

Around the country, there were indications that major companies and sports teams were changing their own plans as the new surges emerged."

W.H.O. Warns of 'Dangerous Phase' of Pandemic as Outbreaks Widen

Beijing and Seoul have had a recent surge in coronavirus cases, and businesses are recoiling in America as infections sharply increase in Southern and Western states.



People in downtown Delray Beach, Fla., on Wednesday. New daily cases of the coronavirus hit all-time highs this week in Florida, Oklahoma, South Carolina and Arizona. Credit...Saul Martinez for The New York Times

By [Julie Bosman](#)

- June 19, 2020



CHICAGO — The world has entered a “new and dangerous phase” of the coronavirus pandemic, a top official from the World Health Organization said on Friday, a stark warning that came as the United States struggled to control spiraling outbreaks and as business leaders signaled growing unease with the country’s ability to effectively contend with the virus.

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Around the country, there were indications that major companies and sports teams were changing their own plans as the new surges emerged.

Advertisement

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Apple said it was temporarily closing 11 retail stores across four states amid an uptick in cases. [AMC Entertainment reversed course on its mask policy](#) on Friday, saying it will now require patrons to wear face coverings when movie theaters reopen next month.

Two Major League Baseball clubs, the Philadelphia Phillies and the Toronto Blue Jays, and a professional hockey team, the Tampa Bay Lightning, abruptly shut down training facilities in Florida over concerns that the virus was threatening players’ safety.

Across the globe, the outlook for containing the coronavirus worsened. A pandemic that had been defined early on by a series of shifting epicenters — including Wuhan, China; Iran; northern Italy; Spain; and New York — was now distinguished by a wide and expanding scope. Eighty-one nations [have seen a growth in new cases](#) over the past two weeks. Only 36 have seen declines.

“Many people are understandably fed up with being at home,” Dr. Tedros Adhanom Ghebreyesus, the director general of the W.H.O., said in a news conference in which he described the new phase of the virus. “Countries are understandably eager to open up their societies and their economies. But the virus is still spreading fast. It is still deadly and most people are still susceptible.”

A sobering lesson in the virus's tenacity came in China, where officials had recently proclaimed that they had vanquished the virus — only to see it surge back in Beijing, the capital. That metropolis, of 21 million people, is facing new restrictions on travel and renewed school closures. Seoul, South Korea, also reported a new surge in cases on Friday.

[Continue reading the main story](#)

For weeks, the United States has been slowly but determinedly returning to its pre-pandemic existence amid economic turmoil. Businesses reopened, summer camps started and retail workers returned to stores.

But efforts to boost the economy by bringing more people back to work may be happening too soon, experts said, warning that the economic outlook in the United States remains wildly uncertain.



Image

Lady Bird Lake in Austin, Texas, provided a retreat from heat this week. The state's coronavirus cases doubled in the past month, a New York Times database showed. Credit...Ilana Panich-Linsman for The New York Times

Eric Rosengren, the president of the Federal Reserve Bank of Boston and an influential policy maker within the central bank system, cited rising caseloads in South Carolina and Florida as he cautioned of the economic impact of states reopening before the virus was under control. The tension between a tumbling economy and a global pandemic remained stark.

"I expect the economic rebound in the second half of the year to be less than was hoped for at the outset of the pandemic," Mr. Rosengren said, citing the virus's continuing spread and the acceleration of new cases in many states.

Around the world, risks are multiplying as nations reopen their economies.

In India, which placed all 1.3 billion of its citizens under a lockdown — then [moved to reopen](#) even with its strained public health system near the breaking point — officials reported a record number of new cases this week. And the virus is now spreading rapidly in Pakistan and Bangladesh.

Some countries where caseloads had appeared to taper — including Israel, Sweden and Costa Rica — are now watching them rise.

Advertisement

[Continue reading the main story](#)

Cases have continued to surge across much of the United States, with new single-day infection records reported in nine states. More widespread testing is no doubt playing some role in the increase in the number of known cases. But growing hospitalizations and rising rates of positive tests compared with total tests in many of those states make clear that the virus is raging uncontrolled across much of the Sun Belt.

In Arizona and Texas, more people with the coronavirus are hospitalized now than at any previous point in the pandemic. In Utah, the percent of positive tests compared with total tests reached the highest levels yet this month. In Nevada, the percent of positive tests recently began increasing again after more than a month of sustained declines.



Gov. Doug Ducey of Arizona, where more people are hospitalized with the virus than at any earlier point in the pandemic. Credit...Michael Chow/POOL, The Arizona Republic, via Associated Press

Dr. Jeff Duchin, the health officer for Seattle and King County, Wash., said in a statement on Friday that the area had seen a spike in cases in the last week, as it proceeded to loosen restrictions. "As we move into Phase 2 and for the foreseeable future, our risk will be increasing, not decreasing," Dr. Duchin said. "Covid-19 has not gone away and we must take the ongoing risk very seriously."

Movie theaters, shuttered for months because of the coronavirus, have struggled to find a balance between making money and ensuring public safety in the midst of a pandemic. Some companies have followed the guidance of scientists and required patrons to wear masks or face coverings for entry, but they have encountered resistance from customers who see mask-wearing as an infringement of personal liberty.

Alamo Drafthouse Cinema, a company with 41 theaters in 10 states, said on Friday that it would require face masks in its theaters "except when eating or drinking," saying the safety of patrons and workers could not be compromised. "This is not political," the theater chain [said in a tweet](#).

[The Coronavirus Outbreak](#)

Today's Question: I've heard about a treatment called dexamethasone. Does it work?

The steroid, dexamethasone, is [the first treatment shown to reduce mortality in severely ill patients](#), according to scientists in Britain. The drug appears to reduce inflammation caused by the immune system, protecting the tissues. In the study, dexamethasone reduced deaths of patients on ventilators by one-third, and deaths of patients on oxygen by one-fifth.

Regal Cinemas joined AMC and Alamo on Friday afternoon in stating that all movie theater employees and patrons would be required to wear masks. The chain, which had previously said it would require masks only in cities that mandated them, said that disposable masks would be made available to customers who needed them.

But a rival chain, Cinemark, began reopening some theaters in Texas on Friday without requiring face masks. "It's a big country out there," Mark Zoradi, Cinemark's chief executive, told the entertainment news site Deadline on Wednesday. "There are places that may require it. California may be one. If it's required in California, we'll abide by it. There are other places like Texas where it's not required. In those cases, we'll highly recommend, but not require it."

All over, businesses were grappling with those sorts of decisions, as state rules have loosened and cases have risen. The possibility of repeated openings and closings was emerging.

In Arizona, Gila River Hotels and Casinos [shut its doors again](#) this week after reopening in mid-May with new safety procedures in place. The company said it would close for two weeks "to see whether the recent rise in Arizona Covid cases subsides and to re-examine every aspect of its operation."

Even as coronavirus cases increase in many states, there was reason for some optimism about the national picture over all. Coronavirus deaths in the United States have fallen to roughly 700 a day from a peak of more than 2,000 a day, and some of the country's hardest-hit regions have showed sustained improvement. New case reports continue to plummet across most of the Northeast and much of the Midwest. The Chicago, Boston, Milwaukee, Detroit and New York areas all continue to improve.

But there were also worrisome signs in those same regions. Case numbers have started trending upward again in Kansas after weeks of falling. The La Crosse, Wis., area is experiencing a period of explosive case growth. And new trouble spots have cropped up in parts of Missouri, Iowa and Pennsylvania.

As more Americans return to ordinary routines, clusters are emerging in places that had been largely closed. More than 230 cases were tied to a Pentecostal church in Oregon, and far smaller clusters were reported recently at churches in Alabama, Wisconsin and West Virginia. Outbreaks have also been reported recently at a Panda Express restaurant in California, an Advance Auto Parts store in Colorado and among athletes at Kansas State University and the University of Texas.

South Carolina's state epidemiologist pleaded with residents to wear masks and practice social distancing as that state identified more than 990 new cases of the virus on Thursday. It was the sixth time in 10 days that the state broke its single-day case record.

"We understand that what we're continuing to ask of everyone is not easy and that many are tired of hearing the same warnings and of taking the same daily precautions," Dr. Linda Bell, the epidemiologist, said in a statement. "Every day that we don't all do our part, we are extending the duration of illnesses, missed work, hospitalizations and deaths in our state."

Reporting was contributed by Rick Gladstone from Eastham, Mass.; David Gelles from Putnam Valley, N.Y.; Gillian Friedman from Salt Lake City; Gillian R. Brassil from Andover, Mass.; Jeanna Smialek from Washington; Mitch Smith from Chicago; and David Waldstein from New York.

The Virus in the United States

[Is America's Pandemic Waning or Raging? Yes](#)

[June 1, 2020](#)



[Coronavirus Cases Spike Across Sun Belt as Economy Lurches into Motion](#)

[June 14, 2020](#)



Julie Bosman is a national correspondent who covers the Midwest. Born and raised in Wisconsin and based in Chicago, she has written about politics, education, law enforcement and literature. [@juliebosman](#) • [Facebook](#)

A version of this article appears in print on June 20, 2020, Section A, Page 1 of the New York edition with the headline: Pandemic Danger Is at a New High, the W.H.O. Warns. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)

[📄 Coronavirus Outbreak](#)

<https://www.nytimes.com/2020/06/19/us/coronavirus-new-dangerous-phase.html?smid=li-share>

Via Dr. Neil Bodie on LinkedIn:

[Dr Neil Bodie](#)

[• 1st](#)

[CEO at Paradigm Immunotherapeutics Inc.](#)

[1d •](#)

Confirmed coronavirus cases are rising faster than ever

New cases of the novel coronavirus are rising faster than ever worldwide, at a rate of more than 100,000 a day over a seven-day average.

In April, new cases never topped 100,000 in one day, but since May 21, there have only been less than 100,000 on five days, according to data from Johns Hopkins University. Newly reported cases reached a high of 130,400 on June 3.

[Confirmed coronavirus cases are rising faster than ever — CNN](#)

[apple.news • 1 min read](#)

Confirmed coronavirus cases are rising faster than ever

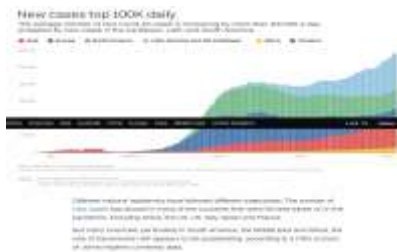
By Emma Reynolds and Henrik Pettersson, CNN

Updated 10:54 AM ET, Fri June 5, 2020

(CNN)New cases of the novel coronavirus are rising faster than ever worldwide, at a rate of more than 100,000 a day over a seven-day average.

In April, new cases never topped 100,000 in one day, but since May 21, there have only been less than 100,000 on five days, according to data from [Johns Hopkins University](#). Newly reported cases reached a high of 130,400 on June 3.

The increase in case rates may be partially explained by [increases](#) in testing capacity, but there's [still](#) not enough [testing](#) to [capture](#) an [accurate](#) picture in many [countries](#).



<https://www.cnn.com/2020/06/05/world/coronavirus-cases-rising-faster-intl/index.html>

Here's what Dr. Fauci is concerned about as states reopen [Anderson Cooper 360](#)

CNN's [Anderson Cooper](#) and [Dr. Sanjay Gupta](#) speak to Dr. Anthony Fauci about his concerns over states starting to reopen amid the coronavirus pandemic.

Source: [CNN](#)

<https://www.cnn.com/videos/health/2020/05/01/anthony-fauci-states-reopening-coronavirus-gupta-cooper-vpx.cnn/video/playlists/cnn-coronavirus-town-hall/>

Experts warn of second virus wave

By [Siobhan Morrin](#), Editor at LinkedIn

Updated 2 days ago

Scientists are urging governments to prepare for a potential second wave of the coronavirus, warning that “now is not the time to relax”. Dr Andrea Ammon, director of the European Centre for Disease Prevention and Control, said that while most of Europe had passed the peak and lockdowns are being relaxed, it is important that [people continue to follow restrictions](#) that remain in place in order to avoid a second wave. The head of the World Health Organization in Europe [said governments should prepare](#) to quickly control the spread of new cases and build health care capacity in case a second wave coincides with disease outbreaks later in the year, such as flu or measles.

LinkedIn Editors' Picks

The Pandemic's Geopolitical Aftershocks Are Coming

Feed Updates

[Margaretta Colangelo](#)

• 1st

[Co-Founder & Managing Director at Deep Knowledge Ventures](#)

5d • Edited •

The pandemic's geopolitical aftershocks are coming and the array of possible second-wave consequences is dizzying. Governments are working to understand the potential threats and prepare for them. Some potential second wave consequences are:

- 1) uncertain impact of AI used to combat the virus
- 2) recession in the EU's poor south and wealthy north
- 3) arc of instability from West Africa to the Middle East to Asia
- 4) some sort of reckoning/decoupling with China
- 5) more problems but less money to deal with them
- 6) protectionism expected to increase
- 7) supply chains to be brought back under national control
- 8) nation-states to be strengthened
- 9) US/China relationship may become more antagonistic
- 10) migrants move to southern Europe
- 11) states default on debt

[#coronavirus #economy #artificialintelligence #datascience](#)



The Pandemic's Geopolitical Aftershocks Are Coming

[theatlantic.com • 2 min read](#)

<https://www.linkedin.com/feed/news/experts-warn-of-second-virus-wave-4114601/>

Biden: Choice between economy and health is false choice

Anderson Cooper 360

During a CNN town hall on the coronavirus pandemic, former Vice President Joe Biden said that a scenario in which one must prioritize the economy separately from public health is a false choice.

[Source: CNN](#)

<https://www.cnn.com/videos/politics/2020/04/17/biden-economy-health-choice-sot-vpx.cnn/video/playlists/cnn-coronavirus-town-hall/>

Bill Gates says US system produces 'bogus' testing numbers

[CNN's Anderson Cooper](#) and [Dr. Sanjay Gupta](#) talk to Bill Gates on the fight against coronavirus.

[Source: CNN](#)

<https://www.cnn.com/videos/business/2020/05/01/bill-gates-coronavirus-testing-numbers-town-hall-vpx.cnn/video/playlists/cnn-coronavirus-town-hall/>

Part 5: Entire CNN coronavirus town hall (April 30)

Bill Gates explains the next steps ahead for a coronavirus vaccine with CNN's Anderson Cooper and Dr. Sanjay Gupta during a CNN town hall on the coronavirus pandemic.

[Source: CNN](#)

https://www.cnn.com/videos/media/2020/05/01/entire-april-30-coronavirus-town-hall-part-5-sot-vpx.cnn?hpt=ob_blogfooterold

The Virus Can Be stopped But Only With Harsh Steps, Experts Say

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#NYT](#) [#WHO](#) [#Covid19](#) [#StringentCounterAttack](#) [#Stopped](#)

'There is a chance to stop the coronavirus. This contagion has a weakness.

Although there are incidents of rampant spread, as on ..Diamond Princess, the coronavirus more often infects clusters of family members, friends & work colleagues, said Dr. David L. Heymann, who chairs an expert panel advising the WHO on emergencies.

No one is certain why the virus travels in this way, but experts see an opening nonetheless. "You can contain clusters," Dr. Heymann said. "You need to identify & stop discrete outbreaks, & then do rigorous contact tracing."

In interviews with a dozen of the world's leading experts on fighting epidemics, there was wide agreement on the steps that must be taken immediately.

Those experts included international public health officials who have fought AIDS, malaria, tuberculosis, flu and Ebola; scientists & epidemiologists; and former health officials who led major American global health programs in both Republican & Democratic administrations.

Americans must be persuaded to stay home, they said, & a system put in place to isolate the infected & care for them outside the home. Travel restrictions should be extended, they said; prod. of masks & ventilators must be accelerated, testing prob. must be resolved.'

<https://www.nytimes.com/2020/03/22/health/coronavirus-restrictions-us.html?smid=li-share>

(xii) Prospects for vaccine and pharmacological drug development, (Food and Drug Administration (FDA) has approved Remdesivir after accelerated process – marginally effective (~3%), but does help recovering patients)

[Via Dr Neil Bodie](#)

• [1st](#)

[CEO at Paradigm Immunotherapeutics Inc.](#)

[21h](#) •

How deadly is the coronavirus? Scientists are close to an answer

Public-health researchers use the infection fatality rate to gauge how to respond to a new disease, but it's tricky to calculate.

<https://lnkd.in/gkjDUng>

Researchers use a metric called [#infection fatality rate](#) ([#IFR](#)) to calculate how deadly a new disease is. It is the proportion of infected people who will die as a result, including those who don't get tested or show symptoms.

"The IFR is one of the important numbers alongside the herd immunity threshold, and has implications for the scale of an epidemic and how seriously we should take a new disease,"

Calculating an accurate IFR is challenging in the midst of any outbreak because it relies on knowing the total number of people infected — not just those who are confirmed through testing.

But the fatality rate is especially difficult to pin down for [#COVID 19](#), the disease caused by the [#SARS CoV 2](#) virus.

That's partly because there are many people with mild or no symptoms, whose infection has gone undetected, and also because the time between infection and death can be as long as two months.

[#IFR](#)

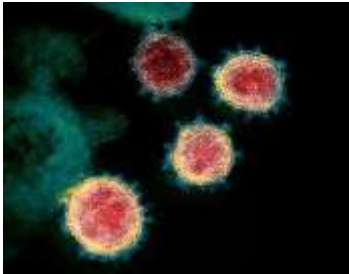


Many countries are struggling to count all their coronavirus deaths. Credit: Michael Dantas/AFP/Getty

One of the most crucial questions about an emerging infectious disease such as the new coronavirus is how deadly it is. After months of collecting data, scientists are getting closer to an answer.

Researchers use a metric called infection fatality rate (IFR) to calculate how deadly a new disease is. It is the proportion of infected people who will die as a result, including those who don't get tested or show symptoms.

"The IFR is one of the important numbers alongside the herd immunity threshold, and has implications for the scale of an epidemic and how seriously we should take a new disease," says Robert Verity, an epidemiologist at Imperial College London.



[Coronavirus and COVID-19: Keep up to date](#)

Calculating an accurate IFR is challenging in the midst of any outbreak because it relies on knowing the total number of people infected — not just those who are confirmed through testing. But the fatality rate is especially difficult to pin down for COVID-19, the disease caused by the SARS-CoV-2 virus, says Timothy Russell, a mathematical epidemiologist at the London School of Hygiene and Tropical Medicine. That's partly because there are many people with mild or no symptoms, whose infection has gone undetected, and also because the time between infection and death can be as long as two months. Many countries are also struggling to count all their virus-related deaths, he says. [Death records suggest](#) that some of those are being missed in official counts.

Data from early in the pandemic overestimated how deadly the virus was, and then later analyses underestimated its lethality. Now, numerous studies — using a range of methods — estimate that in many countries some 5 to 10 people will die for every 1,000 people with COVID-19. "The studies I have any faith in are tending to converge around 0.5–1%," says Russell.

But some researchers say that convergence between studies could just be coincidence. For a true understanding of how deadly the virus is, scientists need to know how readily it kills different groups of people. The risk of dying from COVID-19 can vary considerably depending on age, ethnicity, access to healthcare, socioeconomic status and underlying health conditions. More high-quality surveys of different groups are needed, these researchers say.

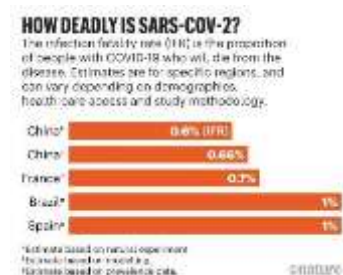
IFR is also specific to a population and changes over time as doctors get better at treating the disease, which can further complicate efforts to pin it down.

Getting the number right is important because it helps governments and individuals to determine appropriate responses. “Calculate too low an IFR, and a community could underreact, and be underprepared. Too high, and the overreaction could be at best expensive, and at worst [could] also add harms from the overuse of interventions like lockdowns,” says Hilda Bastian, who studies evidence-based medicine, and is a PhD candidate at Bond University in the Gold Coast, Australia.

Bridging the gap

Some of the first indications of the virus’s deadliness were gleaned from the total number of confirmed cases in China. In late February, the World Health Organization crudely estimated that [38 people had died for every 1,000 with confirmed COVID-19 diagnoses](#). The death rate among these people — known as the case fatality rate (CFR) — reached as high as 58 out of 1,000 in Wuhan, the city where the virus emerged. But such estimates exaggerated the disease’s deadliness because they did not account for the many people who had the virus but were not tested, obscuring the outbreak’s true spread.

Researchers tried to address this gap by estimating the IFR from models that projected the virus’s spread. The result from these early analyses hovered around 0.9% — 9 deaths for every 1,000 people infected — with a broader range of 0.4–3.6%, says Verity. His own modelling estimated an overall IFR for China of 7 deaths for every 1,000 people infected, increasing to 33 per thousand among those aged 60 or older¹.



Sources: China*: T. W. Russell et al. *Eurosurveillance* 25, 2000256 (2020); China†: R. Verity et al. *Lancet* 20, 669–677 (2020); France: H. Salje et al. *Science* <https://doi.org/10.1126/science.abc3517> (2020); Brazil: P. Hallal et al. Preprint at medRxiv <https://doi.org/10.1101/2020.05.30.20117531> (2020); Spain: [Spanish Ministry of Health, Consumer Affairs and Social Welfare 2020](#) report.

Russell’s team also used data gathered from a large COVID-19 outbreak on the *Diamond Princess* cruise ship in early February to estimate an IFR in China. Almost all of the 3,711 passengers and crew were tested, enabling researchers to count the total number of infections, including asymptomatic ones, and deaths in a known population. From this, his team estimated an IFR of 0.6%, or 6 deaths for every 1,000 infected people².

“The intention of these studies was to gain some ball-park estimates of how deadly COVID-19 is,” says Verity.

But researchers also had to make complicated estimates, which still need to be verified, about the number of confirmed cases and the actual number of infected people. “There is value to obtaining rapid early estimates of the IFR, [but] these should be updated as a matter of urgency once better data becomes available,” he says.

Antibody surveys

Widespread population surveys that test people for antibodies to the virus, known as seroprevalence surveys, were expected to help refine IFR estimates even further. About 120 seroprevalence surveys are under way worldwide.



[Autopsy slowdown hinders quest to determine how coronavirus kills](#)

But results from the first antibody studies only muddled the water, suggesting that the virus was less deadly than previously thought. “It got a bit messy,” says Russell.

One of the earliest studies tested 919 people in the German town of Gangelt, where a large outbreak had occurred³. Of these people, about 15.5% had antibodies against the virus — five times higher than the percentage of people known to have had COVID-19 in the town at the time. The figure was used to estimate an IFR of 0.28%. But researchers noted that the study was based on a relatively small number of people.

Other early seroprevalence studies did not properly account for the lack of sensitivity and specificity in the antibody test kits that were used, or for discrepancies between the sampled and underlying populations, says Verity.

These issues could have inflated estimates of the total number of infected people and so made the virus seem less deadly, he says. Equally, if COVID-19 deaths go undetected — a problem in many countries that aren’t testing all deceased people for the virus — that, too, can bias the fatality rate, says Gideon Meyerowitz-Katz, an epidemiologist and PhD candidate at the University of Wollongong, Australia.

Some larger seroprevalence studies have emerged in recent weeks, and these estimate a higher fatality rate than do early studies. One survey⁴, posted on medRxiv, of more than 25,000 people across Brazil, estimated an IFR of 1%.

Another survey that tested [more than 60,000 people across Spain](#) reports a prevalence of 5%, although the results have not been formally analysed. The survey team did not calculate a fatality rate themselves, but on the basis of the results, Verity estimates that Spain has an IFR of around 1% — or 10 deaths for every 1,000 infected individuals.



[The race for coronavirus vaccines: a graphical guide](#)

Several researchers, including Russell and Verity, find it interesting that a growing number of studies from different regions have estimated IFRs in the range of 0.5–1%. But other scientists are cautious about suggestions of agreement. “The trend is potentially more luck than anything else,” says Meyerowitz-Katz.

Marm Kilpatrick, an infectious disease researcher at the University of California, Santa Cruz, also notes that most of the serological data haven’t been published in scientific manuscripts. It’s hard to know when and how they were collected, and to properly calculate an IFR that accounts for the delay between people getting infected and dying, he says.

Kilpatrick and others say they are eagerly awaiting large studies that estimate fatality rates across age groups and among those with pre-existing health conditions, which will provide the most accurate picture of how deadly the disease is. One of the first studies to account for the effect of age was [posted on a preprint server last week](#). The study, based on seroprevalence data from Geneva, Switzerland, estimates an IFR of 0.6% for the total population, and an IFR of 5.6% for people aged 65 and older.

The results have not been peer reviewed, but Kilpatrick says the study addresses many of the issues in previous seroprevalence surveys. “This study is fantastic. It’s precisely what should be done with all of the serological data,” he says.

doi: 10.1038/d41586-020-01738-2

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Via Lee S. Dryburgh 'Quantified Health, Wellness & Aging' on LinkedIn

Any thoughts on:

<https://www.statnews.com/2020/05/22/the-world-needs-covid-19-vaccines-it-may-also-be-overestimating-their-power/>

** vaccines won't necessarily prevent all or even most infections... Covid-19 vaccines in development may be more like those that protect against influenza — reducing the risk of contracting the disease, and of experiencing severe symptoms should infection occur... We all recognize that flu vaccine, in a year when it's efficacious, you have what, 50% protection? And in a year when it's poor you have 30% or less than that **

The world needs Covid-19 vaccines. It may also be overestimating their power

By [Helen Branswell](#) @HelenBranswell

May 22, 2020



Hyacinth Empinado/STAT

With a little luck and a lot of science, the world might in the not-too-distant future get [vaccines against Covid-19](#). But those vaccines won't necessarily prevent all or even most infections.

In the public imagination, vaccines are often seen effectively as cure-alls, like inoculations against measles.

Rather than those vaccines, however, the Covid-19 vaccines in development may be more like those that protect against influenza — reducing the risk of contracting the disease, and of experiencing severe symptoms should infection occur, a number of experts told STAT.

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BY PAREXEL

“We all recognize that flu vaccine, in a year when it’s efficacious, you have what, 50% protection? And in a year when it’s poor you have 30% or less than that — and still we use that,” said Marie-Paule Kieny, who is chairing a committee advising the French government on vaccines to prevent Covid-19.

[Related:](#)

Ideally, vaccines would prevent infection entirely, inducing what’s known as “sterilizing immunity.” But early work on some of the vaccine candidates suggests they may not stop infection in the upper respiratory tract — and they may not stop an infected person from spreading virus by coughing or speaking.

A [recently released study](#) in which macaques were vaccinated with one vaccine candidate — this one being developed by Oxford University and AstraZeneca — showed the primates were protected from Covid-induced pneumonia. But the macaques still had high levels of virus replicating in their upper airways. (The paper was a pre-print, meaning it hasn’t yet been peer-reviewed and published in a journal.)

Vincent Munster, who leads the team that conducted that study, said a vaccine that could mitigate the severity of the Covid-19 pandemic would still be a significant contribution in a world struggling to co-exist with a dangerous new virus.

“If we push the disease from pneumonia to a common cold, then I think that’s a huge step forward,” said Munster, chief of the virus ecology unit at the National Institute of Allergy and Infectious Diseases’ Rocky Mountain Laboratories in Hamilton, Mont.

The rush to develop vaccines means that ideal solutions may be out of reach in the immediate term; Munster said he anticipates seeing second-generation vaccines that could be more protective. Other scientists, though, are cautious about how much the world can expect from vaccines against this pathogen.

Michael Mina, an infectious diseases epidemiologist at Harvard’s T.H. Chan School of Public Health, thinks achieving sterilizing immunity with a vaccine will not be possible for Covid-19. Experience with human coronaviruses — and with multiple pathogens that cause colds — shows immunity that develops after infection with respiratory tract infections is not lifelong. In some cases, the duration is measured in months, not years.

“If [infection with] natural coronaviruses doesn’t do it, I don’t think that we should necessarily expect or have the anticipation that we’ll be able to get there with the vaccine,” said Mina, who is also associate medical director of clinical microbiology at Boston’s Brigham and Women’s Hospital.

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Munster agreed trying to develop vaccines that confer sterilizing immunity would be a heavy lift with this coronavirus. “I think we really need to focus on what are the fastest achievable true public health goals of the vaccine, which is protecting the vulnerable people against pneumonia and protecting health care workers as well,” he said.

Earlier this week Moderna, the Cambridge, Mass.-based biotech, said eight people in a Phase 1 trial of its Covid-19 vaccine developed neutralizing antibodies to the virus.

Neutralizing antibodies should protect against severe Covid-19 disease, Kanta Subbarao, a vaccine expert who is director of the World Health Organization's influenza collaborating center in Melbourne, Australia, recently wrote in a [commentary](#) in the journal Cell Host and Microbe.

But Subbarao told STAT she wouldn't be surprised if neutralizing antibodies don't protect against infection in the upper airways. Like Munster, she doesn't think that's reason not to pursue these vaccines.

"Converting this infection to a upper respiratory illness would be, I think, quite a lot better than where we are today," said Subbarao, who worked on vaccines for SARS, a closely related coronavirus that caused an international outbreak in 2003.

Subbarao said setting public expectations of what these vaccines will be able to achieve is critical.

It would not be helpful if the type of perception that exists about flu vaccines — that they don't work very well — sets in with Covid-19 vaccines. People don't credit flu vaccines for what they prevent; they deride flu shots for not protecting them on the occasions when they contract influenza, even though they have been vaccinated.

"We can't leave all that messaging until we know how good the vaccines are," Subbarao said. "I think that will be the messaging, that we're not going to prevent all infection. We're going to prevent disease."

The fact that the macaques that Munster's group vaccinated and then infected had virus in their upper airways was [viewed with dismay](#) by some. But Munster noted the animals were infected with large doses of virus; whether the same will be true in people remains to be seen.

Some experts hope that even if the vaccines don't prevent infection in the upper airways, they may reduce the amount of virus a vaccinated person generates and emits.

"Hopefully it would diminish — although we don't know this — the levels of replication on the mucosal surfaces," said Mark Feinberg, CEO of the International AIDS Vaccine Initiative, which is working to develop an orally administered Covid-19 vaccine. That route of administration may improve the vaccine's capacity to protect the mucus membranes of the upper airways.

Mina sees a potential upside to Covid-19 vaccines that don't stop infection and transmission, saying low-level circulation of the virus could act as a natural "booster" to keep people's immunity levels high.

"Then you don't necessarily have to keep going and getting a vaccine every year, for example. You could rely on some level of natural exposure as long as all the people who are at particular risk have been given the opportunity to be vaccinated as well," he said.

But there's the rub, warned Sarah Fortune, chair of the department of immunology and infectious diseases at Harvard's School of Public Health.

"It's a little bit sobering to see that, while we may get protection against disease [and] protect people from getting sick, we may not get nearly as effective protection against transmission," Fortune said during a briefing Thursday for reporters. "Which means that to protect the population, we're going to have to be vaccinating many, many more people, because we can't rely on getting to a lot of people and having the epidemic die out through herd effects."

Andrew Joseph contributed reporting.

[Helen Branswell](#)

Senior Writer, Infectious Disease

Helen covers issues broadly related to infectious diseases, including outbreaks, preparedness, research, and vaccine development.

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<https://www.statnews.com/2020/05/22/the-world-needs-covid-19-vaccines-it-may-also-be-overestimating-their-power/>

T cells found in COVID-19 patients 'bode well' for long-term immunity



Immune hunters called T cells can seek and destroy a cell (green) infected with and making copies of SARS-CoV-2 (yellow).

NIAID

T cells found in COVID-19 patients 'bode well' for long-term immunity

By [Mitch Leslie](#) May. 14, 2020 , 9:00 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

Immune warriors known as T cells help us fight some viruses, but their importance for battling SARS-CoV-2, the virus that causes COVID-19, has been unclear. Now, two studies reveal that infected people harbor T cells that target the virus—and may help them recover. Both studies also found that some people never infected with SARS-CoV-2 have these cellular defenses, most likely because they were previously infected with other coronaviruses.

"This is encouraging data," says virologist Angela Rasmussen of Columbia University. Although the studies don't clarify whether people who clear a SARS-CoV-2 infection can ward off the virus in the future, both identified strong T cell responses to it, which "bodes well for the development of long-term protective immunity," Rasmussen says. The findings could also help researchers create better vaccines.

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The more than 100 COVID-19 vaccines in development mainly focus on another immune response: antibodies. These proteins are made by B cells and ideally latch onto SARS-CoV-2 and prevent it from entering cells. T cells, in contrast, thwart infections in two different ways. Helper T cells spur B cells and other immune defenders into action, whereas killer T cells target and destroy infected cells. The severity of disease can depend on the strength of these T cell responses.

Using bioinformatics tools, a team led by Shane Crotty and Alessandro Sette, immunologists at the La Jolla Institute for Immunology, predicted which viral protein pieces would provoke the most powerful T cell responses. They then exposed immune cells from 10 patients who had recovered from mild cases of COVID-19 to these viral snippets.

[All of the patients carried helper T cells that recognized the SARS-CoV-2 spike protein](#), which enables the virus to infiltrate our cells. They also harbored helper T cells that react to other SARS-CoV-2 proteins. And the team detected virus-specific killer T cells in 70% of the subjects, they report today in *Cell*. "The immune system sees this virus and mounts an effective immune response," Sette says.

The results jibe with those of a study posted as a preprint on medRxiv on 22 April by immunologist Andreas Thiel of the Charité University Hospital in Berlin and colleagues. They [identified helper T cells targeting the spike protein in 15 out of 18 patients](#) hospitalized with COVID-19.

The teams also asked whether people who haven't been infected with SARS-CoV-2 also produce cells that combat it. Thiel and colleagues analyzed blood from 68 uninfected people and found that 34% hosted helper T cells that recognized SARS-CoV-2. The La Jolla team detected this crossreactivity in about half of stored blood samples collected between 2015 and 2018, well before the current pandemic began. The researchers think these cells were likely triggered by past infection with one of the four human coronaviruses that cause colds; proteins in these viruses resemble those of SARS-CoV-2.

The results suggest "one reason that a large chunk of the population may be able to deal with the virus is that we may have some small residual immunity from our exposure to common cold viruses," says viral immunologist Steven Varga of the University of Iowa. However, neither of the studies attempted to establish that people with crossreactivity don't become as ill from COVID-19.

Before these studies, researchers didn't know whether T cells played a role in eliminating SARS-CoV-2, or even whether they could provoke a dangerous immune system overreaction. "These papers are really helpful because they start to define the T cell component of the immune response," Rasmussen says. But she and other scientists caution that the results do not mean that people who have recovered from COVID-19 are protected from reinfection.

To spark production of antibodies, vaccines against the virus need to stimulate helper T cells, Crotty notes. "It is encouraging that we are seeing good helper T cell responses against SARS-CoV-2 in COVID-19 cases," he says. The results have other significant implications for vaccine design, says molecular virologist Rachel Graham of the University of North Carolina, Chapel Hill. Most vaccines under development aim to elicit an immune response against spike, but both studies determined that T cells reacted to several viral proteins, suggesting that vaccines that sic the immune system on these proteins as well could be more effective. "It is important to not just concentrate on one protein," Graham says.

<https://www.sciencemag.org/news/2020/05/t-cells-found-covid-19-patients-bode-well-long-term-immunity#>

Via Dr. Thomas Wilckens on LinkedIn

SARS-CoV-2–Fighting T Cells Found in Recovered Patients <https://bit.ly/2ASSNxV> Good news re [#covid19](#) [#vaccine](#) development; there might also be background immunity in not-infected people, read more here <https://bit.ly/2VqUYjY>

While the finding doesn't prove people become immune to the virus after infection, it is good news for vaccine development.

Even as researchers around the world rush to [develop a vaccine](#) against the virus that causes COVID-19, and some pin their hopes on the idea that enough people will recover from infections to achieve herd immunity in the meantime, questions about whether exposure to the virus induces immunity to it have lingered. If the virus itself does not prompt immunity, a vaccine against it might not either.

Although it doesn't provide a conclusive answer, a study published yesterday (May 14) in [Cell](#) appears to be good news on the immunity front. Researchers at the La Jolla Institute for Immunology in California took blood from 20 adults who'd recovered from COVID-19 and exposed the samples to proteins from the SARS-CoV-2 virus. All of the patients had CD4⁺ helper T cells that recognized the virus's [spike protein](#), and 70 percent of them had CD8⁺ killer T cells that responded to the same protein. "Our data show that the virus induces what you would expect from a typical, successful antiviral response," says coauthor Shane Crotty in an institute [press release](#).

The authors also tested blood samples collected between 2015 and 2018 to see whether people who were never exposed to SARS-CoV-2 might nevertheless have some immunity to it. They detected CD4⁺ T cell responses to SARS-CoV-2 in about half of those samples, which they suggest could be due to exposure to other coronaviruses that cause a cold.

Science notes that the results align with those of another study, led by researchers at Charité University Hospital in Berlin and reported in a [preprint](#) last month, that found CD4⁺ T cells that recognized the spike protein in blood from 83 percent of COVID-19 patients and 34 percent of healthy people tested.

“This is encouraging data,” Columbia University virologist Angela Rasmussen, who was not involved in either study, tells *Science*. Although not conclusive, the T cell response “bodes well for the development of long-term protective immunity” among people who have recovered from COVID-19, she says, and could be useful in designing vaccines.

The results suggest that “one reason that a large chunk of the population may be able to deal with the virus is that we may have some small residual immunity from our exposure to common cold viruses,” viral immunologist Steven Varga of the University of Iowa tells *Science*. But neither study tested whether that is the case.

[**“What Do Antibody Tests For SARS-CoV-2 Tell Us About Immunity?”**](#)

https://www.the-scientist.com/news-opinion/sars-cov-2fighting-t-cells-found-in-recovered-patients-67540?utm_campaign=TS_OTC_2020&utm_medium=email&_hsmi=88313440&_hsenc=p2ANqtz-z0yXLYbu7Vt26wziLlf-5Jz0qRZVuKVNymv8IQlet9WJtG4n3A1T184miSPb6B2OzahXGM5CwlOnbF7IbEllsCb5H9d7dDDXNvy5dhF0QknHxps&utm_content=88313440&utm_source=hs_email

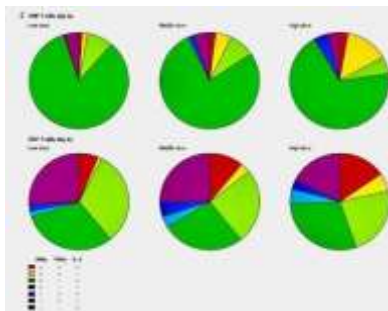
[Via Managing Co-Founder & Director at Deep Knowledge Ventures Margaretta Colangelo on LinkedIn](#)

Making some progress on the vaccine front -- The first peer-reviewed paper on a vaccine for SARSCoV2 was published today in [The Lancet](#). This first-in-human phase 1 clinical study suggests that there is potential for further investigation of the Ad5 vectored vaccine for prevention of COVID. Although none of the participants in this study were older than 60, the researchers plan to include people over 60 in phase 2. This is crucial considering people over 60 are an important target population for a COVID vaccine.

- 1) study was conducted in Wuhan
- 2) 108 healthy adults aged 18 to 60 enrolled in the study
- 3) 51% male and 49% female
- 4) mean age was 36 years
- 5) onset of detectable immune responses was rapid
- 6) T-cell responses peaked at day 14 after vaccination
- 7) antibodies peaked at day 28 after vaccination
- 8) 108 participants had a favorable response neutralizing antibody & T cell
- 9) vaccine was tolerated in all 3 dose groups
- 10) most common adverse reactions were fever, fatigue, headache, muscle pain
- 11) most adverse events were mild or moderate in severity

Peer reviewed paper in The Lancet:

<https://lnkd.in/gnnvXpr>
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Summary

Background

A vaccine to protect against COVID-19 is urgently needed. We aimed to assess the safety, tolerability, and immunogenicity of a recombinant adenovirus type-5 (Ad5) vectored COVID-19 vaccine expressing the spike glycoprotein of a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) strain.

Interpretation

The Ad5 vectored COVID-19 vaccine is tolerable and immunogenic at 28 days post-vaccination. Humoral responses against SARS-CoV-2 peaked at day 28 post-vaccination in healthy adults, and rapid specific T-cell responses were noted from day 14 post-vaccination. Our findings suggest that the Ad5 vectored COVID-19 vaccine warrants further investigation.

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31208-3/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31208-3/fulltext)

Via Prof. Mathias Goyen, MD

[Mathias Goyen, Prof. Dr.med. 2nd degree connection 2nd Chief Medical Officer Europe at GE Healthcare](#)

Hi [Margaretta](#). Great summary. Thanks a lot for sharing. The study found that one dose of the vaccine, tested at three different levels, appeared to induce a good immune response in some subjects. But about half of the volunteers — people who already had immunity to the backbone of the vaccine — had a dampened immune response. —> <https://www.statnews.com/2020/05/22/early-study-of-covid-19-vaccine-developed-in-china-sees-mixed-results/>

#COVID19 Journal Club: "Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence"

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[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[#COVID19](#) [#SARSCoV2](#) [#Plus30OtherViruses](#) [#VeroCellLethality](#) [#By30OtherVirions](#) [#NotSARSCoV2](#)'..air sampling in a clinic and saw that the sample was positive for SARS-CoV-2..culturing to look for live virus and found positive culturing results in Vero cells..virus that was actually killing the Vero cells... and it wasn't SARS-CoV-2..actually three other respiratory viruses. This worries ..having false positive culturing results. Should we be confirming that the positive culturing results are actually due to SARS-CoV-2? Abstract below (see comment):

[https://commons.wikimedia.org/wiki/File:Princess Alexandra Hospital_patient%27s_room.jpg](https://commons.wikimedia.org/wiki/File:Princess_Alexandra_Hospital_patient%27s_room.jpg)

This article ("Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence") caught my attention initially because of the air sampling aspect, but upon reading the Abstract I was struck by something else. Here they did air sampling in a clinic and saw that the sample was positive for SARS-CoV-2. Very standard stuff. Then they moved onto culturing to look for live virus and found positive culturing results in Vero cells. Also pretty standard. But they then looked at the virus that was actually killing the Vero cells... and it wasn't SARS-CoV-2. It was actually three other respiratory viruses. This worries me quite a bit in the context of then having false positive culturing results. Should we be confirming that the positive culturing results are actually due to SARS-CoV-2? Abstract below:

The progression of COVID-19 worldwide can be tracked by identifying mutations within the genomic sequence of SARS-CoV-2 that occur as a function of time. Such efforts currently rely on sequencing the genome of SARS-CoV-2 in patient specimens (direct sequencing) or of virus isolated from patient specimens in cell cultures. A pilot SARS-CoV-2 air sampling study conducted at a clinic within a university student health care center detected the virus vRNA, with an estimated concentration of 0.87 virus genomes L⁻¹ air. To determine whether the virus detected was viable ('live'), attempts were made to isolate the virus in cell cultures. Virus-induced cytopathic effects (CPE) were observed within two days post-inoculation of Vero E6 cells with collection media from air samples; however, rtRT-PCR tests for SARS-CoV-2 vRNA from cell culture were negative. Instead, three other fast-growing human respiratory viruses were isolated and subsequently identified, illustrating the challenge in isolating SARS-CoV-2 when multiple viruses are present in a test sample. The complete SAR-CoV-2 genomic sequence was nevertheless determined by Sanger sequencing and most closely resembles SARS-CoV-2 genomes previously described in Georgia, USA. Results of this study illustrate the feasibility of tracking progression of the COVID-19 pandemic using environmental aerosol samples instead of human specimens. Collection of a positive sample from a distance more than 2 m away from the nearest patient traffic implies the virus was in an aerosol.

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2 thoughts on “#COVID19 Journal Club: “Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence””

1. **Michael Siwicki** says:

May 29, 2020 at 1:25 pm

Good catch David.....QA/QC!

All too often, some only read the abstract and perhaps the conclusions section and pay no attention to materials and methods. Come to think of it....I seem to remember that we had this conversation once before.....quite some time ago.

Reply

2. **Michael Siwicki** says:

May 29, 2020 at 1:28 pm

Editorial correction: “Conclusions” section

Word programs make assumptions too quickly and I often miss their changes before posting.

[#COVID19 Journal Club: "Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence"](#)

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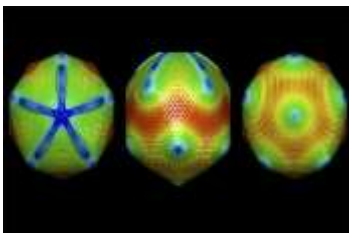
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Giant viruses aren't alive. So why have they stolen genes essential for life?

By [Amanda Heidt](#) Apr. 16, 2020 , 2:10 PM



[#GiantViruses](#) [#ClimateChange](#) [#MagImpactOver](#) [#COVID19](#) 'Viruses..altering life on a global scale..grp of.."giant viruses"..cont. genes assoc. w/ metab..con.. zombified hosts into superch. en. fact...their victims are imp. players in damp. climate ch. & in contr. ocean ecosys..megaviruses may ..unexp. power over life..>than 200,000 kinds of viruses in the world's oceans..giant viruses (GV)..about 10x bigger than ..avge virus..still tiny—larg. is only 1/5 size of a rbc—..why they went undisc. until 2003..mostly infect amoebas & phytoplankton..pub. datab., scan. 1000..marine genome..DNA fingerprints of giant viruses..extr. 501 susp. GV genomes, mapp. them agst 121..ref. gen. to create a family tree..ext. div., split. into 54 dist. grps. Sev. genomes were new to sci. & likely..new species..many also contained genes for metabolism..a surprise because viruses don't eat..weren't a recent add., says first auth. M. Moniruzzaman: Many..evolving inGV for millions of yrs..dram. imp. on sea life. Phytoplankton suck the greenhouse gas carbon dioxide from the atmos. as they photosynth..form the base of the entire food web, the intercon. "who-eats-whom" relat..bet. predator & prey..cautions..Just because a gene helps living organisms metabolize, doesn't mean it does the same thing for viruses.'

sciencemag.org

<https://www.sciencemag.org/news/2020/04/giant-viruses-aren-t-alive-so-why-have-they-stolen-genes-essential-life>

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Published online 2019 Dec 11. doi: [10.1177/0046958019894098](https://doi.org/10.1177/0046958019894098)

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Measles Outbreak in Unvaccinated and Partially Vaccinated Children and Adults in the United States and Canada (2018-2019): A Narrative Review of Cases

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Abstract

Since 2018 and currently in 2019, the United States and Canada experienced a rapidly spreading measles virus outbreak. The developing outbreak may be due to a lack of vaccination, an inadequate dosage of measles (MMR) vaccine, clusters of intentionally under-vaccinated children, imported measles from global travel, and from those who are immunocompromised or have other life-threatening diseases. The infection originated mainly from travelers who acquired measles abroad and has thus led to a major outbreak and health concern not only in the United States and Canada but also in other parts of the world. According to World Health Organization, from January 2019 through September 2019, 1234 cases of measles have been reported in the United States and 91 reported cases in Canada, while in 2018, 372 and 28 cases were reported in the United States and Canada, respectively. A potential driving factor to the increased cases maybe because fewer children have been vaccinated over the last number of years in both countries. This article is a narrative review of cases discussing the measles outbreak among partially vaccinated and unvaccinated children and adults in the United States and Canada in 2018 and 2019.

Keywords: measles, child, adult, vaccination, disease outbreaks, United States, Canada

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6906342/>

[Biotech](#)

Why coronavirus testing isn't so simple

At a COVID-19 testing site in downtown, registered nurse Amanda Price (right), working for a company called COVID Clinic, draws blood from Cindy Stirling for an antibody test Thursday in San Diego, California.

(Eduardo Contreras /The San Diego Union-Tribune)

Access to testing is growing, but so are concerns over the reliability of results.

By [Jonathan Wosen](#) Biotech reporter

May 3, 2020

5:30 AM

It's hard to make evidence-based decisions without evidence. That's what public officials, doctors and scientists have argued in their calls for increased coronavirus testing. But growing evidence demonstrates that performing tests is one thing — accurately interpreting results is another.

Scores of companies have rushed forward with tests to detect past or present infection with the novel coronavirus. The real-world use of these tests can be surprisingly error-prone. Test quality is an issue, but it's not the only one; it's inherently difficult to test for a virus that most of us have not been exposed to.

Why no test is perfect

Ideally, a viral test would always detect those who've been infected, as well as the unexposed.

"If you could achieve 100 percent on both, you would have the perfect test," said Ingo Chakravarty, CEO and president of Mesa Biotech, a local company that [produces a rapid](#) coronavirus molecular test. "That, though, doesn't exist."

Test makers face real-world trade-offs. For molecular tests, that means identifying the genetic material of the coronavirus from a nose or throat swab without picking up similar-looking genetic bits from other viruses. And for antibody tests, this means detecting low amounts of [antibodies](#) to the novel coronavirus without detecting antibodies to related viruses.

When test makers, for lack of a better phrase, test their test, they use samples scientists know are negative or positive. For a molecular test, that means testing a sample with random shards of genetic material or one spiked with viral molecules. These samples tell researchers how often a test produces false positive and false negative results.

In general, a good test correctly identifies known positives and negatives at least 95 percent of the time, says Chakravarty. Many of the new tests have been cleared for use without the usual lengthy Food and Drug Administration review process. And while that has sped things up, it may be causing some issues. Abbott's rapid molecular test, which the company claims can detect the virus in as little as five minutes, has come under fire [after reports](#) that the test fails to detect the virus about 15 percent of the time.

Real-world dilemmas

Testing people is complicated because, of course, we aren't confirmed positive and negative samples. Those who get tested don't know if they're positive — that's why they're getting tested.

The odds that you're infected or have viral antibodies based on a positive test result depend both on how well the test works and how common the disease is.

Think of it this way. Say that 5 percent of people have been infected, and you test 100 random people for antibodies. On average, 5 people should have antibodies and will test positive. Now say that this test has a 2.5 percent false positive rate, which is [about the rate](#) for a test made by Diazyme, a local company that produces the antibody tests used by UC San Diego Medical Center. That means you'd expect nearly 2.5 false positives; in other words, a third of total positives (roughly 7.5) could be wrong. Now imagine testing tens or hundreds of thousands of people knowing that a third of all positive results could be errors.

This is the basic math behind a [firestorm debate](#) ignited after a Stanford study tested 3,300 people in Santa Clara County for antibodies to the coronavirus. The study concluded that the rate of infection in the county may have been between 50 to 85 times greater than previous reports, which would also mean that the death rate of COVID-19 is drastically lower than the [3 percent](#) rate estimated by the World Health Organization.

But very few study participants tested positive, suggesting that the rate of infection is low by any measure. [Experts have pointed out](#) that a third or more of these positive results could have been the result of testing error.

"When you have a large number of people who don't have the disease, and even a small false positive rate, you're going to get a lot of false positives just because there weren't that many people who actually have the disease," said Kristin Sainani, a Stanford biostatistician.

Playing it safe

If the infection rate were high, then a positive test result would be a more reliable sign of infection. But that likely isn't the case in San Diego County. Dr. David Pride, director of UC San Diego's molecular biology lab, says that about 3 percent of his team's molecular tests have come back positive, and he doesn't see any sign of an uptick.

"Right around the end of March, beginning of April, is where we saw our highest number of cases," Pride said. "It's looking like on a daily basis that this curve has flattened out."

Pride says that the numbers suggest that each infected person is, on average, infecting closer to one other person than three or four. But he's also quick to point out that the situation is extremely fluid, and these numbers could easily change.

As long as the infection rate remains at current levels, Pride's team estimates that about 97 percent of negative tests are true negatives. But the researchers will often re-test a negative if a doctor strongly suspects their patient has COVID-19. The team has molecular tests from six different developers and will run a sample on multiple machines to confirm a negative finding. Sometimes the issue is simply that the original swab didn't collect many infected cells, meaning that only the most sensitive tests will detect the virus's genetic material.

With positive results, however, Pride errs on the side of caution.

"If any of our results are positive, we treat the patient as if they've had disease," Pride said. "That's frankly the safest way to move forward."

Since no test is perfect, what's better — a false positive or a false negative? For molecular testing, a false negative risks allowing someone who's infected to go out and get others sick. That's what Pride's team wants to avoid.

For antibody testing, it's a bit more complicated. Want to identify everyone with antibodies because you think these people are now protected and can go back to work? Then avoid false negatives. But what if you don't want to overestimate the number of COVID-19 survivors and underestimate the disease's fatality rate? Then false positives are the problem.

"It depends on the question you're trying to answer," Sainani said.

Testing a given sample several times on multiple machines — as UCSD does with its molecular tests — is probably a good idea in general, says Sainani, because a consistent result is more reliable. And there are plenty of tests out there — over 70 antibody tests nationally and new molecular tests popping up regularly, including [several here](#) in San Diego.

But for every question testing can help us answer — who's infected, who has recovered — there's a question (or two) that these tests can't resolve: Does having antibodies to the virus prevent re-infection — and, if so, how long does protection last? Why are some people asymptomatic while others end up in intensive care units fighting for their lives? Will COVID-19 cases surge in the fall, as they do for flu every year?

"We really do not have much data for this new virus," said Chong Yuan, managing director of Diazyme. "We're still in the data collection (stage) right now."

<https://www.sandiegouniontribune.com/business/biotech/story/2020-05-03/why-coronavirus-testing-isnt-so-simple>

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

22 April 2020

India coronavirus: Rapid testing paused over China kit issues

[#COVID19](#) [#AbDetTests](#) [#Accur5%](#)?

'At least three Indian states have exp. dissatisf. with the kits, with the north. state of Rajasthan refusing outright to use them.

Officials there said the state only had an accuracy of 5%. They added that they used the kits on patients who they already knew were positive, but the tests had shown a "negative" result.

This prompted the Indian Council of Medical Research (ICMR) to ask all states to pause using the kits for two days until it examined them properly.

However, the ICMR said it had always cautioned against wide use of the rapid testing kits as a primary "diagnostic tool" for Covid-19.

The NDTV news channel quoted an ICMR official as saying that data on antibody tests was "still emerging and its utility is still evolving"..

In the US, the New York Times reported that tests of "frankly dubious quality" have flooded the American market, saying that it has been found that it mistakenly flags some people as having antibodies when they actually don't..

In the UK, scientists have said that the tests have a low sensitivity rate and Health Secretary Matt Hancock told the media that they were "not good enough" as yet..

For now, it seems that the lab tests, which are more complex & time-consuming, are still the only reliable method of testing.'

<https://www.bbc.com/news/world-asia-india-52378265>

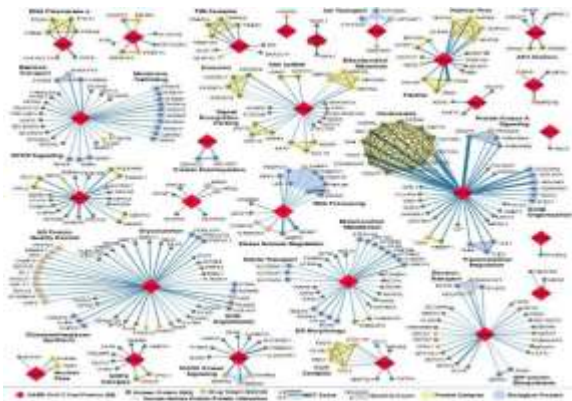
We found and tested 47 old drugs that might treat the coronavirus: Results show promising leads and a whole new way to fight COVID-19

[Nevan Krogan](#)

Professor and Director of Quantitative Biosciences Institute & Senior Investigator at the Gladstone Institutes, University of California, San Francisco

April 30, 2020 2.26pm EDT

47 Old Drugs That Might Treat COVID - Scientists at [University of California, San Francisco](#), [Gladstone Institutes](#), [Icahn School of Medicine at Mount Sinai](#), [Institut Pasteur](#), and [Howard Hughes Medical Institute](#) joined forces and identified 47 old drugs that might treat COVID. Professor [Nevan Krogan](#) and colleagues built a map showing all of the COVID proteins and all of the proteins found in the human body that those viral proteins could interact with. In theory, every place that a COVID protein interacts with a human protein is a potential druggable site. Instead of trying to develop new drugs, they screened their map against the FDA drug catalog to find drugs that interact with the same human proteins as COVID. Some of the molecules they tested repressed the virus but one compound (an ingredient found in cough suppressants) worked in the opposite way and helped the virus replicate more easily. The results, while promising, are preliminary findings and have only been observed in monkey cells and in petri dishes and have not been tested in humans. More testing is needed.



Link to article <https://lnkd.in/gv4gvAm>
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<https://theconversation.com/we-found-and-tested-47-old-drugs-that-might-treat-the-coronavirus-results-show-promising-leads-and-a-whole-new-way-to-fight-covid-19-136789>

Early study of Covid-19 vaccine developed in China sees mixed results

By [Helen Branswell](#) [@HelenBranswell](#)

May 22, 2020

A Covid-19 vaccine candidate being developed by a Chinese drug maker appeared to induce an immune response in subjects, but also showed some concerning although not unexpected results.

Data on the vaccine, made by CanSino Biologics, were [published Friday in the Lancet](#), the first time Phase 1 trial data from any Covid-19 vaccine have been published in a scientific journal. The results are likely to be

closely examined, particularly in Canada, which [recently announced](#) it would test the vaccine and produce it there if results of the early studies were positive.

The study found that one dose of the vaccine, tested at three different levels, appeared to induce a good immune response in some subjects. But about half of the volunteers — people who already had immunity to the backbone of the vaccine — had a dampened immune response...

But many people have had previous infections with adenovirus 5, raising concerns that the immune system would focus on the Ad5 parts of the vaccine rather than the SARS-Cov-2 part. Many research groups that work on viral-vectored vaccines stopped using Ad5 because of concerns about preexisting immunity, which can run to 70% or higher in some populations...

In the study, Chinese scientists reported that while people who had high levels of preexisting immunity to Ad5 responded to the vaccine, the rise in antibodies to the SARS-Cov-2 virus was less robust than among those in the study who had low or no preexisting antibodies to Ad5. They also showed antibodies to the adenovirus itself soared among people who had prior immunity, suggesting their systems views the vaccination as a boost of their Ad5 immunity...

"This probably wouldn't be a vaccine that you would want to give to the people over 65, because they may have higher levels [of pre-existing immunity]," said Kathryn Edwards, scientific director of the Vanderbilt Vaccine Research Program in Nashville, Tenn.

"This was the assumption and they are just demonstrating that the assumption was correct," he told STAT, adding that he doesn't expect this vaccine to succeed.

Kobinger said CanSino — which also produced an Ebola vaccine using this viral vector — has argued it could override the problem of preexisting immunity by using higher doses of the vaccine or using an intra-nasal delivery mechanism, rather than injecting the vaccine into muscle. (In this study, the vaccine was injected.)

But in the highest of the three doses used in this study, the number of side effects was high — 75% of the people in the highest dose arm reported at least one side effect. The authors said the Phase 2 trial, which is already underway, is not using the highest of the three doses.

"This is the story of Ad5," Edwards said. "It's the concern with Ad5 that's been there from the beginning: That if you have antibody to the vector, then you don't get as good a [vaccine] take."

"Maybe this level of antibody is enough? I don't know," she added. "I think it's reasonable to look at this and see what it does. It's only a Phase 1 study."

The problem with pre-existing immunity is not the potential issue with the Ad5 vaccine vector.

In 2007 a trial of an HIV vaccine using an Ad5 backbone was halted when it was seen that more people in the vaccine arms of the trial were becoming infected with HIV than those in the placebo arm. It remains unclear why that happened.

The authors of the Phase 1 Covid-19 trial noted the earlier troubling outcome, and said they will be monitoring for similar safety signals as they continue to study this vaccine..."Although the association between HIV-1 acquisition risk and Ad5-vectored vaccine is controversial and its mechanism is unclear, the potential risks should be taken into account in studies with this viral vector delivery platform," they wrote. "We plan to monitor the participants in our upcoming phase 2 and phase 3 studies to assess the indication for any such acquisition."

<https://www.statnews.com/2020/05/22/early-study-of-covid-19-vaccine-developed-in-china-sees-mixed-results/>

SARS-CoV-2 infection protects against rechallenge in rhesus macaques

2. [View ORCID Profile](#) Abishek Chandrashekar^{1,*},
53. [View ORCID Profile](#) Dan H. Barouch^{1,6,9,†}

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VIA Dr. Neil Bodie on LinkedIn

SARS-CoV-2 infection protects against rechallenge in rhesus macaques

<https://lnkd.in/g8gQuej>

An understanding of protective immunity to SARS-CoV-2 is critical for vaccine and public health strategies aimed at ending the global COVID-19 pandemic. A key unanswered question is whether infection with SARS-CoV-2 results in protective immunity against re-exposure. We developed a rhesus macaque model of SARS-CoV-2 infection and observed that macaques had high viral loads in the upper and lower respiratory tract, humoral and cellular immune responses, and pathologic evidence of viral pneumonia. Following initial viral clearance, animals were rechallenged with SARS-CoV-2 and showed 5 log₁₀ reductions in median viral loads in bronchoalveolar lavage and nasal mucosa compared with primary infection. Anamnestic immune responses following rechallenge suggested that protection was mediated by immunologic control. These data show that SARS-CoV-2 infection induced protective immunity against re-exposure in nonhuman primates.

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

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One more time (because it's important!)...

Imbalanced Host Response to SARS-CoV-2 Drives Development of [#COVID19](#)

<https://lnkd.in/gKag3-G>

Highlights

- ⊙ SARS-CoV-2 infection induces low IFN-I and -III levels with a moderate ISG response
- ⊙ Strong chemokine expression is consistent across in vitro, ex vivo, and in vivo models
- ⊙ Low innate antiviral defenses and high pro-inflammatory cues contribute to COVID-19

In Brief

In comparison to other respiratory viruses, SARS-CoV-2 infection drives a lower antiviral transcriptional response that is marked by low IFN-I and IFN-III levels and elevated chemokine expression, which could explain the pro-inflammatory disease state associated with COVID-19.

[#covid19](#) [#interferon](#) [#cytokinestorm](#) [#inflammation](#) [#proinflammatorydisease](#) [#infectiousdiseases](#)
[#sarscov2](#)

<https://science.sciencemag.org/content/early/2020/05/19/science.abc4776>

Imbalanced Host Response to SARS-CoV-2 Drives Development of COVID-19

Graphical Abstract

Highlights dSARS-CoV-2 infection induces low IFN-I and -III levels with a moderate ISG response Strong chemokine expression is consistent across in vitro, ex vivo, and in vivo models Low innate antiviral defenses and high pro-inflammatory cues contribute to COVID-19

Authors Daniel Blanco-Melo, Benjamin E. Nilsson-Payant, Wen-Chun Liu, ..., Jean K. Lim, Randy A. Albrecht, Benjamin R. ten Oever

SUMMARY

Viral pandemics, such as the one caused by SARS-CoV-2, pose an imminent threat to humanity. Because of its recent emergence, there is a paucity of information regarding viral behavior and host response following SARS-CoV-2 infection. Here we offer an in-depth analysis of the transcriptional response to SARS-CoV-2 compared with other respiratory viruses. Cell and animal models of SARS-CoV-2 infection, in addition to transcriptional and serum profiling of COVID-19 patients, consistently revealed a unique and inappropriate inflammatory response. This response is defined by low levels of type I and III interferons juxtaposed to elevated chemokines and high expression of IL-6. We propose that reduced innate antiviral defenses coupled with exuberant inflammatory cytokine production are the defining and driving features of COVID-19.

<https://www.cell.com/action/showPdf?pii=S0092-8674%2820%2930489-X>

Coronavirus vaccine: First evidence jab can train immune system

By James Gallagher Health and science correspondent

- 18 May 2020

The first hints that a vaccine can train people's immune system to fight coronavirus have been reported by a company in the US.

[Moderna](#) said neutralising antibodies were found in the first eight people who took part in their safety trials.

It also said the immune response was similar to that in people infected with the actual virus.

Larger trials to see whether the jab protects against infection are expected to start in July.

Work on a coronavirus vaccine has been taking place at unprecedented speed, with around 80 groups around the world working on them.

Moderna was the first to test an experimental vaccine, called mRNA-1273, in people.

The vaccine is a small snippet of the coronavirus's genetic code, which is injected into the patient.

It is not capable of causing an infection or the symptoms of Covid-19, but is enough to provoke a response from the immune system.

The vaccine trials, run by the US government's National Institute of Allergy and Infectious Diseases, showed the vaccine led to the production of antibodies which can neutralise the coronavirus.

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However, testing for these neutralising antibodies has only taken place on the first eight, out of 45, people on the trial.

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The people on the trial were taking either a low, middle or high dose. The highest dose was linked to most side-effects.

However, Moderna said that even people taking the lowest dose had antibodies at the same levels seen in patients who recover from Covid-19.

And antibodies "significantly exceeded" those in recovered patients for people on the middle dose.

The study is known as a phase 1 trial as it is designed to test whether the vaccine is safe, rather than whether it is effective.

It will take larger trials to see if people are protected against the virus. However, experiments on mice showed the vaccine could prevent the virus replicating in their lungs.

"These interim phase 1 data, while early, demonstrate that vaccination with mRNA-1273 elicits an immune response of the magnitude caused by natural infection," said Dr Tal Zaks, chief medical officer at Moderna.

"These data substantiate our belief that mRNA-1273 has the potential to prevent Covid-19 disease and advance our ability to select a dose for pivotal trials."

Moderna said it was hoping to start a large-scale trial in July, and that it was already investigating how to manufacture the vaccine at scale.

Oxford vaccine

A vaccine pioneered by the University of Oxford is also being tested in people, but there are no results from those trials yet.

However, concerns have been raised about the results of experiments in monkeys.

Tests showed vaccinated animals had less severe symptoms and did not get pneumonia. However, they were not completely protected from the virus and signs of it were detected at the same level in the monkeys' noses as in unvaccinated animals.

Prof Eleanor Riley, from the University of Edinburgh, said: "If similar results were obtained in humans, the vaccine would likely provide partial protection against disease in the vaccine recipient but would be unlikely to reduce transmission in the wider community."

However, until human trials have been performed it is impossible to know how the vaccine will perform in people.

Profits and Pride at Stake, the Race for a Vaccine Intensifies

Governments, companies and academic labs are accelerating their efforts amid geopolitical crosscurrents, questions about safety and the challenges of producing enough doses for billions of people.

By [David E. Sanger](#), [David D. Kirkpatrick](#), [Carl Zimmer](#), [Katie Thomas](#) and [Sui-Lee Wee](#)

Published May 2, 2020 Updated May 3, 2020, 11:10 a.m. ET

WASHINGTON — Four months after a mysterious new virus began its deadly march around the globe, the search for a vaccine has taken on an intensity never before seen in medical research, with huge implications for public health, the world economy and politics.

Seven of the roughly 90 projects being pursued by governments, pharmaceutical makers, biotech innovators and academic laboratories have reached the stage of clinical trials. With political leaders — not least President Trump — increasingly pressing for progress, and with big potential profits at stake for the industry, drug makers and researchers have signaled that they are moving ahead at unheard-of speeds.

But the whole enterprise remains dogged by uncertainty about whether any coronavirus vaccine will prove effective, how fast it could be made available to millions or billions of people and whether the rush — compressing a process that can take 10 years into 10 months — will sacrifice safety.

In an era of intense nationalism, the [geopolitics](#) of the vaccine race are growing as complex as the medicine. The months of [mutual vilification](#) between the United States and China over the origins of the virus have poisoned most efforts at cooperation between them. The U.S. government is already warning that American innovations must be protected from theft — chiefly from Beijing.

“Biomedical research has long been a focus of theft, especially by the Chinese government, and vaccines and treatments for the coronavirus are today’s holy grail,” John C. Demers, the assistant attorney general for national security, said on Friday. “Putting aside the commercial value, there would be great geopolitical significance to being the first to develop a treatment or vaccine. We will use all the tools we have to safeguard American research.”

The intensity of the global research effort is such that governments and companies are building production lines before they have anything to produce.

“We are going to start ramping up production with the companies involved,” Dr. Anthony S. Fauci, the director of the National Institute of Allergy and Infectious Diseases and the federal government’s top expert on infectious diseases, said on NBC this week. “You don’t wait until you get an answer before you start manufacturing.”

Two of the leading entrants in the United States, [Johnson & Johnson](#) and [Moderna](#), have announced partnerships with manufacturing firms, with Johnson & Johnson promising a billion doses of an as-yet-undeveloped vaccine by the end of next year.

[Continue reading the main story](#)

Not to be left behind, the Britain-based pharmaceutical giant AstraZeneca said this week that it was working with a vaccine development project at the University of Oxford to manufacture tens of millions of doses by the end of this year.



Image

A researcher replicating the coronavirus in order to develop a vaccine in Belo Horizonte, Brazil. Credit...Douglas Magno/Agence France-Presse — Getty Images

With the demand for a vaccine so intense, there are escalating calls for “human-challenge trials” to speed the process: tests in which volunteers are injected with a potential vaccine and then deliberately exposed to the coronavirus.

Because the approach involves exposing participants to a potentially deadly disease, challenge trials are ethically fraught. But they could be faster than simply inoculating human subjects and waiting for them to be exposed along with everyone else, especially as the pandemic is brought under control in big countries.

Even when promising solutions are found, there are big challenges to scaling up production and distribution. Bill Gates, the Microsoft founder, whose foundation is spending \$250 million to help spur vaccine development, has warned about a critical shortage of a mundane but vital component: medical glass.

Without sufficient supplies of the glass, there will be [too few vials](#) to transport the billions of doses that will ultimately be needed.

The scale of the problem and the demand for a quick solution are bound to create tensions between the profit motives of the pharmaceutical industry, which typically fights hard to wring the most out of their investments in new drugs, and the public's need for quick action to get any effective vaccines to as many people as possible.

So far, much of the research and development has been supported by governments and foundations. And much remains to be worked out when it comes to patents and what national governments will claim in return for their support and pledges of quick regulatory approval.

Given the stakes, it is no surprise that while scientists and doctors talk about finding a “global vaccine,” national leaders emphasize immunizing their own populations first. Mr. Trump said he was personally in charge of [“Operation Warp Speed”](#) to get 300 million doses into American arms by January.

Already, the administration has identified 14 vaccine projects it intends to focus on, a senior administration official said, with the idea of further narrowing the group to a handful that could go on, with government financial help and accelerated regulatory review, to meet Mr. Trump's goal. The winnowing of the projects to 14 was [reported Friday](#) by NBC News.

But other countries are also signaling their [intention to nationalize their approaches](#). The most promising clinical trial in China is financed by the government. And in India, the chief executive of the Serum Institute of India — the world's largest producer of vaccine doses — said that most of its vaccine “would have to go to our countrymen before it goes abroad.”

George Q. Daley, the dean of Harvard Medical School, said thinking in country-by-country rather than global terms would be foolhardy since it “would involve squandering the early doses of vaccine on a large number of individuals at low risk, rather than covering as many high-risk individuals globally” — health care workers and older adults — “to stop the spread” around the world.

[Latest Updates: Coronavirus Outbreak in the U.S.](#)

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Given the proliferation of vaccine projects, the best outcome may be none of them emerging as a clear winner.

“Let's say we get one vaccine quickly but we can only get two million doses of it at the end of next year,” said Anita Zaidi, who directs the Bill and Melinda Gates Foundation's vaccine development program. “And another vaccine, just as effective, comes three months later but we can make a billion doses. Who won that race?”

The answer, she said, “is we will need many different vaccines to cross the finish line.”

Speed Versus Safety



Image
Dr. Maurice Hilleman holds the record for the quickest delivery of a vaccine from the lab to the clinic: four years. Credit...Associated Press

At 1 a.m. on March 21, 1963, a 5-year-old girl named Jeryl Lynn Hilleman woke up her father. She had come down with the mumps, which had made her miserable with a swollen jaw.

It just so happened that her father, Maurice, was a vaccine designer. So he told Jeryl Lynn to go back to bed, drove to his lab at Merck to pick up some equipment, and returned to swab her throat. Dr. Hilleman refrigerated her sample back at his lab and soon got to work weakening her viruses until they could serve as a mumps vaccine. In 1967, it was approved by the F.D.A.

To vaccine makers, this story is the stuff of legend. Dr. Hilleman still holds the record for the quickest delivery of a vaccine from the lab to the clinic. Vaccines typically take ten to fifteen years of research and testing. And only six percent of the projects that scientists launch reach the finish line.

For a world in the grips of Covid-19, on the other hand, this story is the stuff of nightmares. No one wants to wait four years for a vaccine, while millions die and economies remain paralyzed.

Some of the leading contenders for a coronavirus vaccine are now promising to have the first batches ready in record time, by the start of next year. They have accelerated their schedules by collapsing the standard vaccine timeline.

They are combining trials that used to be carried out one after the other. They are pushing their formulations into production, despite the risk that the trials will fail, leaving them with millions of useless doses.

But some experts want to do even more to speed up the conveyor belt. Writing last month in the journal *Vaccines*, the vaccine developer Dr. Stanley A. Plotkin and Dr. Arthur L. Caplan, a bioethicist at NYU Langone Medical Center, proposed infecting vaccinated volunteers with the coronavirus — the method known as challenge trials. The procedure might cut months or years off the development but would put test subjects at risk.

Challenge trials were used in the early days of vaccine research but now are [carried out under strict conditions](#) and only for illnesses, like flu and malaria, that have established treatments.

In [an article](#) in March in *The Journal of Infectious Diseases*, a team of researchers wrote, “Such an approach is not without risks, but every week that vaccine rollout is delayed will be accompanied by many thousands of deaths globally.”

Dr. Caplan said that limiting the trials to healthy young adults could reduce the risk, since they were less likely to suffer serious complications from Covid-19. “I think we can let people make the choice and I have no doubt many would,” he said.



Image

The manufacturing workshop at the Wuhan Institute of Biological Products in China. The U.S. and China have clashed over the origins of the coronavirus, dampening cooperation in developing a vaccine. Credit...China Stringer Network/Reuters

In Congress, Representative Bill Foster, Democrat of Illinois and a physicist, and Representative Donna E. Shalala, Democrat of Florida and the former secretary of the Department of Health and Human Services, organized a bipartisan group of 35 lawmakers to sign a letter asking regulators to approve such trials.

The organizers of a website set up to promote the idea, 1daysooner.org, say they have signed up more than 9,100 potential volunteers from 52 countries.

Some scientists caution that truly informed consent, even by willing volunteers, may not be possible. Even medical experts do not yet know all the effects of the virus. Those who have appeared to recover might still face future problems.

Even without challenge trials, accelerated testing may run the risk of missing potential side effects. A vaccine for dengue fever, and one for SARS that never reached the market, were abandoned after making some people more susceptible to severe forms of the diseases, not less.

"It will be extremely important to determine that does not happen," said Michel De Wilde, a former senior vice president of research and development at Sanofi Pasteur, a vaccine maker in France.

When it comes to the risks from flawed vaccines, China's history is instructive.

The Wuhan Institute of Biological Products was involved in a 2018 scandal in which ineffective vaccines for diphtheria, tetanus, whooping cough and other conditions were injected into hundreds of thousands of babies.

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The government confiscated the Wuhan institute's "illegal income," fined the company, and punished nine executives. But the company was allowed to continue to operate. It is now running a coronavirus vaccine project, and along with two other Chinese groups has been allowed to combine its safety and efficacy trials.

Several Chinese scientists questioned the decision, arguing that the vaccine should be shown to be safe before testing how well it works.

Nationalism Versus Globalism



Image

Elderly women waiting to see health workers in Mumbai. A powerful vaccine manufacturer in India has made it clear that any vaccine it produces would have to first go to India's 1.3 billion people, at least initially. Credit...Atul Loke for The New York Times

In the early days of the crisis, Harvard was approached by the Chinese billionaire Hui Ka Yan. He arranged to give roughly \$115 million to be split between Harvard Medical School and its affiliated hospitals and the Guangzhou Institute of Respiratory Diseases for a collaborative effort that would include developing coronavirus vaccines.

"We are not racing against each other, we are racing the virus," said Dr. Dan Barouch, the director of the Center for Virology and Vaccine Research at Beth Israel Deaconess Medical Center and a professor at Harvard Medical School who is also working with Johnson & Johnson. "What we need is a global vaccine — because an outbreak in one part of the world puts the rest of the world at risk."

That all-for-one sentiment has become a mantra among many researchers, but it is hardly universally shared.

In India, the Serum Institute — the heavyweight champion of vaccine manufacturing, producing 1.5 billion doses a year — has signed agreements in recent weeks with the developers of four promising potential vaccines. But in [an interview with Reuters](#), Adar Poonawalla, the company's billionaire chief executive, made it clear that "at least initially" any vaccine the company produces would have to go to India's 1.3 billion people.

The tension between those who believe a vaccine should go where it is needed most and those dealing with pressures to supply their own country first is one of the defining features of the global response.

The Trump administration, which in March put out feelers to a German biotech company to acquire its vaccine research or move it to American shores, has awarded grants of nearly half a billion dollars each to two U.S.-based companies, Johnson & Johnson and Moderna.

Johnson & Johnson, though based in New Jersey, conducts its research in the Netherlands.

Paul Stoffels, the company's vice chairman and chief scientific officer, said in an interview that the Department of Health and Human Services understood "we can't pick up our research and move it" to the United States. But it made sure that the company joined a partnership with Emergent BioSolutions — a Maryland biological production firm — to produce the first big batches of any approved vaccine for the United States.

"The political reality is that it would be very, very hard for any government to allow a vaccine made in their own country to be exported while there was a major problem at home," said Sandy Douglas, a researcher at the University of Oxford. "The only solution is to make a hell of a lot of vaccine in a lot of different places."

The [Oxford vaccine team](#) has already begun scaling up plans for manufacturing by half a dozen companies across the world, including China and India, plus two British manufacturers and the British-based multinational AstraZeneca.

In China, the government's instinct is to showcase the country's growth into a technological power capable of beating the United States. There are nine Chinese Covid-19 vaccines in development, involving 1,000 scientists and the Chinese military.

China's Center for Disease Control and Prevention predicted that one of the vaccines could be in "emergency use" by September, meaning that in the midst of the presidential election in the United States, Mr. Trump might see television footage of Chinese citizens lining up for injections.

"It's a scenario we have thought about," one member of Mr. Trump's coronavirus task force said. "No one wants to be around that day."

Traditional Versus New Methods



Image

Engineers working with monkey kidney cells at a Sinovac laboratory in Beijing. The company announced that its Covid-19 vaccine protected monkeys. Credit...Nicolas Asfour/Agence France-Presse — Getty Images

The more than 90 different vaccines under development work in radically different ways. Some are based on designs used for generations. Others use genetic-based strategies that are so new they have yet to lead to an approved vaccine.

"I think in this case it's very wise to have different platforms being tried out," Dr. De Wilde said.

The traditional approach is to make vaccines from viruses.

When our bodies encounter a new virus, they start learning how to make effective antibodies against it. But they are in a race against the virus as it multiplies. Sometimes they produce effective antibodies quickly enough to wipe out an infection. But sometimes the virus wins.

Vaccines give the immune system a head start. They teach it to make antibodies in advance of an infection.

The first vaccines, against diseases like rabies, were made from viruses. Scientists weakened the viruses so that they could no longer make people sick.

A number of groups are weakening the coronavirus to produce a vaccine against Covid-19. In April, the Chinese company Sinovac announced that their inactivated vaccine protected monkeys.

Another approach is based on the fact that our immune system makes antibodies that lock precisely onto viruses. As scientists came to understand this, it occurred to them that they didn't have to inject a whole virus into someone to trigger immunity. All they needed was to deliver the fragment of a viral protein that was the precise target.

Today these so-called subunit viral vaccines are used against hepatitis B and shingles. Many Covid-19 subunit vaccines are now in testing.

In the 1990s, researchers began working on vaccines that enlisted our own cells to help train the immune system. The foundation of these vaccines is typically a virus called an adenovirus. The adenovirus can infect our cells, but is altered so that it doesn't make us sick.

Scientists can add a gene to the adenovirus from the virus they want to fight, creating what's known as a viral vector. Some viral vectors then invade our cells, stimulating the immune system to make antibodies.

Researchers at the University of Oxford and the Chinese company CanSino Biologics have created a viral vector vaccine for Covid-19, and they've started safety trials on volunteers. Others including Johnson & Johnson are going to launch trials of their own in the coming months.

Some groups, including the American company Inovio Pharmaceuticals, are taking a totally different approach. Instead of injecting viruses or protein fragments, they're injecting pure DNA, which is read by the cell's machinery, making a copy as an RNA molecule. The RNA is then read by the cell's protein-building factories, making a viral protein. The protein in turn comes out of the cell, where immune cells bump into it and make an antibody to it.

Other teams are creating RNA molecules rather than DNA. Moderna and a group at Imperial College London have launched safety trials for RNA vaccines. While experimental, these genetic vaccines can be quickly designed and tested.

Designing Versus Manufacturing

It is one thing to design a vaccine in record time. It is an entirely different challenge to manufacture and distribute one on a scale never before attempted — billions of doses, specially packaged and transported at below-zero temperatures, to nearly every corner of the world.

“If you want to give a vaccine to a billion people, it better be very safe and very effective,” said Dr. Stoffels of Johnson & Johnson. “But you also need to know how to make it in amounts we’ve never really seen before.”

So the race is on to get ahead of the enormous logistical issues, from basic manufacturing capacity to the shortages of medical glass and stoppers that Mr. Gates and others have warned of.

Researchers at Johnson & Johnson are trying to make a five-dose vial to save precious glass, which might work if a smaller dose is enough for inoculation.

Each potential vaccine will require its own customized production process in special “clean” facilities for drug making. Building from scratch might cost tens of millions of dollars per plant. Equipping one existing facility could easily cost from \$5 million to \$20 million. Ordering and installing the necessary equipment can take months.

Governments as well as organizations like the Gates Foundation and the nonprofit Coalition for Epidemic Preparedness Innovations are putting up money for production facilities well before any particular vaccine is proven effective.

What’s more, some vaccines — including those being tested by the American companies Moderna and Inovio — rely on technology that has never before yielded a drug that was licensed for use or mass-produced.

But even traditional processes face challenges.

Because of staff illnesses and social distancing, the pandemic this spring slashed productivity by 20 percent at the Millipore Sigma facility in Danvers, Mass., that supplies many drug makers with the equipment used for brewing vaccines.

Then, about three weeks ago, the first clinical trials for new proposed vaccines started. Urgent calls poured from customers around the world. Even before the first phase of the first trials, manufacturers were scrambling.

“Demand went through the roof, and everybody wanted it yesterday,” said Udit Batra, MilliporeSigma’s chief executive, who has expanded production and asked other customers to accept delays to avoid becoming a bottleneck.

Treatments Versus Vaccines



Image

Doctors treating a patient infected with Covid-19 in the intensive care unit of the Brooklyn Hospital Center. Some experts are more optimistic about new treatments for sick patients than potential vaccines. Credit...Victor J. Blue for The New York Times

Even as the world waits for a vaccine, a potential treatment for coronavirus is already here — and more could be on the way.

On Friday, [the Food and Drug Administration granted emergency authorization](#) for the use of remdesivir as a treatment of severely ill patients.

Remdesivir showed modest success in a federally funded clinical trial, slowing the progression of the disease, but without significantly reducing fatality rates.

The F.D.A.'s decision to allow its use comes as hundreds of other drugs — mainly existing medicines that are being used for other conditions — are being tested around the world to see if they hold promise. The F.D.A. said there are currently [72 therapies](#) in trial.

Studies of drugs tend to move more quickly than vaccine trials. Vaccines are given to millions of people who are not yet ill, so they must be extremely safe. But in sicker people, that calculus changes, and side effects might be an acceptable risk.

As a result, clinical trials can be conducted with fewer people. And because drugs are tested in people who are already sick, results can be seen more quickly than in vaccine trials, where researchers must wait to see who gets infected.

Public health experts have cautioned there will likely be no magic pill. Rather, they are hoping for incremental advances that make Covid-19 less deadly.

“Almost nothing is 100 percent, especially when you are dealing with a virus that really creates a lot of havoc in the body,” said Dr. Luciana Borio, a former director of medical and biodefense preparedness for the National Security Council under President Trump.

Antiviral drugs like remdesivir battle the virus itself, slowing its replication in the body.

The malaria drug hydroxychloroquine — which has been [enthusiastically promoted](#) by Mr. Trump and also received emergency authorization to be used in coronavirus patients — showed early promise in the laboratory. However, small, limited studies in humans [have so far been disappointing](#).

So have some H.I.V. treatments, including a two-drug cocktail sold as Kaletra, [which failed in a Chinese trial](#).

Daniel O'Day, the chief executive of Gilead Sciences, the manufacturer of remdesivir, in the Oval Office on Friday. Credit: Erin Schaff/The New York Times

Other researchers have focused on identifying immunosuppressant drugs that address the most severe form of Covid-19, [when the body's immune system goes into overdrive](#), attacking the lungs and other organs.

Many in the medical community are closely watching the development of antibody drugs that could act to neutralize the virus, either once someone is already sick or as a way of blocking the infection in the first place.

Several hospitals [are also administering plasma from recovered patients](#) to people who are sick with Covid-19, in the hopes that the antibodies of survivors will give the patients a boost.

Dr. Scott Gottlieb, a former F.D.A. commissioner, and others said that by the fall, the treatment picture for Covid-19 could look more hopeful.

If proven effective in further trials, remdesivir may become more widely used. One or two antibody treatments may also become available, providing limited protection to health care workers.

Even without a vaccine, Dr. Borio said, a handful of early treatments could make a difference. “If you can protect people that are vulnerable and you can treat people that come down with the disease effectively,” she said, “then I think it will change the trajectory of this pandemic.”

David E. Sanger reported from Washington, David D. Kirkpatrick from London, Carl Zimmer and Katie Thomas from New York and Sui-Lee Wee from Singapore. Denise Grady and Maggie Haberman contributed reporting.

[A New Front for Nationalism: The Global Battle Against a Virus](#)

[April 10, 2020](#)

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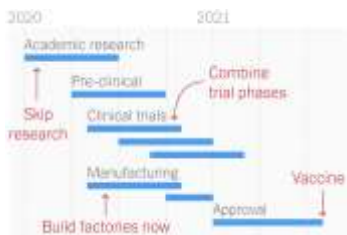
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A version of this article appears in print on May 3, 2020, Section A, Page 1 of the New York edition with the headline: Profits and Pride at Stake, Race to Vaccine Intensifies. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)

The Coronavirus Outbreak

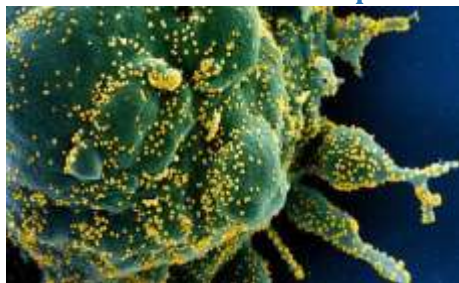
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<https://www.nytimes.com/2020/05/02/us/politics/vaccines-coronavirus-research.html>

T cells found in COVID-19 patients 'bode well' for long-term immunity



Immune hunters called T cells can seek and destroy a cell (green) infected with and making copies of SARS-CoV-2 (yellow).

NIAID

T cells found in COVID-19 patients 'bode well' for long-term immunity

By [Mitch Leslie](#) May. 14, 2020 , 9:00 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

Immune warriors known as T cells help us fight some viruses, but their importance for battling SARS-CoV-2, the virus that causes COVID-19, has been unclear. Now, two studies reveal that infected people harbor T cells that target the virus—and may help them recover. Both studies also found that some people never infected with SARS-CoV-2 have these cellular defenses, most likely because they were previously infected with other coronaviruses.

"This is encouraging data," says virologist Angela Rasmussen of Columbia University. Although the studies don't clarify whether people who clear a SARS-CoV-2 infection can ward off the virus in the future, both identified strong T cell responses to it, which "bodes well for the development of long-term protective immunity," Rasmussen says. The findings could also help researchers create better vaccines.

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The more than 100 COVID-19 vaccines in development mainly focus on another immune response: antibodies. These proteins are made by B cells and ideally latch onto SARS-CoV-2 and prevent it from entering cells. T cells, in contrast, thwart infections in two different ways. Helper T cells spur B cells and other immune defenders into action, whereas killer T cells target and destroy infected cells. The severity of disease can depend on the strength of these T cell responses.

Using bioinformatics tools, a team led by Shane Crotty and Alessandro Sette, immunologists at the La Jolla Institute for Immunology, predicted which viral protein pieces would provoke the most powerful T cell responses. They then exposed immune cells from 10 patients who had recovered from mild cases of COVID-19 to these viral snippets.

[All of the patients carried helper T cells that recognized the SARS-CoV-2 spike protein](#), which enables the virus to infiltrate our cells. They also harbored helper T cells that react to other SARS-CoV-2 proteins. And the team detected virus-specific killer T cells in 70% of the subjects, they report today in *Cell*. "The immune system sees this virus and mounts an effective immune response," Sette says.

The results jibe with those of a study posted as a preprint on medRxiv on 22 April by immunologist Andreas Thiel of the Charité University Hospital in Berlin and colleagues. They [identified helper T cells targeting the spike protein in 15 out of 18 patients](#) hospitalized with COVID-19.

The teams also asked whether people who haven't been infected with SARS-CoV-2 also produce cells that combat it. Thiel and colleagues analyzed blood from 68 uninfected people and found that 34% hosted helper T cells that recognized SARS-CoV-2. The La Jolla team detected this crossreactivity in about half of stored blood samples collected between 2015 and 2018, well before the current pandemic began. The researchers think these cells were likely triggered by past infection with one of the four human coronaviruses that cause colds; proteins in these viruses resemble those of SARS-CoV-2.

The results suggest "one reason that a large chunk of the population may be able to deal with the virus is that we may have some small residual immunity from our exposure to common cold viruses," says viral immunologist Steven Varga of the University of Iowa. However, neither of the studies attempted to establish that people with crossreactivity don't become as ill from COVID-19.

Before these studies, researchers didn't know whether T cells played a role in eliminating SARS-CoV-2, or even whether they could provoke a dangerous immune system overreaction. "These papers are really helpful because they start to define the T cell component of the immune response," Rasmussen says. But she and other scientists caution that the results do not mean that people who have recovered from COVID-19 are protected from reinfection.

To spark production of antibodies, vaccines against the virus need to stimulate helper T cells, Crotty notes. “It is encouraging that we are seeing good helper T cell responses against SARS-CoV-2 in COVID-19 cases,” he says. The results have other significant implications for vaccine design, says molecular virologist Rachel Graham of the University of North Carolina, Chapel Hill. Most vaccines under development aim to elicit an immune response against spike, but both studies determined that T cells reacted to several viral proteins, suggesting that vaccines that sic the immune system on these proteins as well could be more effective. “It is important to not just concentrate on one protein,” Graham says.

<https://www.sciencemag.org/news/2020/05/t-cells-found-covid-19-patients-bode-well-long-term-immunity#>

A human monoclonal antibody blocking SARS-CoV-2 infection

[Chunyan Wang](#), [Wentao Li](#), [Dubravka Drabek](#), [Nisreen M. A. Okba](#), [Rien van Haperen](#), [Albert D. M. E. Osterhaus](#), [Frank J. M. van Kuppeveld](#), [Bart L. Haagmans](#), [Frank Grosveld](#) & [Berend-Jan Bosch](#)

Nature Communications volume 11, Article number: 2251 (2020) [Cite this article](#)

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Abstract

The emergence of the novel human coronavirus SARS-CoV-2 in Wuhan, China has caused a worldwide epidemic of respiratory disease (COVID-19). Vaccines and targeted therapeutics for treatment of this disease are currently lacking. Here we report a human monoclonal antibody that neutralizes SARS-CoV-2 (and SARS-CoV) in cell culture. This cross-neutralizing antibody targets a communal epitope on these viruses and may offer potential for prevention and treatment of COVID-19.

<https://www.nature.com/articles/s41467-020-16256-y>

(xiii) SARS-CoV-2 source - Wuhan, derived from Pangolins in Wet Markets? Debated.

Pangolin Coronavirus Analysis Finds High Similarity to SARS-CoV-2

May 08, 2020



Credit: Wikimedia commons

NEW YORK – Researchers have isolated a coronavirus from Malayan pangolins that is highly similar to SARS-CoV-2, suggesting pangolins may have served as an intermediate host for the virus.

While bats are thought to be the reservoir for a number of coronaviruses, and SARS-CoV-2 has high sequence similarity to the bat coronavirus RaTG13, it's unknown whether SARS-CoV-2 has other hosts, such as pangolins.

A team led by researchers at South China Agricultural University searched for SARS-CoV-2-like viruses in Malayan pangolins (*Manis javanica*) that were confiscated by customs officials in March and August of 2019. A pangolin virus they isolated shared a high amino acid identity with SARS-CoV-2, including at the receptor-binding domain of the S protein. As the scientists [reported in Nature this week](#), about two-thirds of the Malayan pangolins they analyzed carried the pangolin SARS-CoV-2-like virus and displayed signs of infection.

"The isolation of a coronavirus that is highly related to SARS-CoV-2 in pangolins suggests that they have the potential to act as the intermediate host of SARS-CoV-2," SCAU's Yongyi Shen and colleagues wrote in their paper.

For their study, the researchers obtained lung tissue samples from four Chinese pangolins (*M. pentadactyla*) and 25 Malayan pangolins and analyzed them for SARS-related coronaviruses using an RT-PCR-based assay. They recovered virus from 17 of the 25 Malayan pangolins, but none of the Chinese pangolins.

All of the infected Malayan pangolins, the researchers noted, were from the same seized transport, and all showed signs of respiratory disease. Histological examinations of infected animals uncovered diffuse alveolar damage in the lungs. Of the 17 animals that tested positive, 14 died within a month and a half.

The researchers then isolated a coronavirus from the lung tissue of a pangolin that died, and RT-PCR analysis targeting the spike and RdRp genes showed an 84.5 percent and 92.2 percent nucleotide sequence identity to the SARS-CoV-2 versions, respectively.

After assembling the genome of the coronavirus they isolated from the pangolin, dubbed Pangolin-CoV, they made additional comparisons to SARS-CoV-2. At the amino acid level, they noted that the S, E, M, and N Pangolin-CoV genes shared 90.7, 100, 98.6, and 97.8 percent identity with SARS-CoV-2.

At the whole-genome level, meanwhile, it shared 80 and 98 percent sequence identity with SARS-CoV-2 and Bat SARSr-CoV RaTG13 genomes, respectively, except for the S gene.

The S gene instead exhibited signs of recombination: at the first 914 nucleotides, it was more similar to Bat SARSr-CoV ZXC21 and Bat SARSr-CoV ZC45, but the rest of the Pangolin-CoV S gene was more similar to SARS-CoV-2 and Bat-CoV-RaTG13. In particular, the receptor-binding domain of the S protein of Pangolin-CoV differed from that of SARS-CoV-2 by one amino acid.

This suggests that SARS-CoV-2 might have originated through the recombination of a Pangolin-CoV-like virus with a Bat-CoV-RaTG13-like virus, the researchers said, a theory that is bolstered by additional analyses of the evolutionary relationships between the viruses.

These findings are in line with previous studies that also reported similarities between [pangolin coronaviruses and SARS-CoV-2](#), especially in the receptor-binding domain, and additionally suggested that it may be [the result of a recombination event](#) between pangolin and bat coronaviruses.

Similar to one of the previous studies, the South China Agricultural University team suggested that pangolins may have been an intermediate host for SARS-CoV-2, while bats served as the native host. Further studies, they added, are needed to confirm the role of pangolins.

"Therefore, more systematic and long-term monitoring of SARSr-CoV in pangolins and other related animals should be implemented to identify the potential animal source of SARS-CoV-2 in the current outbreak," the researchers wrote.

<https://www.genomeweb.com/sequencing/pangolin-coronavirus-analysis-finds-high-similarity-sars-cov-2#.Xr4cxzl7nX5>

Pangolin Coronavirus Study Finds No Evidence of Direct Evolution to SARS-CoV-2

May 14, 2020

NEW YORK – A new analysis of Malayan pangolins by researchers in the US and China has found no evidence that the SARS-CoV-2 virus evolved directly from a pangolin coronavirus (pangolin-CoV-2020), seemingly contradicting a study published last week in *Nature*, which suggested pangolins may have served as an intermediate host for SARS-CoV-2.

In [the *Nature* study published last week](#), a team led by researchers at South China Agricultural University searched for SARS-CoV-2-like viruses in the lung tissue of 25 Malayan pangolins (*Manis javanica*) that were confiscated by customs officials in March and August of 2019, as well as from four Chinese pangolins (*M. pentadactyla*). The investigators said they isolated a pangolin virus in 17 of the Malayan pangolins that shared a high amino acid identity with SARS-CoV-2, including at the receptor-binding domain of the S protein.

"The isolation of a coronavirus that is highly related to SARS-CoV-2 in pangolins suggests that they have the potential to act as the intermediate host of SARS-CoV-2," SCAU's Yongyi Shen and colleagues wrote in their paper.

Now, however, another team of researchers said it has come to a different conclusion based on its own results. In [a study published in *PLOS Pathogens* on Thursday](#), a team led by Jinping Chen of the Guangdong Institute of Applied Biological Resources assembled the complete genome of a coronavirus identified in three sick Malayan pangolins. But while the molecular and phylogenetic analyses showed that pangolin-CoV-2020 is genetically related to SARS-CoV-2, as well as a group of bat coronaviruses, the data did not support the theory that SARS-CoV-2 emerged directly from pangolin-CoV-2020, the researchers said.

Authors of the *Nature* study did not respond to a request for comment on the diverging results.

For the *PLOS Pathogens* study, the researchers conducted metagenomic sequencing and *de novo* viral genome assembly on samples from the three Malayan pangolins, recovering 38 contigs ranging from 380 to 3,377 nucleotides. The sequence identity among the contigs from the three samples was 99.54 percent. They then pooled sequences from the three samples and assembled the draft genome of the pangolin coronavirus, after which they conducted gap filling with amplicon sequencing to obtain a nearly full genome sequence. This pangolin-CoV-2020 genome was found to have 29,521 nucleotides.

Importantly, the researchers said, genomic analyses suggested that pangolin-CoV-2020 had high identity with both SARS-CoV-2 and Bat-CoV-RaTG13, which is the proposed origin of SARS-CoV-2 in bats. The nucleotide sequence identity was 90.32 percent between pangolin-CoV-2020 and SARS-CoV-2 and 90.24 percent between pangolin-CoV-2020 and BatCoV-RaTG13, but the sequence identity for the corresponding regions between SARS-CoV-2 and Bat-CoV-RaTG13 was 96.18 percent.

Further analyses found that pangolin-CoV-2020 and SARS-CoV-2 shared the same angiotensin-converting enzyme 2 (ACE2) receptor. However, the researchers also found that sequence similarities were not homogeneous across the S genes of pangolin-CoV-2020, SARS-CoV-2, Bat-CoV-ZXC21, and Bat-CoV-ZC45, which suggested that a recombination event could have occurred during the evolution of these coronaviruses.

"At the genomic level, SARS-CoV-2 was also genetically closer to Bat-CoV-RaTG13 than pangolin-CoV-2020," the authors wrote. "Phylogenetic analyses and a special amino acid sequence in the S gene of SARS-CoV-2 did not support the hypothesis of SARS-CoV-2 arising directly from the pangolin-CoV-2020."

The researchers noted that although their study didn't support the hypothesis that pangolins are the intermediate hosts for the emergence of SARS-CoV-2, their results don't exclude the possibility that other coronaviruses could be circulating in pangolins. Therefore, they added, surveillance of coronaviruses in pangolins could elucidate the spectrum of coronaviruses in the wild and minimize the exposures of humans to these viruses.

https://www.genomeweb.com/infectious-disease/pangolin-coronavirus-study-finds-no-evidence-direct-evolution-sars-cov-2?utm_source=Sailthru&utm_medium=email&utm_campaign=GWDN%20Thurs%20PM%202020-05-14&utm_term=GW%20Daily%20News%20Bulletin#.Xr4bUTl7nX4

Coronavirus: Pangolins found to carry related strains

By Helen Briggs



[3 weeks ago](#)

Coronavirus: Pangolins found to carry related strains

By Helen Briggs BBC News

26 March 2020

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[#BBC](#) [#Nature](#) [#Covid19](#) [#Zoonoses](#) [#Pangolins?](#) [#HorseshoeCrabs?](#) [#Trafficking](#) 'Smuggled pangolins have been found to carry viruses closely related to the one sweeping the world. Scientists say the sale of the animals in wildlife markets should be strictly prohibited to minimise the risk of future outbreaks. Pangolins are the most-commonly illegally trafficked mammal, used both as food and in traditional medicine. In research published in the journal Nature, researchers say handling these animals requires "caution". "Although their role as the intermediate host of the SARS-CoV-2 outbreak remains to be confirmed, sale of these wild animals in wet markets should be strictly prohibited to avoid future zoonotic [animal to human] transmission," he told BBC News. Exactly how the virus jumped from a wild animal, presumably a bat, to another animal and then humans remains a mystery. The horseshoe bat and the pangolin have both been implicated, but the precise sequence of events is unknown. Finding the virus in smuggled Malayan pangolins raised the question of where they contracted the virus, said Dr Lam. Was it from bats along the trafficking route to China or in their native habitats in Southeast Asia?'

<https://www.bbc.com/news/science-environment-52048195>

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[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

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The first case of SARS-CoV-2 didn't emerge from a Wuhan wet market, according to experts at the Wuhan Institute of Virology (WIV).

Instead, the live animal market may have been the site of a superspreader event, where one person spread the virus to many other people..

..early cases of the outbreak in Wuhan were tied to the Huanan Seafood Wholesale Market. Later, researchers took environmental samples that suggested the virus had landed on surfaces in the market. But in the period since, tissue samples from the market's animals have revealed no trace of the virus. For the virus to jump from animals to humans, the animals have to actually be carrying [it](#). One reason this idea has gained such traction is that it dovetails with conservation efforts. Many wet markets sell exotic, endangered and highly trafficked animals such as pangolins. And it would be a victory for animal conservation, he said, if markets like this one were shut down after being blamed for the disease. But that doesn't mean that the evidence is there.'

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[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

The coronavirus didn't really start at that Wuhan 'wet market'

By [Rafi Letzter - Staff Writer](#) a day ago

Early reports blamed a market where live animals were sold, but evidence now shows they were wrong.

[Comments \(1\)](#)



In a Jan. 24 image, a police officer stood guard outside of Huanan Seafood Wholesale Market, where some reports suggested the pandemic began.

(Image: © HECTOR RETAMAL/AFP via Getty Images)

The first case of SARS-CoV-2 didn't emerge from a Wuhan wet market, according to experts at the Wuhan Institute of Virology (WIV).

Instead, the live animal market may have been the site of a superspreader event, where one person spread the virus to many other people, one US-based expert told Live Science.

Since the early days of the coronavirus [pandemic](#), reports have suggested that SARS-CoV-2 (the virus that causes COVID-19) jumped from animals to humans in [Wuhan's Huanan Seafood Wholesale Market](#). Now, experts at the WIV have said publicly that the theory was wrong, and that the virus must have originated elsewhere, according to [a Wall Street Journal report](#).

"I haven't seen anything that makes me feel, as a researcher who studies [zoonotic disease](#), that this market is a likely option," said Colin Carlson, a professor at Georgetown University who studies the spread of such zoonotic viruses, which transmit between animals and humans. Carlson does not work for the WIV.

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The theory was plausible, he said. For a virus to jump from animals to humans, the animal host needs to come into contact with humans somewhere. And viruses often jump from one animal to another before breaking into the human population. In fact, the genome of SARS-CoV-2 is most closely related to coronaviruses isolated from horseshoe bats in China. From there, scientists suspect the virus may have jumped to another animal and then hopped to humans. Wet markets, where lots of different species of live animals are clustered, and lots of humans come into contact with them, offer opportunities for that sort of transmission. And the outbreak of another coronavirus, dubbed SARS, began at a similar market in 2002, after that virus spread from bats to civets.

A number of [early cases of the outbreak](#) in Wuhan were tied to the Huanan Seafood Wholesale Market. Later, researchers took environmental samples that suggested the virus had landed on surfaces in the market. But in the period since, tissue samples from the market's animals have revealed no trace of the virus. For the virus to jump from animals to humans, the animals have to actually be carrying it.

"None of the animals tested positive. So since January, this has not actually been particularly conclusive. But this has developed into a narrative," he said.

Carlson said his colleagues in China have been careful and precise in their work, publishing data according to international regulations that any scientist anywhere in the world can examine, and that strongly supports the conclusion that the Huanan Seafood Wholesale Market wasn't the source of the virus.

One reason this idea has gained such traction is that it dovetails with conservation efforts. Many wet markets sell exotic, endangered and highly trafficked animals such as pangolins. And it would be a victory for animal conservation, he said, if markets like this one were shut down after being blamed for the disease. But that doesn't mean that the evidence is there.

"This is an animal-origin virus that made the leap, maybe from bats to humans, maybe through... another animal, maybe through livestock. And we don't have the data yet to know where or how," he said. "That takes time. The study that really definitively showed the bats that SARS came from was published in 2017," roughly 15 years after the outbreak first occurred.

"It took that long to go through caves, to go through samples, and build an evidence base where we could confidently say: 'This was the sort of bat, in this cave, at this time,'" Carlson said.

So when will we know for sure where SARS-CoV-2 came from? Ruling out one site took a few months. Finding the definitive origin site will likely take much longer, he said.

- [The 12 deadliest viruses on Earth](#)
- [20 of the worst epidemics and pandemics in history](#)
- [13 Coronavirus myths busted by science](#)

Originally published on [Live Science](#).

https://www.livescience.com/covid-19-did-not-start-at-wuhan-wet-market.html?utm_source=Selligent&utm_medium=email&utm_campaign=18567&utm_content=20200528CoronavirusInfographic&utm_term=4003045&

Coronavirus: Exploiting nature 'drives outbreaks of new diseases'

By Helen Briggs

[#ZoonosisAndReverse](#) [#HabitatLoss](#) [#ArcticPermafrostThaw](#) [#CrossSpeciesContact](#) [#WetMarkets](#)
[#NewPandemics](#)

"New evidence has emerged of a link between human exploitation of nature & pandemics. Coronavirus is thought to have originated in bats, w/ other wild animals, possibly pangolins, playing a role in transmission to humans. There are strong indications of a wildlife source and a link to trade.

..researchers trawled scientific papers for reports of diseases that have crossed from animals to humans, then combined this data with information on extinction risk compiled by the International Union for the Conservation of Nature (IUCN).

Wild animals at risk of extinction due to human exploitation were found to carry over twice as many viruses that can cause human disease as threatened species listed for other reasons. The same was true for threatened species at risk due to loss of habitat.

"As natural habitat is diminished, wildlife come into closer contact with people," Dr Christine Johnson of UC,Davis, US,.

"Wildlife also shift their distributions to accommodate anthropogenic activities and modification of the natural landscape. This has hastened disease emergence from wildlife, which put us at risk of pandemics because we are all globally connected through travel and trade."

<https://www.bbc.com/news/science-environment-52204724>

#COVID19 Journal Club: "Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence"

[microbe.net • 2 min read](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[17m • Edited •](#)

[#COVID19](#) [#SARSCoV2](#) [#Plus30OtherViruses](#) [#VeroCellLethality](#) [#By30OtherVirions](#) [#NotSARSCoV2](#)'..air sampling in a clinic and saw that the sample was positive for SARS-CoV-2..culturing to look for live virus and found positive culturing results in Vero cells..virus that was actually killing the Vero cells... and it wasn't SARS-CoV-2..actually three other respiratory viruses. This worries ..having false positive culturing results. Should we be confirming that the positive culturing results are actually due to SARS-CoV-2? Abstract below (see comment):

[https://commons.wikimedia.org/wiki/File:Princess Alexandra Hospital patient%27s room.jpg](https://commons.wikimedia.org/wiki/File:Princess_Alexandra_Hospital_patient%27s_room.jpg)

This article ("Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence") caught my attention initially because of the air sampling aspect, but upon reading the Abstract I was struck by something else. Here they did air sampling in a clinic

and saw that the sample was positive for SARS-CoV-2. Very standard stuff. Then they moved onto culturing to look for live virus and found positive culturing results in Vero cells. Also pretty standard. But they then looked at the virus that was actually killing the Vero cells... and it wasn't SARS-CoV-2. It was actually three other respiratory viruses. This worries me quite a bit in the context of then having false positive culturing results. Should we be confirming that the positive culturing results are actually due to SARS-CoV-2? Abstract below:

The progression of COVID-19 worldwide can be tracked by identifying mutations within the genomic sequence of SARS-CoV-2 that occur as a function of time. Such efforts currently rely on sequencing the genome of SARS-CoV-2 in patient specimens (direct sequencing) or of virus isolated from patient specimens in cell cultures. A pilot SARS-CoV-2 air sampling study conducted at a clinic within a university student health care center detected the virus vRNA, with an estimated concentration of 0.87 virus genomes L⁻¹ air. To determine whether the virus detected was viable ('live'), attempts were made to isolate the virus in cell cultures. Virus-induced cytopathic effects (CPE) were observed within two days post-inoculation of Vero E6 cells with collection media from air samples; however, rtRT-PCR tests for SARS-CoV-2 vRNA from cell culture were negative. Instead, three other fast-growing human respiratory viruses were isolated and subsequently identified, illustrating the challenge in isolating SARS-CoV-2 when multiple viruses are present in a test sample. The complete SAR-CoV-2 genomic sequence was nevertheless determined by Sanger sequencing and most closely resembles SARS-CoV-2 genomes previously described in Georgia, USA. Results of this study illustrate the feasibility of tracking progression of the COVID-19 pandemic using environmental aerosol samples instead of human specimens. Collection of a positive sample from a distance more than 2 m away from the nearest patient traffic implies the virus was in an aerosol.

Like this:

2 thoughts on “#COVID19 Journal Club: “Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence””

3. **Michael Siwicki** says:

May 29, 2020 at 1:25 pm

Good catch David.....QA/QC!

All too often, some only read the abstract and perhaps the conclusions section and pay no attention to materials and methods. Come to think of it....I seem to remember that we had this conversation once before.....quite some time ago.

Reply

4. **Michael Siwicki** says:

May 29, 2020 at 1:28 pm

Editorial correction: “Conclusions” section

Word programs make assumptions too quickly and I often miss their changes before posting.

[#COVID19 Journal Club: "Collection of SARS-CoV-2 Virus from the Air of a Clinic within a University Student Health Care Center and Analyses of the Viral Genomic Sequence"](#)

[microbe.net • 2 min read](#)

(xiv) SARS-CoV-2 transmission: Zoonoses - Animals (Pets) to Humans (unknown) but Reverse Zoonoses - Humans to Animals (Pets) – confirmed as likely

#COVID19 Journal club “Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2”

Not a pre-print this time but a (presumably) [peer-reviewed article](#) about the susceptibility of domesticated animals to SARS-CoV-2. The authors looked at dogs, cats, ferrets, pigs, ducks, and chickens. Basically the virus can infect ferrets and cats pretty well and that with cats, they can potentially get the virus from other cats. Not clear yet what this will all mean for transmission risk in humans but certainly of great interest. Abstract below:

<http://microbe.net/2020/04/08/covid19-journal-club-susceptibility-of-ferrets-cats-dogs-and-other-domesticated-animals-to-sars-coronavirus-2/>

Xinhua News Agency/Shutterstock)

Dogs caught coronavirus from their owners

The first two dogs reported to have coronavirus probably caught it from their owners. Researchers found that the genetic sequences of the virus were almost identical between the animals and members of the infected households in Hong Kong. The direct genomic link strongly supports the idea that the infection had been passed from the owners to the dogs. Neither dog got sick, and there's no evidence that dogs can pass the virus to each other or back to humans. (Nature | 4 min read)

Reference: *Nature* paper

https://www.nature.com/articles/d41586-020-01430-5?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

Tiger at US zoo tests positive for coronavirus

bbc.com

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19 #ReverseZoonosis #RareCaseHumanToAnimal #BronxZoo #MalayanTigerPositiveForVirus!](#)

'A four-year-old female Malayan tiger at the Bronx Zoo has tested positive for the coronavirus. The tiger, named Nadia, is believed to be the first known case of an animal infected with Covid-19 in the US. The Bronx Zoo, in New York City, says the test result was confirmed by the National Veterinary Services Laboratory in Iowa.

Nadia, along with six other big cats, is thought to have been infected by an asymptomatic zoo keeper.

The cats started showing symptoms, including a dry cough, late last month after exposure to the employee, who has not been identified.

"This is the first time that any of us know of anywhere in the world that a person infected the animal and the animal got sick," Paul Calle, the chief veterinarian at the zoo, told Reuters news agency on Sunday.

There have been isolated instances of pets testing positive for the coronavirus elsewhere in the world, but experts have stressed there is no evidence they can become sick or spread the disease.

Mr Calle said he intends to share the findings with other zoos and institutions researching the transmission of Covid-19.'



<https://www.bbc.com/news/world-us-canada-52177586>

Lions nap on road during South African lockdown

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[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19](#) [#SouthAfrican](#) [#WildLife](#) "...animals were going to notice that the humans had disappeared and in South Africa's Kruger National Park lions have been taking advantage.

"Lions are used to people in vehicles," he explained. "All animals have much more of an instinctive fear of people on foot, so if I had walked up they would never have allowed me to get so close."

As a ranger in one of Africa's largest game reserves, Mr Sowry performs an essential service..What rangers do not want, however, is for lions to start thinking that roads are a safe place just because they are now so still..seen lions as well as wild dogs venturing on to a golf course in the park but otherwise..the lockdown has had any major effect on the animals' behaviour yet.

"Kruger is a very wild place," he says. "It has been wild and it is still wild."

"These are difficult times for everyone and the intention was to bring people joy," he says.

To date, SA has rec. 34 deaths of people with Covid-19 and registered 2,506 cases of infection..most affected country in Africa.

But why..would lions prefer tarmac to the softness of grass?

Probably for the simple reason that it had been raining on Tuesday night and, as Mr Phaala explained, "The tar was drier than the grass at the time - big cats and water don't mix."



[Lions nap on road during South African lockdown](#)

[bbc.com](#)

<https://www.bbc.com/news/world-africa-52314282>

Coronavirus: Great apes on lockdown over threat of disease

By Helen Briggs BBC Environment correspondent

10 April 2020



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[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19 #ReverseZoonosesThreat #TakenSeriously #Conservation #GreatApesGreatLockdown](#)

'Great apes have been put on lockdown against the threat of coronavirus.

Gorilla tourism in Africa has been suspended, while sanctuaries for other apes, such as orangutans, have closed to the public.

It's not known if great apes can contract the virus, but there are growing fears that our closest living relatives might be equally at risk.

This week a tiger at Bronx Zoo tested positive for coronavirus.

New measures have been put in place to protect big cats and their caregivers.

Dr Kirsten Gilardi is chief veterinary officer for Gorilla Doctors, which provides veterinary care to gorillas in the forests of Rwanda, Uganda and the Democratic Republic of Congo.

"We don't know if it's infected mountain gorillas; we have not seen any evidence of that," she said. "But because mountain gorillas are susceptible to human pathogens, we know that they can develop respiratory illness."

Image copyright Gorilla Doctors Mountain gorillas (*Gorilla beringei beringei*) are an endangered species of great ape found only in the forests of Rwanda, Uganda and the DR Congo. All three countries have seen human cases of coronavirus, with gorilla tourism currently suspended.'

<https://www.bbc.com/news/science-environment-52236493>

**(xv) Therapeutic or preemptive prospects from lab bench to clinical trials to hospital
bedsides (Town Hall discussion)**

BioTechniques journal:

<file:///C:/Users/owner/Downloads/COVID-19%20eBook.pdf>



<file:///C:/Users/owner/Downloads/COVID-19%20eBook.pdf>

As the number of confirmed cases of COVID-19 surges past 2.2 million globally and deaths surpass 150,000, clinicians and pathologists are struggling to understand the damage wrought by the coronavirus as it tears through the body. They are realizing that although the lungs are ground zero, its reach can extend to many organs including the heart and blood vessels, kidneys, gut, and brain.

<https://www.sciencemag.org/news/2020/04/how-does-coronavirus-kill-clinicians-trace-ferocious-rampage-through-body-brain-toes>

My conservative bet in an Existential Crisis. Play it safe with the imperfect known while allowing development of someone hitting a Home Run in the unknown - albeit with an educated guess! The combination, contact tracing, social distancing, testing and some sort of drug/vaccine combination eg remdesivir or Moderna's mRNA - 1273 and monoclonal Ab to SARS-CoV-2 Spike proteins.

Moderna's coronavirus vaccine shows promise in early results

By [Yasemin Saplakoglu - Staff Writer](#) a day ago

The vaccine seems safe and able to prompt the body to produce antibodies against the coronavirus at levels comparable to a natural infection.

Two weeks after the first group of 15 participants received their second dose of 25 µg of the vaccine, the level of antibodies in their blood was comparable to the level found in blood samples taken from people who had recovered from COVID-19. Those who received two 100 µg doses had levels that exceeded those found in blood samples from COVID-19 patients. Samples for the other participants aren't yet available, according to the statement.

But this data just refers to the levels of "binding" antibody, or antibodies that can bind to the coronavirus but don't necessarily attack it. But the researchers also gathered data on "neutralizing" antibodies, or those that can block infection, from eight of the participants (data for the remaining participants is also not yet available).

All eight of those participants (four receiving 25 µg and four receiving 100 µg) had neutralizing antibodies at or above levels seen in those who recovered from COVID-19. In a separate study conducted in mice, similar neutralizing antibodies were found to prevent viral replication in mice infected with SARS-CoV-2.

The vaccine "was generally safe and well tolerated," and no participant had serious side effects, the company wrote in the statement. "All adverse events have been transient and self-resolving." Some had side effects such as redness at the injection site and fever, headache or flu-like symptoms, [according to NPR](#).

Moderna's vaccine uses a new technology that hasn't been used in any approved vaccines to date: It uses a molecule called messenger RNA (mRNA) to instruct cells to build viral proteins, specifically the coronavirus' spike protein, which the virus uses to infect human cells. The idea is that the [immune system](#) will then create antibodies that will recognize that spike protein and stop the coronavirus from infecting cells.

The Food and Drug Administration (FDA) recently gave Moderna the go-ahead to begin phase 2 of testing its vaccine, which will involve testing on an additional 600 people, according to a previous [Live Science report](#). The company's goal is to start their phase 3 trial in which they recruit hundreds to thousands of additional people to further understand whether the vaccine is working and if participants have any adverse reactions to it, in July and will use this data to figure out the correct dose to give to participants.

"These interim phase 1 data, while early, demonstrate that vaccination with mRNA-1273 elicits an immune response of the magnitude caused by natural infection starting with a dose as low as 25 µg," Dr. Tal Zaks, the chief medical officer at Moderna, said in the statement. When combined with data from the mouse study, these results "substantiate our belief that mRNA-1273 has the potential to prevent COVID-19 disease and advance our ability to select a dose for pivotal trials."

- [11 surprising facts about the respiratory system](#)
- [The 9 deadliest viruses on Earth](#)
- [28 devastating infectious diseases](#)

<https://www.livescience.com/coronavirus-vaccine-moderna-shows-promise-early-results.html>

Remdesivir in adults with severe COVID-19: a randomised, double-blind, placebo-controlled, multicentre trial

- [Yeming Wang, MD †](#)
- [Dingyu Zhang, MD †](#)
- [Prof Guanhua Du, PhD †](#)

- [Prof Ronghui Du, MD †](#)
- [Prof Jianping Zhao, MD †](#)
- [Prof Yang Jin, MD †](#)
- et al.
- [Show all authors](#)
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Published: April 29, 2020

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Summary

Background

No specific antiviral drug has been proven effective for treatment of patients with severe coronavirus disease 2019 (COVID-19). Remdesivir (GS-5734), a nucleoside analogue prodrug, has inhibitory effects on pathogenic animal and human coronaviruses, including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in vitro, and inhibits Middle East respiratory syndrome coronavirus, SARS-CoV-1, and SARS-CoV-2 replication in animal models.

Methods

We did a randomised, double-blind, placebo-controlled, multicentre trial at ten hospitals in Hubei, China. Eligible patients were adults (aged ≥ 18 years) admitted to hospital with laboratory-confirmed SARS-CoV-2 infection, with an interval from symptom onset to enrolment of 12 days or less, oxygen saturation of 94% or less on room air or a ratio of arterial oxygen partial pressure to fractional inspired oxygen of 300 mm Hg or less, and radiologically confirmed pneumonia. Patients were randomly assigned in a 2:1 ratio to intravenous remdesivir (200 mg on day 1 followed by 100 mg on days 2–10 in single daily infusions) or the same volume of placebo infusions for 10 days. Patients were permitted concomitant use of lopinavir–ritonavir, interferons, and corticosteroids. The primary endpoint was time to clinical improvement up to day 28, defined as the time (in days) from randomisation to the point of a decline of two levels on a six-point ordinal scale of clinical status (from 1=discharged to 6=death) or discharged alive from hospital, whichever came first. Primary analysis was done in the intention-to-treat (ITT) population and safety analysis was done in all patients who started their assigned treatment. This trial is registered with [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT04257656), [NCT04257656](https://clinicaltrials.gov/ct2/show/study/NCT04257656).

Findings

Between Feb 6, 2020, and March 12, 2020, 237 patients were enrolled and randomly assigned to a treatment group (158 to remdesivir and 79 to placebo); one patient in the placebo group who withdrew after randomisation was not included in the ITT population. Remdesivir use was not associated with a difference in time to clinical improvement (hazard ratio 1.23 [95% CI 0.87–1.75]). Although not statistically significant, patients receiving remdesivir had a numerically faster time to clinical improvement than those receiving placebo among patients with symptom duration of 10 days or less (hazard ratio 1.52 [0.95–2.43]). Adverse events were reported in 102 (66%) of 155 remdesivir recipients versus 50 (64%) of 78 placebo recipients. Remdesivir was stopped early because of adverse events in 18 (12%) patients versus four (5%) patients who stopped placebo early.

Interpretation

In this study of adult patients admitted to hospital for severe COVID-19, remdesivir was not associated with statistically significant clinical benefits. However, the numerical reduction in time to clinical improvement in those treated earlier requires confirmation in larger studies.

- Correspondence
- Open Access
- [Published: 20 April 2020](#)

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31022-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31022-9/fulltext)

A human monoclonal antibody blocking SARS-CoV-2 infection

- [Chunyan Wang](#),
- [Wentao Li](#),
- [Dubravka Drabek](#),
- [Nisreen M. A. Okba](#),
- [Rien van Haperen](#),
- [Albert D. M. E. Osterhaus](#),
- [Frank J. M. van Kuppeveld](#),
- [Bart L. Haagmans](#),
- [Frank Grosveld](#) &
- [Berend-Jan Bosch](#)

[Nature Communications](#) **volume 11**, Article number: 2251 (2020) [Cite this article](#)

- 2268 Altmetric
- [Metrics details](#)

Abstract

The emergence of the novel human coronavirus SARS-CoV-2 in Wuhan, China has caused a worldwide epidemic of respiratory disease (COVID-19). Vaccines and targeted therapeutics for treatment of this disease are currently lacking. Here we report a human monoclonal antibody that neutralizes SARS-CoV-2 (and SARS-CoV) in cell culture. This cross-neutralizing antibody targets a communal epitope on these viruses and may offer potential for prevention and treatment of COVID-19.

<https://www.nature.com/articles/s41467-020-16256-y>

Human monoclonal antibodies block the binding of SARS-CoV-2 spike protein to angiotensin converting enzyme 2 receptor

[Xiangyu Chen](#), [Ren Li](#), [Zhiwei Pan](#), [Chunfang Qian](#), [Yang Yang](#), [Renrong You](#), [Jing Zhao](#), [Pinghuang Liu](#), [Leiqiong Gao](#), [Zhirong Li](#), [Qizhao Huang](#), [Lifan Xu](#), [Jianfang Tang](#), [Qin Tian](#), [Wei Yao](#), [Li Hu](#), [Xiaofeng Yan](#), [Xinyuan Zhou](#), [Yuzhang Wu](#), [Kai Deng](#), [Zheng Zhang](#), [Zhaohui Qian](#), [Yaokai Chen](#) & [Lilin Ye](#)

[Cellular & Molecular Immunology](#) (2020) [Cite this article](#)

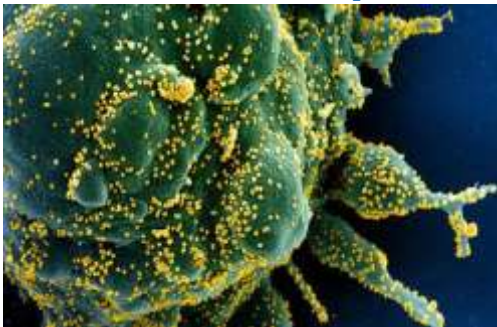
According to the World Health Organization (WHO) newly updated situation report on March 18th, 2020, the coronavirus disease 2019 (COVID-19) pandemic has confirmed 191,127 cases and claimed 7807 deaths worldwide.¹ The etiological agent of COVID-19 has been identified as a novel coronavirus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), belonging to *Sarbecovirus* subgenus (genus

Betacoronavirus, family *Coronaviridae*) and showing 79.6 and 96.2% sequence identity in nucleotide to SARS-CoV and a bat coronavirus (BatCoV RaTG13), respectively.^{2,3,4} Like SARS-CoV infection, a substantial fraction of COVID-19 patients exhibits severe respiratory symptoms and has to be hospitalized in intensive care unit.^{5,6,7,8} Although the mortality rate of COVID-19 is significantly lower than that of SARS-CoV infection, SARS-CoV-2 shows much higher human-to-human transmission rate, rapidly leading to a global pandemic declared by WHO on March 11th, 2020.⁹

Currently, there are no approved prophylactic vaccines or therapeutic drugs that are specific to COVID-19. Blocking monoclonal antibodies (mAbs), due to their extraordinary antigen specificity, are one of the best candidates for neutralizing virus infection.^{10,11} Therefore, identifying and cloning blocking mAbs that can specifically target surface viral proteins to block the viral entry to host cells is a very attractive approach for preventing and treating COVID-19, in particular when effective vaccines and therapeutics are unavailable in the outbreak of the COVID-19 pandemic. We then sought to identify and clone blocking mAbs from the memory B cell repertoire of recently recovered COVID-19 patients to prevent the entry of COVID-19 virus to the host cells.

<https://www.nature.com/articles/s41423-020-0426-7>

T cells found in COVID-19 patients 'bode well' for long-term immunity



Immune hunters called T cells can seek and destroy a cell (green) infected with and making copies of SARS-CoV-2 (yellow).

NIAID

T cells found in COVID-19 patients 'bode well' for long-term immunity

By [Mitch Leslie](#) May. 14, 2020 , 9:00 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

Immune warriors known as T cells help us fight some viruses, but their importance for battling SARS-CoV-2, the virus that causes COVID-19, has been unclear. Now, two studies reveal that infected people harbor T cells that target the virus—and may help them recover. Both studies also found that some people never infected with SARS-CoV-2 have these cellular defenses, most likely because they were previously infected with other coronaviruses.

“This is encouraging data,” says virologist Angela Rasmussen of Columbia University. Although the studies don’t clarify whether people who clear a SARS-CoV-2 infection can ward off the virus in the future, both identified strong T cell responses to it, which “bodes well for the development of long-term protective immunity,” Rasmussen says. The findings could also help researchers create better vaccines.

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The more than 100 COVID-19 vaccines in development mainly focus on another immune response: antibodies. These proteins are made by B cells and ideally latch onto SARS-CoV-2 and prevent it from entering cells. T cells, in contrast, thwart infections in two different ways. Helper T cells spur B cells and other immune defenders into action, whereas killer T cells target and destroy infected cells. The severity of disease can depend on the strength of these T cell responses.

Using bioinformatics tools, a team led by Shane Crotty and Alessandro Sette, immunologists at the La Jolla Institute for Immunology, predicted which viral protein pieces would provoke the most powerful T cell responses. They then exposed immune cells from 10 patients who had recovered from mild cases of COVID-19 to these viral snippets.

[All of the patients carried helper T cells that recognized the SARS-CoV-2 spike protein](#), which enables the virus to infiltrate our cells. They also harbored helper T cells that react to other SARS-CoV-2 proteins. And the team detected virus-specific killer T cells in 70% of the subjects, they report today in *Cell*. “The immune system sees this virus and mounts an effective immune response,” Sette says.

The results jibe with those of a study posted as a preprint on medRxiv on 22 April by immunologist Andreas Thiel of the Charité University Hospital in Berlin and colleagues. They [identified helper T cells targeting the spike protein in 15 out of 18 patients](#) hospitalized with COVID-19.

The teams also asked whether people who haven’t been infected with SARS-CoV-2 also produce cells that combat it. Thiel and colleagues analyzed blood from 68 uninfected people and found that 34% hosted helper T cells that recognized SARS-CoV-2. The La Jolla team detected this crossreactivity in about half of stored blood samples collected between 2015 and 2018, well before the current pandemic began. The researchers think these cells were likely triggered by past infection with one of the four human coronaviruses that cause colds; proteins in these viruses resemble those of SARS-CoV-2.

The results suggest “one reason that a large chunk of the population may be able to deal with the virus is that we may have some small residual immunity from our exposure to common cold viruses,” says viral immunologist Steven Varga of the University of Iowa. However, neither of the studies attempted to establish that people with crossreactivity don’t become as ill from COVID-19.

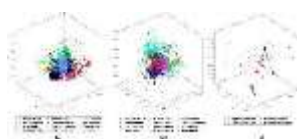
Before these studies, researchers didn’t know whether T cells played a role in eliminating SARS-CoV-2, or even whether they could provoke a dangerous immune system overreaction. “These papers are really helpful because they start to define the T cell component of the immune response,” Rasmussen says. But she and other scientists caution that the results do not mean that people who have recovered from COVID-19 are protected from reinfection.

To spark production of antibodies, vaccines against the virus need to stimulate helper T cells, Crotty notes. “It is encouraging that we are seeing good helper T cell responses against SARS-CoV-2 in COVID-19 cases,” he says. The results have other significant implications for vaccine design, says molecular virologist Rachel Graham of the University of North Carolina, Chapel Hill. Most vaccines under development aim to elicit an immune response against spike, but both studies determined that T cells reacted to several viral proteins, suggesting that vaccines that sic the immune system on these proteins as well could be more effective. “It is important to not just concentrate on one protein,” Graham says.

<https://www.sciencemag.org/news/2020/05/t-cells-found-covid-19-patients-bode-well-long-term-immunity#>

Machine learning using intrinsic genomic signatures for rapid classification of novel pathogens: COVID-19 case study

Published: April 24, 2020



Abstract

The 2019 novel coronavirus (renamed SARS-CoV-2, and generally referred to as the COVID-19 virus) has spread to 184 countries with over 1.5 million confirmed cases. Such major viral outbreaks demand early elucidation of taxonomic classification and origin of the virus genomic sequence, for strategic planning, containment, and treatment. This paper identifies an intrinsic COVID-19 virus genomic signature and uses it together with a machine learning-based alignment-free approach for an ultra-fast, scalable, and highly accurate classification of whole COVID-19 virus genomes. The proposed method combines supervised machine learning with digital signal processing (MLDSP) for genome analyses, augmented by a decision tree approach to the machine learning component, and a Spearman's rank correlation coefficient analysis for result validation. These tools are used to analyze a large dataset of over 5000 unique viral genomic sequences, totalling 61.8 million bp, including the 29 COVID-19 virus sequences available on January 27, 2020. Our results support a hypothesis of a bat origin and classify the COVID-19 virus as *Sarbecovirus*, within *Betacoronavirus*. Our method achieves 100% accurate classification of the COVID-19 virus sequences, and discovers the most relevant relationships among over 5000 viral genomes within a few minutes, *ab initio*, using raw DNA sequence data alone, and without any specialized biological knowledge, training, gene or genome annotations. This suggests that, for novel viral and pathogen genome sequences, this alignment-free whole-genome machine-learning approach can provide a reliable real-time option for taxonomic classification.

COVID 19 testing: Doing more tests at lesser cost with the same infrastructure

Via [Raja Mugasimangalam • 1st Founder and CEO, Genotypic Technology- Genomics Simplified 2d • Edited •](#)

COVID 19 testing: Doing more tests at lesser cost with the same infrastructure

****Smart pooling with advanced mathematical algorithms****: Genotypic, India and an Israeli startup are launching a program that can increase the tests by 5X to 10X and reduce the cost by 3X to 6X. This can help India increase the tests performed per day from 500K per day to [2.5M](#) or 5 Million per day without any additional capital costs.

Unlike simple pooling - smart 1 step pooling can identify the samples that have the virus. In simple pooling, samples from any pool that tests positive should be tested individually.

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https://docs.google.com/forms/d/e/1FAIpQLSf7OsXKyiFEKqNW_u6eF5z888TmpraryKbomKNCWhG4MHEVbA/viewform

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1d

Thank you for having shared this report! It is always refreshing to see cooperation dampen nationalistic and negative competition into an international and positive enterprise! In this case it meets a crisis! Doing so by melding the computing and analytical power of those from States in India that gave Humankind the innate genius of Mathematicians like Chakravarthi Padmanabhan Ramanujam and Computational Wizards like Shakuntala Devi with the experimental and analytical power of Israeli Science and Technology. And all for the common good! [https://en.wikipedia.org/wiki/C. P. Ramanujam](https://en.wikipedia.org/wiki/C._P._Ramanujam)
[https://en.wikipedia.org/wiki/Shakuntala Devi](https://en.wikipedia.org/wiki/Shakuntala_Devi)
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<https://doi.org/10.1371/journal.pone.0232391>

SARS-CoV-2 productively infects human gut enterocytes

Mart M. Lamers^{1,*}, Joep Beumer^{2,*}, Jelte van der Vaart^{2,*}, Kèvin Knoops³, Jens Puschhof², Tim I. Breugem¹, Raimond B. G. Ravelli³, J. Paul van Schayck³, Anna Z. Mykytyn¹, Hans Q. Duimel³, Elly van Donselaar³, Samra Riesebosch¹, Helma J. H. Kuijpers³, Debby Schippers¹, Willine J. van de Wetering³, Miranda de Graaf¹, Marion Koopmans¹, Edwin Cuppen^{4,5}, Peter J. Peters³, Bart L. Haagmans^{1,†}, Hans Clevers^{2,†,‡}

Science 01 May 2020:

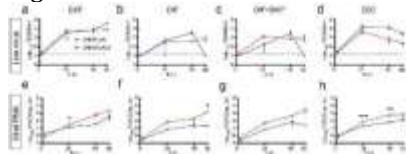
eabc1669

DOI: 10.1126/science.abc1669

Abstract

The virus severe acute respiratory syndrome–coronavirus 2 (SARS-CoV-2) can cause coronavirus disease 2019 (COVID-19), an influenza-like disease that is primarily thought to infect the lungs with transmission via the respiratory route. However, clinical evidence suggests that the intestine may present another viral target organ. Indeed, the SARS-CoV-2 receptor angiotensin converting enzyme 2 (ACE2) is highly expressed on differentiated enterocytes. In human small intestinal organoids (hSIOs), enterocytes were readily infected by SARS-CoV and SARS-CoV-2 as demonstrated by confocal- and electron-microscopy. Consequently, significant titers of infectious viral particles were detected. mRNA expression analysis revealed strong induction of a generic viral response program. Hence, intestinal epithelium supports SARS-CoV-2 replication, and hSIOs serve as an experimental model for coronavirus infection and biology.

Fig. 2 SARS-CoV and SARS-CoV-2 replicate in hSIOs.



(a to d) Live virus titers can be observed by virus titrations on VeroE6 cells of lysed organoids at 2, 24, 48 and 60h after infection with SARS-CoV (blue) and SARS-CoV-2 (red). Different medium compositions show similar results. (e to h) qPCR analysis targeting the E gene of similar timepoints and medium compositions

as (a) to (d). The dotted line indicates the lower limit of detection. Error bars represent SEM. N=3. *P<0.05, **P<0.01, ***P<0.001.

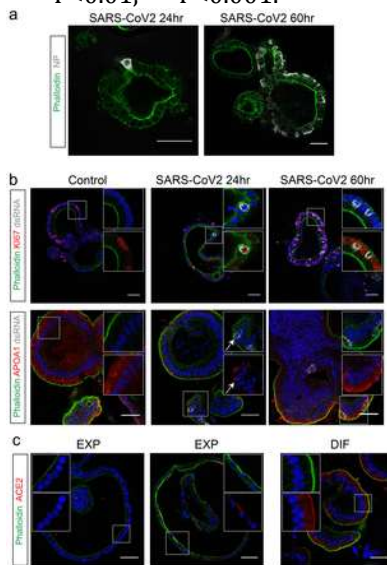


Fig. 3 SARS-CoV-2 infects proliferating cells and enterocytes.

- (a) Immunofluorescent staining of SARS-CoV-2-infected intestinal organoids. Nucleoprotein (NP) stains viral capsid. After 24 hours, single virus-infected cells are generally observed in organoids. These small infection clusters spread through the whole organoid after 60 hours. (b) SARS-CoV-2 infects both post-mitotic enterocytes identified by Apolipoprotein A1 (APOA1) and dividing cells that are KI67-positive. Infected cells are visualized by dsRNA staining. Enterocytes are shown in differentiated organoids, and proliferating cells in expanding organoids. Arrows point to APOA1-positive cells. (c) Immunofluorescent staining of ACE2 in intestinal organoids in expansion and differentiation condition. All scale bars are 50 μm.

<https://science.sciencemag.org/content/early/2020/04/30/science.abc1669>

Coronavirus (Coverage in Science Magazine News)

Coronavirus: Research, Commentary, and News

The Science journals are striving to provide the best and most timely research, analysis, and news coverage of COVID-19 and the coronavirus that causes it. All content is free to access.

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Coronavirus

[Study tells ‘remarkable story’ about COVID-19’s deadly rampage through a South African hospital](#)

By [Linda Nordling](#) May. 25, 2020

Staff and medical equipment carried the virus from patient to patient and from ward to ward.

[Doubts greet \\$1.2 billion bet by United States on a coronavirus vaccine by October](#)

By [Jon Cohen](#) May. 22, 2020

Operation Warp Speed's funding of AstraZeneca is intended to deliver a COVID-19 vaccine by October, although some call that timeline unrealistic.

[Coronavirus antigen tests: quick and cheap, but too often wrong?](#)

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Tests that detect coronavirus proteins raise hopes of widespread daily screening

[How Sweden wasted a ‘rare opportunity’ to study coronavirus in schools](#)

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One of the few countries to keep primary schools open failed to collect data on children’s role in pandemic

[‘The house was on fire.’ Top Chinese virologist on how China and U.S. have met the pandemic](#)

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Shao Yiming leads the HIV program at China’s Center for Disease Control and Prevention

[Nobel laureates and science groups demand NIH review decision to kill coronavirus grant](#)

By [Science News Staff](#) May. 21, 2020

Agency killed funding after complaints from Conservative media and President Donald Trump

COVID-19 contact tracing apps are coming to a phone near you. How will we know whether they work?

By [Kelly Servick](#) May. 21, 2020

Digital contact tracing could help stop viral spread—but it has yet to prove its worth

Scientists Used **AI** to Crack COVID19's Genetic Signature and Identify Its Origin. Gurjit Randhawa and his colleagues developed a ML method that achieved 100% accuracy in classifying the COVID19 sequences and discovered the most relevant relationships among more than 5,000 viral genomes within minutes. Their study supports the hypothesis that COVID19 has its origin in bats. Their paper demonstrates how ML can use genomic signatures to provide ultra fast classification of novel pathogens. They used a graphics based classification system that delivered highly accurate classifications of the virus without a priori biological knowledge. This new AI tool will allow researchers to quickly and easily classify other deadly viruses in minutes which is extremely important for strategic planning and mobilizing medical needs during a pandemic. The tool will be an essential component in the toolkit for vaccine and drug developers, front-line health-care workers, researchers and scientists during this global pandemic and beyond.

Link to paper in PLOS: https://lnkd.in/gVaE3_g

Reference: "Machine learning using intrinsic genomic signatures for rapid classification of novel pathogens: COVID-19 case study" by Gurjit S. Randhawa, Maximillian P. M. Soltysiak, Hadi El Roz, Camila P. E. de Souza, Kathleen A. Hill and Lila Kari, 24 April 2020, PLOS ONE.

DOI: 10.1371/journal.pone.0232391

<https://scitechdaily.com/researchers-crack-covid-19-genetic-signature-using-ai-identify-origin/>

(xvi) Epidemiology and Population Dynamics of COVID-19: Johns Hopkins UHM Pandemic Tracker, BBC and NYT reports on: postpandemic recovery

The virus, which causes the respiratory infection Covid-19, was first detected in the city of Wuhan, China, in late 2019.

It then spread quickly across the globe in the first months of 2020.

Figures last updated on 02 August 2020, 18:46 BST:



<https://coronavirus.jhu.edu/map.html>

In rare cases, coronavirus might ail children

Pediatric multisystem inflammatory syndrome— a serious condition in children that has been compared with an illness called Kawasaki disease — seems to be linked to the coronavirus. Physicians in Bergamo, at the heart of the COVID-19 outbreak in Italy, report a 30-fold increased incidence of Kawasaki-like disease. New York governor Andrew Cuomo said this week that the syndrome has affected around 100 children in the state, 2 of whom have died. Pediatricians stress that the problem is extremely rare, and most children who

have it get better. (BBC | 4 min read)

Reference: *The Lancet* paper

https://www.bbc.com/news/amp/health-52648557?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

Operation reopen America: are we about to witness a second historic failure of leadership from Trump?

Trump speaks during a meeting with healthcare executives on Tuesday. Photograph: Doug Mills//Bloomberg via Getty Images

Without mass testing, contact tracing, and protective equipment for health workers – all in critically short supply – the president’s plan could be disastrous

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Beyond the cloistered confines of the White House an alternative interpretation of events was gathering force. On a day in which the US suffered its [highest death toll](#) from Covid-19, with a total of more than [680,000 confirmed cases](#) and 34,000 deaths, public health experts were scrutinising the president’s new guidelines and coming to rather different conclusions.

“This isn’t a plan, it’s barely a PowerPoint,” spluttered Ron Klain on [Twitter](#). Klain, the US government’s Ebola tsar during the last health crisis to test the White House, in 2014, said the proposals contained “no provision to ramp up testing, no standard on levels of disease before opening, no protections for workers or customers”.

https://www.theguardian.com/us-news/2020/apr/18/operation-reopen-america-are-we-about-to-witness-a-second-historic-failure-of-leadership-from-trump?utm_term=RWRpdG9yaWFsX0d1YXJkaWFuVG9kYXIVUy0yMDA0MTg%3D&utm_source=esp&utm_medium=Email&CMP=GTUS_email&utm_campaign=GuardianTodayUS

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[#COVID19 #DeathRates #USvSouthKoreavPeoplesRepubChina](#)

'Coronavirus: US death rates v China, Italy and South Korea

The US has seen its cases spike dramatically in recent days and these graphs show what could be in store. Produced by the BBC's Franz Strasser, narrated by Hannah Long-Higgins.'

<https://www.bbc.com/news/av/world-us-canada-52066105/coronavirus-us-death-rates-v-china-italy-and-south-korea>

[Technology](#)

How Hong Kong Did It

With the government flailing, the city's citizens decided to organize their own coronavirus response.

[Zeynep Tufekci](#)

May 12, 2020

[Via Margaretta Colangelo](#)

[Co-Founder & Managing Partner at Deep Knowledge Ventures](#)

Hong Kong has had only 4 COVID deaths without a lockdown. How they did it -- With over 7 million people Hong Kong is densely populated, has more cross-border traffic with China than anywhere else in the world, and has a crowded mass-transportation system. Hong Kong is connected to Wuhan via a high-speed-train and many daily flights. More than 2.5 million people came to Hong Kong from mainland China in January of 2020. When the initial outbreak occurred, Hong Kong's citizens acted swiftly, collectively, and efficiently against the virus. The organizational capacity and the civic infrastructure built by the protest movement played a central role in Hong Kong's grassroots response. Groups of organized citizens built a website to track COVID cases, monitor hot spots, warn people of places selling fake PPE, and report hospital wait times and other relevant information. Hong Kongers were so successful in their efforts that even the flu season ended 6 weeks earlier than usual. Life is returning to normal in Hong Kong.

#artificialintelligence #datascience #innovation #coronavirus #economy The Atlantic Zeynep Tufekci

<https://www.theatlantic.com/technology/archive/2020/05/how-hong-kong-beating-coronavirus/611524/>

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[Donald Trump](#)

Administration to Phase Out Coronavirus Task Force

The group had provided President Trump a backdrop for his daily briefings while working to coordinate the government response to the pandemic.



Dr. Anthony Fauci and Dr. Deborah Birx before a coronavirus task force briefing at the White House in March. Credit...Erin Schaff/The New York Times

By [Noah Weiland](#), [Maggie Haberman](#) and [David E. Sanger](#)

- May 5, 2020

WASHINGTON — Despite growing evidence that the pandemic is still raging, administration officials said on Tuesday that they had made so much progress in bringing it under control that they planned to wind down the coronavirus task force in the coming weeks and focus the White House on restarting the economy.

Vice President Mike Pence, who has led the task force for two months, said it would probably wrap up its work around the end of the May, and shift management of the public health response back to the federal agencies whose work it was created to coordinate.

Other administration officials said that under plans still in discussion, the White House would consult with medical experts on a more informal basis and that Jared Kushner, the president's son-in-law and senior adviser, would help oversee a group pushing for progress in developing a vaccine and treatments for the virus.

"It really is all a reflection of the tremendous progress we've made as a country," Mr. Pence told reporters at the White House.

His comments came a day after the revelation of new estimates that suggest deaths from the coronavirus, now above 70,000, [could double by early August](#), and that infection rates may rise sharply as businesses reopen. While the number of new cases logged daily in the New York City area is declining, [new cases continue to grow](#) across the rest of the United States.

With President Trump facing a tough re-election battle, the White House appears intent on putting a response to the daily death toll more toward the background as it emphasizes efforts at a return to economic and job growth. The president's advisers have repeatedly tried to place the responsibility for testing and decisions about reopening on individual states.

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The task force spent some of its time preparing talking points for Mr. Trump, who took over its public briefings, often turning them into lengthy opportunities to air grievances, praise his own handling of the crisis and offer up his own prescriptions.

[Latest Updates: Coronavirus Outbreak in the U.S.](#)

- [Trump contradicts his administration's plans to shut down the coronavirus task force.](#)
- [A deep recession and ballooning unemployment in Europe darken the global economic picture.](#)
- [China assails United States over Wuhan lab leak allegations.](#)

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There were signals in recent days of the task force's impending demise: The panel did not meet on Saturday, as it typically does, and canceled a meeting on Monday. And the president has stopped linking his news briefings to the task force's meetings and no longer routinely arrays task force members around him in his public appearances, a change that came swiftly after he mused one day about [the possibility of injecting disinfectants](#) to kill the virus.

Members of the coronavirus task force, including Dr. Deborah L. Birx, the White House's coronavirus response coordinator, had to urge Americans not to take those steps. And they often served as a public check on Mr. Trump's questionable or false statements, cautioning about promises of a quick vaccine or [the effectiveness of hydroxychloroquine](#), a drug [promoted by the president](#).

While the task force's advice has sometimes been swept aside by Mr. Trump and the guidelines it produced for states to reopen ignored by some of them, the group was a comforting symbol for people scared about the virus's spread and looking for a sign the White House was taking it seriously. People closely monitored which members attended, noting any time Dr. Anthony S. Fauci, a leading infectious disease expert, was absent. The decision to phase out the task force has prompted new questions about whether the administration will be adequately organized to address the complex, life-or-death decisions related to the virus and give sufficient voice to scientists and public health experts in making policy.

"We will have something in a different form," Mr. Trump told reporters on Tuesday during a trip to Arizona.

Asked why now was the right time to wind down the task force, he replied, "Because we can't keep our country closed for the next five years."

If there is a recurrence of cases in the fall, he said, "we're going to put the flame out."

White House officials said that medical officials like Dr. Birx would still be advising the president and be available to answer reporters' questions.

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Still, the change means a growing role for Mr. Kushner, who is looking for a czarlike appointee to oversee the development of a vaccine and therapeutic treatments, as well as for top economic officials like Steven Mnuchin, the Treasury secretary, and the White House advisers Larry Kudlow and Kevin Hassett.

Since it was formed in January, the task force has been the scene of bureaucratic and policy battling, its influence only as great as Mr. Trump's episodic willingness to accept its advice.

Its priorities and configuration often reflected the most immediate circumstances, starting with quarantines for passengers of cruise ships and repatriated Americans in late January and early February. But the group spent little time managing [the testing of Americans for the virus](#), a problem the administration still has not fully resolved.

It was initially overseen by Alex M. Azar II, the secretary of health and human services, before he was [cast aside for Mr. Pence](#). Its influence peaked in March, when Dr. Birx led other members in persuading the president to urge the stay-at-home and social-distancing orders that have averted even higher death tolls, but at a huge cost to the economy.

From the task force's inception, there have been tensions between economic advisers and some of Mr. Trump's health and national security officials over the right balance between keeping the nation locked down to minimize illness and death and the devastation from a [historic surge in joblessness](#).

In recent weeks, one official said, economic advisers, including Mr. Mnuchin, have had an increasingly prominent role in discussions of public health matters. To critics, Mr. Trump's promotion of economic recovery reflects the White House's impatience with the caution that top health officials have urged for months as the virus's death toll has climbed rapidly.

At the same time, top White House officials have moved much of the coordination of federal resources away from the official task force. A group led by Mr. Kushner has been functioning as something of a shadow task force since early March. Among other issues, Mr. Kushner has told people he is helping oversee the vaccine development process, and he has been overseeing the expansion of testing.

"The task force has been hampered by inconsistent messaging," said Dr. Joshua M. Sharfstein, a former top F.D.A. official who [teaches on public health crises](#) at the Johns Hopkins Bloomberg School of Public Health. "There were too many times when what the scientists said and what the president said were at odds."

At various moments, different splinter groups separate from the task force have met elsewhere in the White House, including the one led by Mr. Kushner, which focused on testing and then supplies of personal protective equipment and ventilators. Another has been led by Joe Grogan, the chief of the White House Domestic Policy Council who plans to leave his post this month.

That group, composed mostly of top health officials, gathers in the West Wing's Roosevelt Room to organize and script discussion for the larger task force meeting that occurs directly after it, one senior administration official said. Another group, which consists solely of top health officials with medical degrees, meets less regularly in person and by phone.

The news of the task force's potential disbandment was not met with strong resistance from medical officials in the group, according to senior administration officials. In recent months, top health officials had become wary of the amount of time task force obligations were taking, including trips to and from the White House, which is far from the headquarters of agencies such as the National Institutes of Health, where a task force meeting was scheduled to take place on Tuesday before it was moved to the White House, one official said.

Dr. Fauci described the meetings last week as the place where health officials could spend 90 minutes or so examining data about new infections and deaths, the effectiveness of potential treatments and the surging of resources to new hot spots.

"Everyone understands the task force and refers to it as the coordinating body, where policies came out, messaging came out, guidelines were centralized from this one body," said Dr. Leana S. Wen, an emergency physician and public health professor at George Washington University. "We need to have a national coordinating body that has the ear of the president and is able to direct the entire federal government."

Noah Weiland and David E. Sanger reported from Washington, and Maggie Haberman from New York.

The Coronavirus Crisis

[With New Hot Spots Emerging, No Sign of a Respite](#)

[May 5, 2020](#)

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[March 3, 2020](#)



Noah Weiland is a reporter in the Washington bureau of The New York Times, covering health care. He was raised in East Lansing, Michigan and graduated from the University of Chicago. [@noahweiland](#)

Maggie Haberman is a White House correspondent. She joined The Times in 2015 as a campaign correspondent and was part of a team that won a Pulitzer Prize in 2018 for reporting on President Trump's advisers and their connections to Russia. [@maggieNYT](#)

David E. Sanger is a national security correspondent. In a 36-year reporting career for The Times, he has been on three teams that have won Pulitzer Prizes, most recently in 2017 for international reporting. His newest book is "The Perfect Weapon: War, Sabotage and Fear in the Cyber Age." [@SangerNYT](#) • [Facebook](#)

A version of this article appears in print on May 6, 2020, Section A, Page 11 of the New York edition with the headline: Task Force To Wrap Up Even as Virus Bears Down. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)

https://www.nytimes.com/2020/05/05/us/politics/coronavirus-task-force-trump.html?campaign_id=2&emc=edit_th_200506&instance_id=18224&nl=todaysheadlines®i_id=29747032&segment_id=26690&user_id=c32bb24514e7532676495d039447dd68

Russia adds record 10,000 coronavirus cases in dramatic turnaround as Putin's problems stack up

Nepomnyashchaya was reported to have opposed those changes due to the lack of protective gear in the hospital. The Health Ministry's regional health department denied the allegations in a statement, adding that the hospital is in "reserve" for coronavirus patients and its staff has been trained and equipped. The hospital did not respond to CNN's requests for comment.

This story has been updated.

CNN's Matthew Chance contributed to this report.

<https://www.cnn.com/2020/05/04/europe/russia-medical-workers-windows-intl/index.html>

Germany and U.S. on Divergent Paths to Reopen

Online retailers, backed by Amazon, are beginning a campaign to press for billions of dollars to rescue the Postal Service. Nearly one in five children in the U.S. are not getting enough to eat.

May 6, 2020

This briefing has ended. Here are [the latest updates on the coronavirus outbreak](#) in the United States.

Here's what you need to know:

- [Merkel and Trump lead their countries into a new phase. Their paths here have been quite different.](#)
- [Nearly 1 in 5 young children in the U.S. don't get enough to eat, research found.](#)
- [Trump says the coronavirus task force will continue, after all.](#)
- [Online retailers, including Amazon, want Congress to save the Postal Service.](#)



Image

People enjoying the warm weather at J. Hood Wright Park in New York on Sunday. Credit...Juan Arredondo for The New York Times

Merkel and Trump lead their countries into a new phase. Their paths here have been quite different.

Germany was a leader in the West in taking on the pandemic, and then a leader in the calibrated restarting of public life. On Wednesday, Chancellor Angela Merkel had a hopeful message for the nation: The experiment was working.

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The country's infection numbers, Ms. Merkel announced, were not just stable but lower than two weeks ago. Germany, the chancellor said, was now in a position [to reopen most aspects of its economy and society](#).

"We can afford a little audacity," Ms. Merkel said.

Germany's successful strategy was good news for countries eager for a sign that life can continue with the virus. But it was also a stark reminder of the differences in other Western countries, including the United States, where some states have taken steps toward [reopening](#) even as infections rise, and where President Trump is clearly eager to [move past the pandemic and on to the recovery](#) — whatever the cost.

"Hopefully that won't be the case," Mr. Trump said on Wednesday when asked if deaths would rise as a result of the reopening of the American economy he covets, before adding, "It could very well be the case."

To many of Mr. Trump's critics, the strategy that has won Ms. Merkel praise and Germany a reprieve — a combination of cautious, science-led political leadership and a regimen of [widespread testing](#), tracing and [social distancing](#) — is precisely the one the United States should have followed.

Germany shut down early and has been systematically testing its way back to some semblance of normality. Face masks, already mandatory in shops and public transport, are fast becoming the new normal, and socializing in restaurants and bars — even those now allowed to reopen — will still take place under strict restrictions.

With those limitations in place, Ms. Merkel on Wednesday was able to announce the restoration of many freedoms shelved for the best part of two months. All shops will be allowed to reopen. Restaurants and hotels can resume in time for two long holiday weekends at the end of May.

"We can say today that the first phase of the pandemic is behind us," Ms. Merkel said.

Mr. Trump had tried to signal the same kind of optimism this week, announcing the winding down of the White House coronavirus task force on Tuesday before promptly reversing course on Wednesday morning after public outcry and private lobbying changed his mind.

Mr. Trump has [staked his legacy on an economic record that was shredded by the crisis](#), and moving on from the pandemic's forced closures and economic pain may seem like the best way to stabilize his chances for re-election this fall.

"We have to get our country open again," Mr. Trump said on Wednesday. "People want to go back, and you're going to have a problem if you don't do it."

SUCCESS STORY

Germany, which shut down early and tested its way back to some semblance of normality, is now [confident enough to lift most restrictions on businesses and schools](#). In the U.S., President Trump is [eager to move past the crisis, too](#), Peter Baker writes in a news analysis.

<https://www.nytimes.com/2020/05/06/us/coronavirus-live-updates.html#after-bottom>

When can we start up child care again?

Here are some points to consider before you call your babysitter.

Reporting was contributed by Reed Abelson, Katie Benner, Katrin Bennhold, Alan Blinder, Nicholas Bogel-Burroughs, Keith Bradsher, Jonah Engel Bromwich, Ben Casselman, Niraj Chokshi, Helene Cooper, Michael Cooper, Michael Crowley, Elizabeth Dias, Caitlin Dickerson, Melissa Eddy, Nicholas Fandos, Christina Goldbaum, Maggie Haberman, Andrew Jacobs, Zolan Kanno-Youngs, Jodi Kantor, Josh Katz, Jillian Kramer, Michael Levenson, Adam Liptak, Denise Lu, Neil MacFarquhar, Apoorva Mandavilli, Sarah Mervosh, Andy Newman, Michael Powell, Simon Romero, David E. Sanger, Margot Sanger-Katz, Marc Santora, Ed Shanahan, Ana Swanson, Kenneth P. Vogel, David Waldstein, Noah Weiland, Edward Wong and Carl Zimmer.

[Continue reading the main story](#)

<https://www.nytimes.com/2020/05/04/parenting/child-care-resume-questions.html>

No lockdown, little virus

The most important point: Hong Kong's strategy is working extremely well.

It hasn't reported a new homegrown case in more than two weeks. Over all, only about 1,000 people — out of 7.5 million — [have tested positive](#). Only four have died.

It's a sign that a lockdown isn't the only way to battle the virus. But it's also a reminder of how different life [in a post-reopening United States will be](#) from life in countries that have most effectively stopped the virus's spread.

https://messaging-custom-newsletters.nytimes.com/template/oakv2?uri=nyt://newsletter/b4ad6ab6-237f-4261-bdd2-34067aeef302&productCode=NN&te=1&nl=the-morning&emc=edit_nn_20200506

[View in Browser](#)

America: are we about to witness a second historic failure of leadership from Trump?

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19 #CurrentNumber680000cases34000deaths #ImpendingCatastrophe](#) "W/o mass testing, contact tracing, & protective equip. for health workers – all in critically short supply – the presid. plan could be disastrous. D. Trump..dec. that he was leading America in a "historic battle against the invisible enemy" that amounted to the "greatest national mobilisation since WWII".

Beyond the cloistered confines of the White House an alternative interpretation of events was gathering force. On a day the US suffered its highest death toll from Covid-19, with a total of more than 680,000 confirmed cases and 34,000 deaths, public health experts..coming to rather different conclusions. “This isn’t a plan, it’s barely a powerpoint,” spluttered Ron Klain on Twitter. Klain, the US government’s Ebola tsar during the last health crisis to test the White House, in 2014, said the proposals contained “no provision to ramp up testing, no standard on levels of disease before opening, no protections for workers or customers”.

<https://lnkd.in/erpAAjK>

https://www.theguardian.com/us-news/2020/apr/18/operation-reopen-america-are-we-about-to-witness-a-second-historic-failure-of-leadership-from-trump?utm_term=RWRpdG9yaWFsX0d1YXJkaWFuVG9kYXIVUy0yMDA0MTg%3D&utm_source=esp&utm_medium=Email&CMP=GTUS_email&utm_campaign=GuardianTodayUS

Will Americans ever forgive Trump for his heartless lack of compassion?

While the nation grieves, the US president has spent less than five minutes expressing compassion for those who are suffering

- [Coronavirus – live US updates](#)
- [Live global updates](#)
- [See all our coronavirus coverage](#)

Francine Prose

Tue 5 May 2020 06.22 EDT Last modified on Tue 5 May 2020 09.04 EDT

[Comments](#)

[364](#)



‘We can’t help thinking how much less worried we would be if a humane, competent, well-informed adult was making the decisions that affect us all.’ Photograph: Andrew Caballero-Reynolds/AFP via Getty Images

To exist at this moment is to navigate (or try to fend off) the flood of grief that threatens to submerge even our rare, buoyant moments. We mourn the death of friends and relatives, the absence of human contact and the everyday pleasures we once took for granted. We can’t stop thinking about the tens of thousands of families facing hunger, bankruptcy and homelessness even as they struggle to endure the loss of someone they dearly loved.

What’s striking, if not surprising, is that this deluge of sorrow has run dry at the door to the Oval Office.

While the nation grieves, the US president has spent less than five minutes expressing compassion for those who are suffering

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What's striking, if not surprising, is that this deluge of sorrow has run dry at the door to the Oval Office.

[Under Trump, America has gone a bit late Weimar. We know how that ended](#)

Lloyd Green

[Read more](#)

One's heart goes out to the reporters who have sifted through the Donald Trump's press briefings on the current pandemic – hour after hour of bombast, self-promotion, vitriol, lies and recklessly unscientific speculation – for any evidence of sympathy for those who are in pain. It's hardly a shock to learn that our president's expressions of care and compassion have occupied a total of less than five minutes, out of all that time.

After all, a man who mocked a disabled journalist and boasted about grabbing women wasn't elected for the depths of his kindness and the purity of his moral conscience. And it seems unrealistically optimistic to have hoped that the extremity of this crisis should have inspired, in our leader, a deep and essential change of heart.

Arguably, few politicians seek (and are elected to) office out of an excess of compassion. Even those who respond to catastrophe in more appropriately "human" ways – George W Bush mourning the victims of 9/11, Obama tearing up at the site of the Sandy Hook school shooting – have been parochial in their sympathies; there was little ceremonial grieving for the innocent child-casualties of our bombing and drone strikes in the Middle East.

And yet we can't help thinking how much less worried we would be if a humane, competent, well-informed adult was making the decisions that affect us all. Though we've learned that Franklin Delano Roosevelt turned away refugees from Hitler's Europe, we can still imagine how comforting it was, for those who lived through the Great Depression, hearing his radio speeches: absorbing their message of reassurance and hope, his determination to comprehend and mitigate the sufferings of our nation.

Trump's enraged, self-infatuated maunderings are the opposite of Roosevelt's calm resolve. Yet ultimately our president's failure of empathy is less disturbing than the ways in which it appears to resonate with his supporters. He and his allies have framed our response to the crisis in terms of partisan politics, to imply (incorrectly, as the polls suggest) that tough conservatives are eager to get back to work sooner than scaredy-cat, stay-at-home progressives.

The flag-waving, gun-toting, defiantly unmasked [protesters storming the capitol buildings in Michigan](#) and Wisconsin would seem to support that view. This, too, is a situation that could have been defused by a president who projected sympathy, who persuaded his listeners, as Roosevelt did, that the pain of those who have lost jobs and businesses is shared by us all. Instead we see Trump's efforts to stoke rage and bitterness because he suspects that it might help solidify his base.

It may be that the deepening polarization in our country – the suspicion, grievance and rage that the president is spouting and encouraging – is less political than spiritual. These divides go deeper than how we vote; they express our core beliefs about our responsibility to those with whom we share this brief span on this damaged planet. As Slate editor Tom Scocca posted on Twitter: "Conservatives have by now been conditioned to believe that thinking about other people's needs or interests in any way is tyranny by definition," a sentiment echoed by Emily Raboteau in the Huffington Post: "I can't debate someone into caring about what happens to our fellow human beings."

It's hard to imagine anything more grotesque than using the pandemic as an excuse to further the ongoing campaign to separate families and exclude asylum seekers and other immigrants

This idea that empathy and altruism are expressions of weakness and naivety is nothing new; it's the foundation of novelist Ayn Rand's Objectivism, and it received a major boost during the Reagan-Bush years, when "trickle-down" economics did little to stem the growing problem of homelessness. But it's never seemed so virulent as it does today, perhaps because it has never been so openly advocated – so blatantly demonstrated – by our president. It's hard to think of anything more corrupt or corrupting than to boast about one's success when (as I write this) more than [60,000 Americans have died of Covid-19](#). It's hard to imagine anything more grotesque than using the pandemic as an excuse to further the ongoing campaign to separate families and exclude asylum seekers and other immigrants.

What's most frightening to me is that the lack of empathy – the selfishness, the resentment, the hope that others will suffer even more than we are suffering – is itself a kind of virus: contagious, dangerous, possibly even lethal. I've heard people say that the Wisconsin and Michigan protesters – shouting shoulder to shoulder, refusing to observe the simple rules of social distancing – won't learn how profoundly Trump has betrayed them until they themselves contract the virus that they have been encouraged to downplay. I've even heard it said how unfair it is that our overweight, out-of-shape politicians – too vain to wear a mask, flouting scientific advice and the dictates of common sense – have proved immune to the disease that has felled so many decent, generous people.

But such statements echo the absence of compassion that Trump, by tweet and by example, is encouraging us to feel. It's become another thing to resist. I don't want to wish that *anyone* will learn that particular hard lesson, in that particularly hard way: not the governors opening their states for business before it's safe, not the demonstrators on the state capitol steps, not our president. Despite my own anger, frustration and fear, I still can't bring myself to claim suffering as a success.

[On this Giving Tuesday ...](#)

... we're asking readers like you to make a contribution in support of our independent journalism. The news industry is facing huge commercial challenges as traditional revenues streams like advertising decline precipitously. Meanwhile, misinformation and falsehoods are routine in our discourse. Trusted, science-based journalism has never been more crucial, and your support will ensure we can keep delivering vital reporting from all over the world.

https://www.theguardian.com/commentisfree/2020/may/05/will-americans-forgive-trump?utm_term=RWRpdG9yaWFsX0d1YXJkaWFuVG9kYXIVUy0yMDA1MDU%3D&utm_source=esp&utm_medium=Email&CMP=GTUS_email&utm_campaign=GuardianTodayUS

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19 #GlobalToll250000 #PostReopening](#)

'Summary

The worldwide Covid-19 death toll is now above 250,000, according to Johns Hopkins University
Europe's first-known case may have emerged almost a month earlier than thought, French doctor suggests after re-testing patient

Deaths involving virus in UK care homes rose to total of 5,890 in week ending 24 April, up by 2,794 from week before

UK's top scientific adviser says masks can be "beneficial" in crowded areas

India is among countries to start easing restrictions even as it reports record numbers of new infections and deaths

New Zealand prime minister discusses "Trans-Tasman travel bubble" with Australian cabinet

Later on Tuesday, the UK is to begin testing a new contact-tracing app on the Isle of Wight

The US records 1,015 virus-related deaths in 24 hours, the lowest one-day tally in a month.'

<https://lnkd.in/e5Kn9-G>

<https://www.bbc.com/news/live/world-52539905>

(5)Biology and Medical Impact of SARS-CoV-2 virus: How, what, when and where of an inert particle, with embedded code, that can mushroom into a Pandemic:

- (i) Infecting multiple tissues (lungs, liver, blood system, digestive system), including breaching immune privileged tissues (eyes, brain, testis),
- (ii) Breaching immune privileged being breached it could remain undetected and endemic in populations,
- (iii) Mutating virus and so possibly enhancing its potency by contributing to avoidance of the immune surveillance,
- (iv) In endemic state in populations source of secondary infections,
- (v) Its environmental resistance, drug resistance, virulence and pathogenicity;
- (vi) Several collateral health conditions such as socioeconomic, physiological and microbiota health of infected patients are now the accepted target moves unpredictably,
- (vii) Zoonoses and Environmental Impact – Where and how did it start still unsure? Bats, Pangolins, Dogs, Cats, Tigers and illegal international trade in protected species which bear a higher (frequency of) viral and parasite burden

Highlights from 40 COVID-19 Research Papers Published in July 2020

- Published on August 2, 2020



[Margaretta Colangelo](#)

Co-Founder & Managing Director Deep Knowledge Group

[107 articles](#)

Between January and July of this year, over 67,753 research papers and 19,789 preprints were [published](#) on COVID-19.

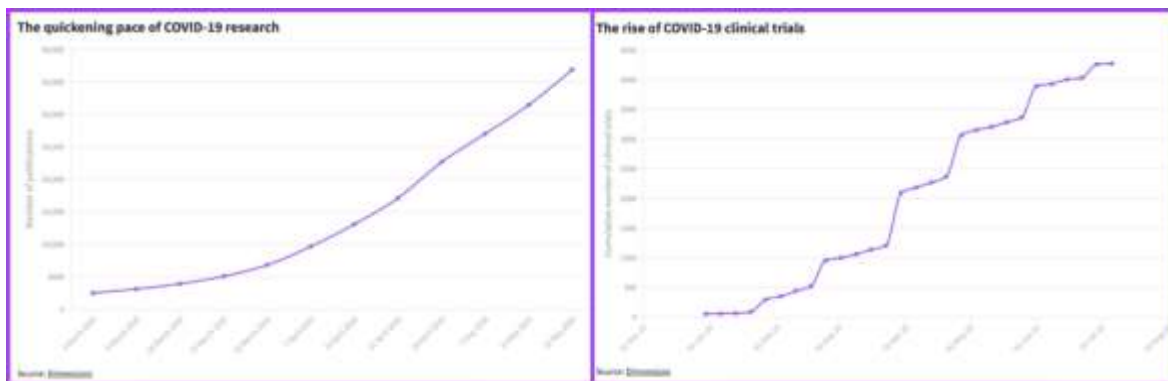
I remember what I did on Monday January 20th because it was Martin Luther King Jr. Day. Since it was a national holiday, I spent most of the day in a cafe in Honolulu, where I live, reading about the events that were unfolding in China. I remember being stunned by what was happening in Wuhan. I remember feeling concerned and uninformed. On January 23rd, China locked down 11.8 million people in Wuhan, and by the next day, over 50 million people in China were in lockdown. This was unprecedented. Nothing on this scale had ever happened before.

Over the next few days I became very interested in the scientific literature on COVID-19. Since then, I have sifted through COVID-19 research every morning to find the most high quality and relevant research. I typically read, summarize, and share one or two COVID-19 papers everyday. Over the past six months I have shared summaries of about 400 papers. In March I shared 70 of my top posts in an article entitled

[How Scientists Are Using AI and Data Science To Fight COVID-19.](#)

Stats and Highlights

This article includes stats on COVID-19 research over the past six months. Following the stats are highlights from 40 research papers that I shared in July 2020.



Increasing Number of COVID-19 Research and Clinical Trials

The US, China, and UK have produced the highest number of COVID-19 research papers. The number of COVID-19 clinical trials grew from 60 in January 2020 to 4,271 by July 2020. More than 1,000 new clinical trials were registered in March 2020.

COVID-19 Research by Country

1. US 12,404 articles / 4,966 preprints
2. China 6,379 articles / 1,275 preprints
3. UK 5,137 articles / 467 preprints
4. Italy 4,055 articles / 255 preprints
5. India 2,108 articles / 299 preprints
6. Canada 2,043 articles / 197 preprints
7. Australia 1,701 articles / 187 preprints

COVID-19 Research by University

Universities in the US have produced the highest number of COVID-19 articles and preprints. Since January 2020, Harvard researchers have produced 616 journal articles and 97 preprints related to COVID-19. Researchers at Huazhong University of Science and Technology have produced 510 articles and 38 preprints. Researchers at the University of Oxford have produced 499 articles and 91 preprints.

Over the past six months, I have shared about 400 research papers on COVID-19. The following are highlights from 40 papers that I shared in July 2020.

[Systematic Review of Current Drug Treatments for Severe COVID](#)

BMJ

July 30, 2020

Researchers analyzed 32 unique randomized controlled trials that evaluated drug treatments to compare effects on outcomes. Glucocorticoids were the only intervention with evidence for a reduction in death and duration of mechanical ventilation. This result was driven entirely by the RECOVERY trial. Remdesivir was the only intervention in which moderate certainty exists supporting benefits for both time to symptom resolution and duration of mechanical ventilation, but it is uncertain whether it has any effect on mortality.

[Children Aged 1 Month to 5 Years Had Higher Viral Load Than Adults](#)

JAMA Pediatrics

July 30, 2020

This study found that babies and children aged 1 month to 5 years with mild to moderate COVID had 10x to 100x more SARS-CoV-2 in the nose and throat than adults and older children. In this study, babies and children younger than 5 years had significantly lower CT values indicating that they harbored higher amounts of viral nucleic acid. These results are consistent with results from similar studies in Germany, France, and South Korea.

[1 in 5 People In This UK Study Had COVID Without Any Symptoms](#)

MedRxiv

July 30, 2020

A new antibody testing study led by researchers at King's College London analyzed data for 431 adult twins aged 19-89 in London and South-East England. The participants in this study are members of the *TwinsUK* cohort, the largest UK registry of adult twins. 85% of study participants were female and 15% were male. 1) 12% were positive for viral antibodies 2) 19% with detectable antibodies to SARS-CoV-2 were entirely asymptomatic 3) 25% did not have the core signs of the disease: persistent cough, fever, loss of smell 4) loss of smell was the strongest indicator of seropositivity.

Effectiveness of School Closure in Reducing COVID Spread

JAMA

July 29, 2020

The objective of this population-based time series observational study was to determine the effectiveness of school closure in reducing the spread of COVID in the US. Researchers analyzed the association between school closure and COVID cases and mortality in the US. All 50 US states closed schools in March. Analysis was conducted March 9 - May 7. This analysis showed an association between school closure and a significant decline in COVID cases and mortality.

Wherever ACE2 is Expressed in the Body SARSCoV2 Will Find It

Molecular Systems Biology

July 26, 2020

Researchers analyzed the ACE2 expression in more than 150 different cell types corresponding to all major tissues and organs in the human body. Understanding the role of ACE2 will help us improve our understanding of susceptibility to COVID and the role of ACE2 in clinical manifestations of the disease. Highest expression: intestinal tract, kidney, testis, gallbladder heart. Lowest expression: thyroid gland, adipose tissue, liver, female reproductive organs, lung. Lack of expression: brain, lymphoid tissues, skin, smooth muscle, immune cells.

Using Genome Sequencing to Prevent Future COVID Outbreaks

PNAS

July 28, 2020

In late January, the Diamond Princess cruise ship was placed under quarantine off shore of Yokohama, Japan after a passenger who disembarked in Hong Kong was confirmed to have COVID. Whole-genome sequencing of SARS-CoV-2 from passengers on the ship suggests that a single person with COVID disseminated the virus to passengers throughout the ship at mass gatherings in common areas.

Interferons as a Potential Treatment for COVID

Scientific American

July 28, 2020

Interferons are antivirals that suppress viral replication early in disease and could prevent severe COVID if given at the right time. However interferons might actually exacerbate inflammation if given later in disease. Some early studies show that if the interferon response begins before viral replication peaks, the person will have protective immunity. Interferon given later can cause too many monocytes to secrete inflammatory molecules and cause tissue damage.

Inflammatory Dynamics During COVID

Nature

July 27, 2020

This peer reviewed paper in Nature examines the inflammatory dynamics during COVID and identifies immunological misfiring in severe COVID. Researchers at Yale New Haven Hospital analyzed immune

responses in 113 patients with moderate (non-ICU) and severe (ICU) COVID disease between March and May 2020.

Potential Long-Term Cardiovascular Consequences of COVID

JAMA

July 27, 2020

In this study, researchers analyzed cardiac MRIs from 100 patients who had recovered from COVID and compared them to MRIs of 100 similar people who had not contracted COVID. The MRIs revealed heart damage which was independent of preexisting conditions, severity, and overall course of acute illness. The study found that patients without preexisting cardiovascular conditions many of whom recovered at home, frequently had cardiac inflammation. None of the patients has previous heart conditions.

Largest Study of Viral Load in Asymptomatic People with COVID

MedRxiv

July 27, 2020

This is the largest study of viral load in asymptomatic people with COVID. The objective of this study was to increase understanding of the relationship between viral load, symptom severity, and transmission risk in people who tested positive for COVID. 1) researchers tested 32,480 staff and residents in nursing homes in Massachusetts for COVID 2) the vast majority of residents and staff who tested positive for COVID reported no symptoms at the time of testing 3) the viral load in asymptomatic people and people with symptoms was very similar

Surge of Pulmonary Fibrosis Expected in Next Year Due to COVID

Massachusetts General Hospital

June 12, 2020

A surge of pulmonary fibrosis is expected in the next year due to COVID-- Pathologists from Harvard Medical School and Massachusetts General Hospital note that physicians can expect to see increased numbers of patients with fibrotic lung disease that has developed as a complication of ARDS related to COVID.

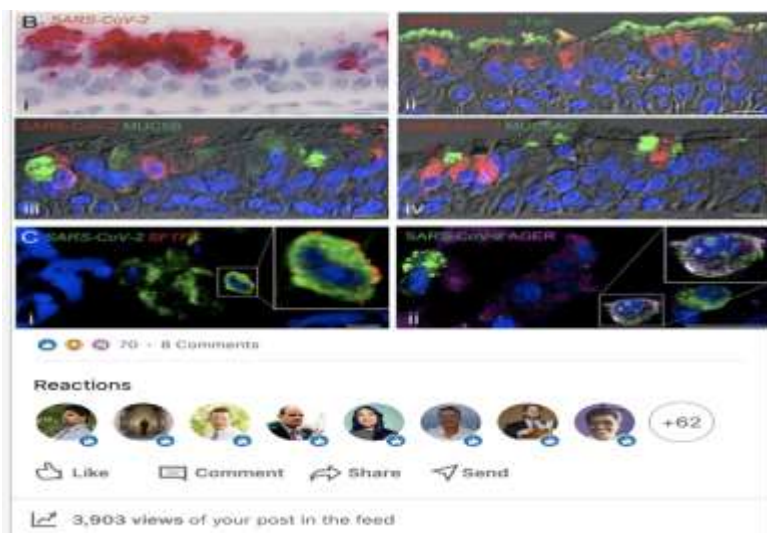
Aerosol Transmission of Infectious Viruses Including SARS-CoV-2

The Lancet

July 24, 2020

This is an excellent article with analysis and interpretation of aerosol transmission of infectious viruses - including SARS-CoV-2 - and implications for infection control. The most important questions are whether pathogens are in plumes and whether their size is consistent with transmission.

COVID Might Infect The Nose First and Use It as an Entry Point



Cell

July 23, 2020

Research at University of North Carolina at Chapel Hill suggests that COVID might infect the nose first and use it as an entry point to the rest of the body and as a hotspot for rapid replication. ACE2 was more abundant in nasal passages than in the respiratory tract. The findings suggest that the virus becomes firmly established in the nose and then makes its way to the lungs where it can cause serious disease including potentially fatal pneumonia.

[How SARS-CoV-2 Disrupts Normal Immune Responses](#)

Signal Transduction and Targeted Therapy

July 25, 2020

SARS-CoV-2 disrupts normal immune responses, leading to an impaired immune system and uncontrolled inflammation. Patients with COVID exhibit lymphopenia and high cytokine levels which are potential biomarkers for disease progression. COVID can induce microbial infection and multiple organ dysfunction. Improving lymphopenia and reducing inflammation may represent effective therapeutic strategies for patients with COVID. This is a clear and detailed review of the COVID immune response and potential treatment strategies.

[COVID Vaccine Reality Check](#)

The Atlantic

July 24, 2020

1) more than 165 candidate vaccines are in development 2) 27 vaccines are already in human trials 3) 6 vaccines are in or about to enter phase 3 trials 4) current trials underway in the UK, Brazil, South Africa 5) the leading vaccine candidates rely on technology that's never been used before in approved vaccines 6) 2 doses of COVID vaccine will likely be required to be effective.

[Very Severe COVID In Healthy Young Men](#)

JAMA

July 24, 2020

Very severe COVID occurred in 4 healthy young men with no preexisting medical conditions. Researchers performed clinical whole-exome sequencing to see if these young men had an underlying genetic variation

that increased susceptibility. They identified a unique genetic defect that might cause a predisposition to developing severe COVID. The findings provide insights into the pathogenesis of COVID.

Prolonged Illness Is Common Patients with Mild COVID

CDC Report

July 24, 2020

Relatively little is known about the clinical course of COVID and return to baseline health for people with mild outpatient illness. In this study, the CDC found that prolonged illness is common in non-hospitalized COVID patients with mild illness. This graph shows the percentage of non-hospitalized COVID patients who reported symptoms up to 3 weeks after positive RT-PCR test for COVID. These findings have important implications for understanding the full spectrum of COVID related illness in outpatients with mild illness.

First Thermostable mRNA COVID Vaccine Candidate in Phase 1

Cell

July 23, 2020

ARCoV is the first thermostable mRNA COVID vaccine candidate. Since cold chain transportation is not available in many COVID epidemic areas, a vaccine that can be stored at room temperature is highly desirable. 1) ARCoV is currently in phase 1 clinical trials 2) results indicate high thermostability of vaccine 3) stable at room temperature for one week 4) in a pre-filled syringe for self-administration 5) based on modified mRNA encapsulated in LNP 6) evaluated in vivo delivery capability in mice 7) conferred full protection against SARS-CoV-2 in mice.

The First Rapid Antibody SARSCoV2 Test

Nature Biotechnology

July 23, 2020

Robust serological testing is critical for contact tracing, accurate determination of asymptomatic infection rate, fatality rate, assessment of herd immunity, and protective immunity. The current gold standard is the conventional virus neutralization test. The major advantage of the new sVNT SARS-CoV-2 surrogate virus neutralization test is that it takes 1-2 hours (vs 2-4 days) and does not require live virus or BL3 containment.

Unexpected Features of Cardiac Pathology in COVID

Circulation

July 21, 2020

The mechanism of cardiac injury in COVID is not known. A series of 22 autopsies by Louisiana State University pathologists yielded unusual observations about how COVID damages the heart. The most significant finding was severely enlarged right ventricles. Evidence of extreme stress on the heart, secondary to acute pulmonary disease. The damage not consistent with typical heart muscle inflammation patterns.

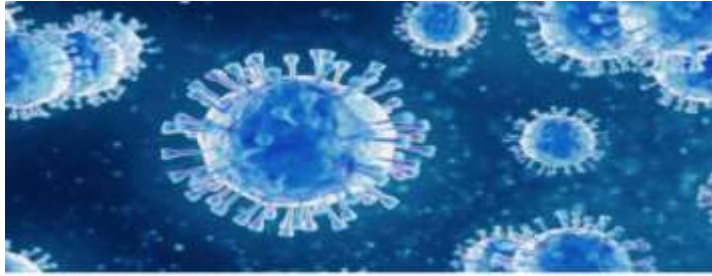
Early Interferon Therapy and Improved Survival

Cell Host & Microbe

July 2020

Encouraging new data shows an association between early interferon therapy and improved survival for COVID patients. In this retrospective multi-center cohort study in China, researchers analyzed data for COVID patients who received interferon therapy to determine if IFNs prevented rapid viral spreading, inflammation, and subsequent cytokine storm. Late interferon therapy increased mortality and delayed recovery, suggesting the timing of interferon therapy is crucial for favorable responses in COVID patients.

Most People in this Study Contracted COVID at Home



CDC Report

July 2020

The first case of COVID in South Korea was identified on January 20, 2020. By May 13, a total of 10,962 cases had been reported. A nationwide COVID contact tracing study provided a big data set on secondary attack rates. South Korean epidemiologists analyzed the data and found that people were more likely to contract COVID at home from members of their own households than from people outside the home. Researchers note that this data was collected when most people were self isolating at home and only went out to perform essential tasks.

Results from Oxford/AstraZeneca Phase 1/2 Vaccine Trials

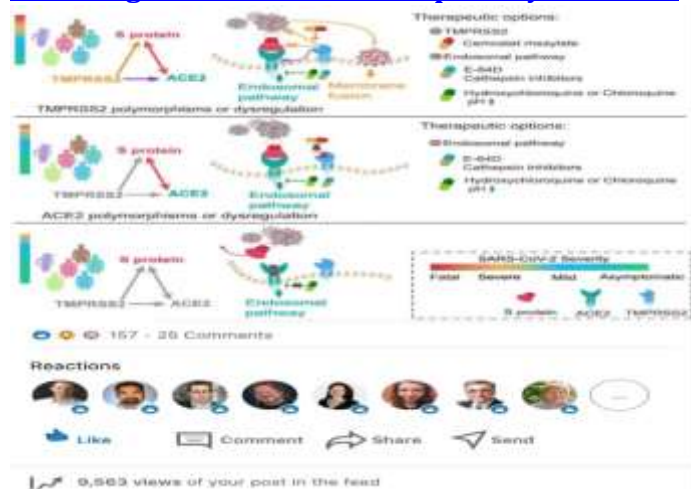


The Lancet

July 20, 2020

Preliminary AZD1222 COVID vaccine trials from [University of Oxford](#)/AstraZeneca. This was a phase 1/2, single-blind, randomized controlled trial with 1077 participants in 5 trial sites in the UK. The objective of this trial was to test immune response and safety. this trial showed antibody response and T-cell response but did not show prevention of infection or disease. No serious adverse events and all side effects were mild or moderate. Vaccine increased levels of both protective neutralizing antibodies and immune T-cells that target the virus.

[New Insights Into Genetic Susceptibility To COVID](#)



BMC Medicine

July 15, 2020

Researchers at Cleveland Clinic investigated how genetic factors may influence COVID susceptibility. They examined DNA polymorphisms in ACE2 and TMPRSS2 from over 81,000 human genomes and found unique genetic susceptibility demonstrating a possible association to COVID susceptibility. They found that the distribution of deleterious variants in ACE2 differs among 8 populations including African/African-American, Non-Finnish European, Latino American, East Asian, Finnish, South Asian, Amish, Ashkenazi Jewish.

[Big Picture Overview of COVID-19](#)

MedRxiv

July 7, 2020

This is an excellent paper by researchers at Radboud University Medical Centre Nijmegen in the Netherlands with an incredibly comprehensive diagram illustrating how comorbidities may increase susceptibility to severe COVID and providing the possible pathophysiological origin of signs, symptoms, and biochemical abnormalities. This visualizes the interwovenness of pathophysiological pathways, with a focus on cytokine-induced pathology, the sequelae of ACE2 downregulation, and thrombosis associated with microvascular injury.

[Six Distinct Types of COVID Identified at King's College London](#)

MedRxiv

July 21, 2020

Scientists at King's College London used AI to identify six types of COVID with increasing severity levels and determined that Type 6 patients are 10x more likely to need breathing support than Type 1. Type 1 - 'flu-like' with no fever: Type 2 - 'flu-like' with fever: headache. Type 3 - GI: headache, loss of smell, loss of appetite, diarrhea. Type 4 - Severe level 1, fatigue: headache, chest pain Type 5 - Severe level 2, confusion: headache, muscle pain Type 6 - Severe level 3, abdominal /respiratory: headache, chest pain, confusion, shortness of breath, diarrhea, abdominal pain.

[This Study Demonstrates Airborne Transmission of COVID](#)

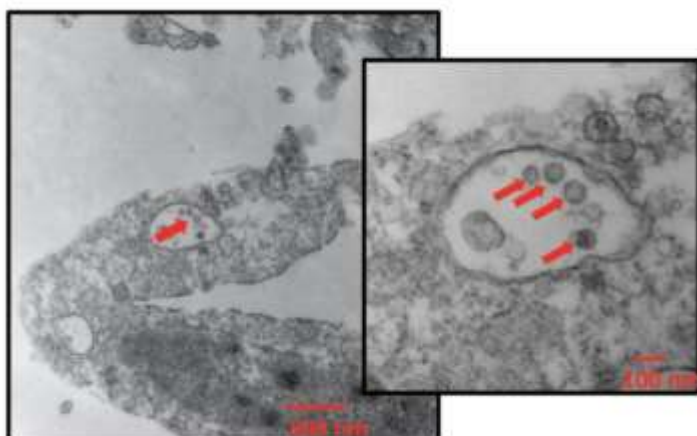


Figure 3. Electron micrographs of SARS-CoV-2 virions cultivated from the sub-micron filter from Room 5C.

76 · 5 Comments

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MedRxiv

July 21, 2020

In order to classify an infectious disease as airborne it must be transmitted via aerosol particles $<5\text{ }\mu\text{m}$ in diameter, be produced by ill individuals, the infectious aerosol must be stable long enough to expose another person, if inhaled, the viral aerosol must be capable of causing infection. This study demonstrates that SARS-CoV-2 RNA exists in respired aerosols less than $5\text{ }\mu\text{m}$ in diameter and that aerosols containing SARS-CoV-2 RNA exist in particle modes that are produced during respiration, vocalization, and coughing.

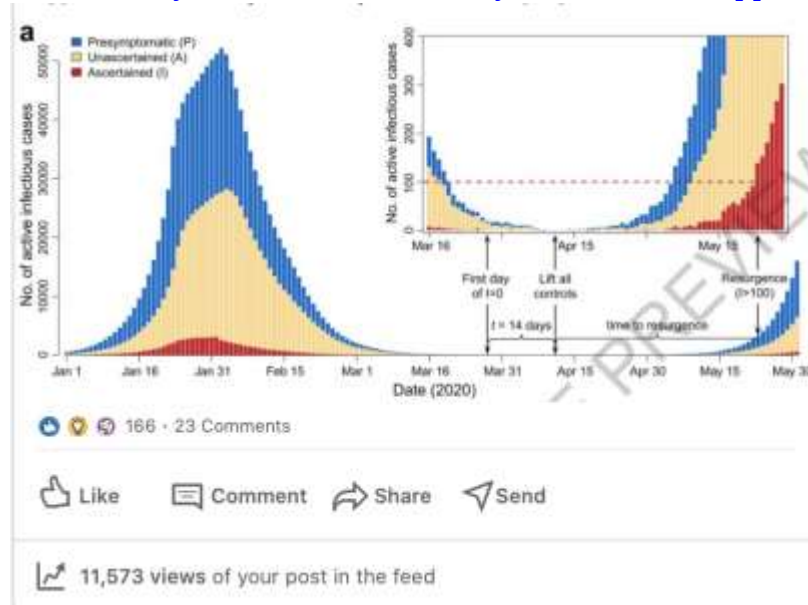
[The Potential Role of T Cells in Long Term COVID Immunity](#)

BBC

July 19, 2020

Several studies have shown that people infected with COVID have T cells that can target the virus. CD4+ and CD8+ T cells have been detected in 70- 100% of recovered COVID patients. Some people test negative for antibodies against COVID but positive for T cells that can identify the virus. When researchers tested blood samples taken years before the pandemic started, they found T cells which were specifically tailored to detect proteins on the surface of COVID. 40-60% of unexposed people had T cells that could detect proteins on the surface of COVID. This suggests that some people already had pre-existing resistance against COVID before it ever infected humans and some level of immunity against COVID might be twice as common as was previously thought. If scientists can decipher the importance of T cells and understand which aspects of the immune system are the most important in fighting COVID, they can make vaccines and treatments that work.

Almost Every Person Was Infected by Someone Who Appeared Healthy



Nature

July 16, 2020

This study shows that almost every person who became sick with COVID from January 1 - March 8 in 375 cities in China was infected by someone who appeared to be healthy. This study reveals important transmission features including the infectiousness of asymptomatic and presymptomatic people and concludes that understanding the transmissibility of asymptomatic and presymptomatic cases is critical for controlling the spread of COVID.

COVID-19 Immunity Compared to Other Coronavirus Infections

Immunity

July 2020

Developing an effective COVID-19 vaccine requires understanding what constitutes a protective immune response to COVID-19. Since COVID-19 has only infected humans for 6 months, the immune response to COVID-19 is not well understood. This paper reviews the literature on other coronavirus infections. Insights gained from studies of other coronavirus infections might help us understand COVID-19 immunity and help us develop an effective vaccine.

Moderna Publishes Promising Results from Phase 1 Trials

New England Journal of Medicine

July 14, 2020

Moderna published promising results from Phase 1 trials of their COVID vaccine candidate. This is the first US vaccine candidate to publish results in a peer-reviewed medical journal. In the trials, the vaccine induced anti-SARS-CoV-2 immune responses in all participants and no safety concerns were identified. Moderna says that if all goes well in upcoming trials, they will be able to deliver 500 million doses per year, and possibly up to 1 billion doses per year, beginning in 2021.

[T Cell Immunity Found in People Not Exposed to SARS-CoV-2](#)



Nature

July 7, 2020

Researchers found that substantial T cell immunity exists in people who have not been exposed to SARS-CoV-2. In studies, lymphocytes from up to 50% of unexposed people display significant reactivity to SARS-CoV-2. The potential for pre-existing immunity to COVID has led to extensive speculation. The source and clinical relevance of pre-existing immunity is unknown but it may reflect T cell memory to circulating common cold coronaviruses.

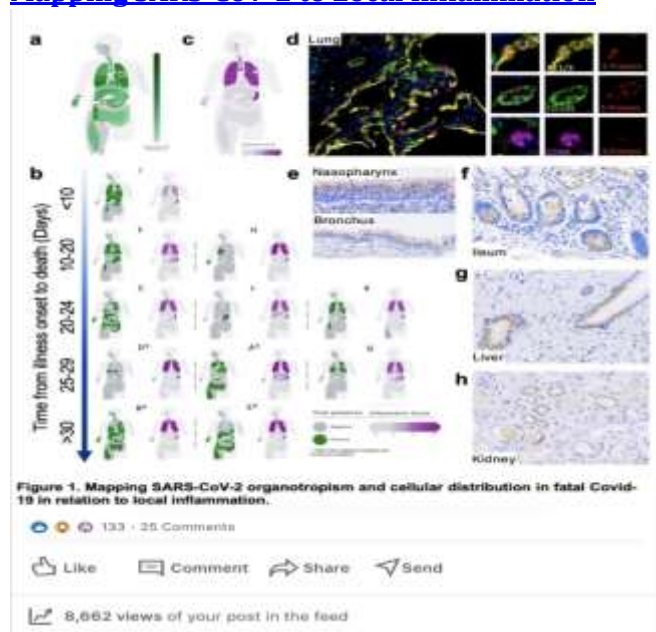
[Organ-Specific Manifestations of COVID](#)

Nature

July 10, 2020

This excellent new paper provides a clear and comprehensive review of organ-specific manifestations of COVID with insights into the clinical impact on various organ systems. This paper explores Direct viral toxicity, Endothelial cell damage, Hematologic manifestations, Cardiovascular manifestations, Renal manifestations, GI manifestations, Hepatobiliary manifestations, Endocrinologic manifestations, Neurologic and ophthalmologic manifestations, Dermatologic manifestations.

Mapping SARS-CoV-2 to Local Inflammation

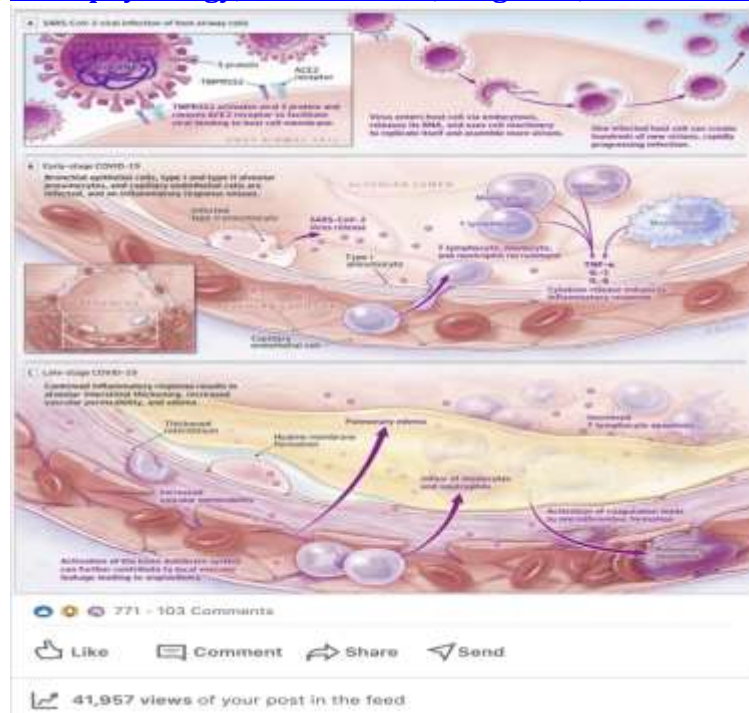


MedRxiv

July 12, 2020

In this study, researchers performed detailed autopsies of organ injury throughout the body and present a multi-parameter tissue survey of fatal COVID. This study highlights for the first time the discrepancy between the presence of SARS-CoV-2 and tissue inflammation. Detected SARS-CoV-2 RNA across all sampled organs and tissue sites, most frequently in respiratory tract, but also in the GI tract, heart, liver, and kidney. Found that tissue inflammation and organ dysfunction do not map to the tissue and cellular distribution of SARS-CoV-2, demonstrating tissue-specific tolerance. Concluded that death in COVID is primarily a consequence of immune-mediated, rather than pathogen-mediated, organ inflammation and injury.

Pathophysiology, Transmission, Diagnosis, Treatment of COVID



JAMA

July 10, 2020

This is a very detailed paper with data analyzed from hospitalized COVID patients in studies published from January 1 - June 15, 2020. 1) mean incubation period 2-7 days 2) 97% develop symptoms within 11 days of infection 3) median age of hospitalized patients 47-73 years 4) 75% require supplemental oxygen therapy 5) 72% treated with broad-spectrum antibiotics 6) 17-35% treated in ICU 7) 29-91% require invasive mechanical ventilation 8) 9% have kidney injury 9) 19% have liver dysfunction 10) 10-25% have bleeding and coagulation dysfunction 11) 8% have bacterial or fungal co-infection 12) 6% have septic shock 13) overall hospital mortality from COVID is 15%-20% 14) ICU mortality from COVID is up to 40%

Next Generation COVID Testing

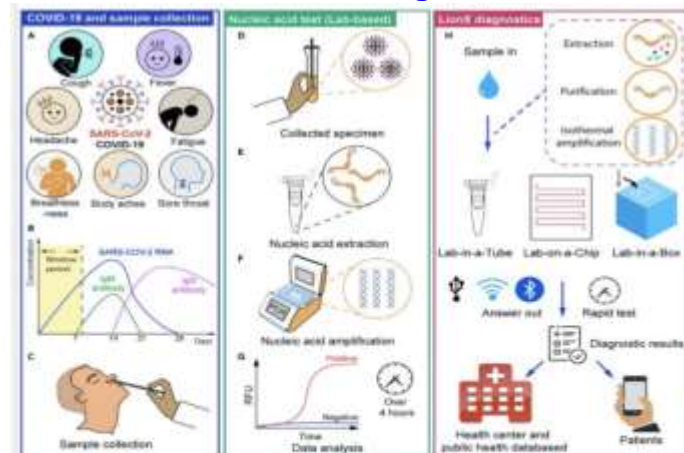


Figure 1: The Diagnosis of COVID-19 with Laboratory-Based and POC Tests

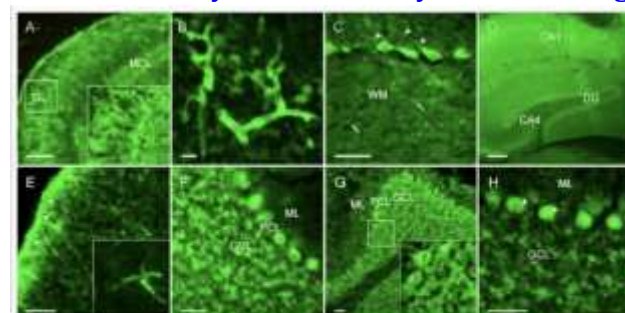


Matter, Cell Press Journal

July 9, 2020

The continued development of new diagnostic platforms based on state-of-the-art technologies is improving COVID testing. This paper summarizes next generation micro and nanosystems for NA-based virus detection and describes advances in sample collection, nucleic acid extraction, nucleic acid amplification, and signal detection methods including optical detection, electrochemical sensing, electronic sensing, and nanopore based sequencing. LionX systems: Lab-in-a-Tube, Lab-on-a-Chip, Lab-in-a-Box, Lab-in-a-Cartridge, Lab-on-a-Drone.

How COVID May Trick the Body Into Attacking the Brain



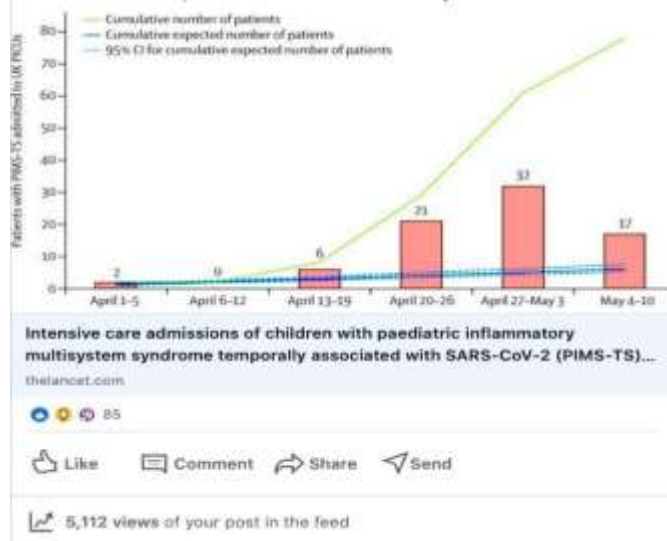
MedRxiv

July 6, 2020

After the 1918 flu pandemic, over a million patients had persistent neurological problems. Neurological symptoms have also been observed in COVID patients. A new study in Germany observed a mechanism by

which COVID may trick the body into attacking the brain causing neurological problems. 1) all 11 patients in this study had strong autoantibodies in their cerebrospinal fluid that targeted the brain 2) these autoantibodies are not normally found in the cerebrospinal fluid of healthy people 3) it appears that these patients' immune systems produced autoantibodies that mistakenly targeted their tissues and organs.

Paediatric Inflammatory Multisystem Syndrome with COVID



The Lancet

July 9, 2020

This is the largest study of critically ill children admitted to UK ICUs with paediatric inflammatory multisystem syndrome associated with COVID. This is the first nationwide, multi-center observational study and the first to describe longitudinal data. Notable findings, including the absence of significant respiratory involvement, indicate that PIMS-TS might represent a post-COVID immunological disease that is clinically distinct from acute COVID in children.

The Largest Peer Reviewed Study Ever on COVID Risk

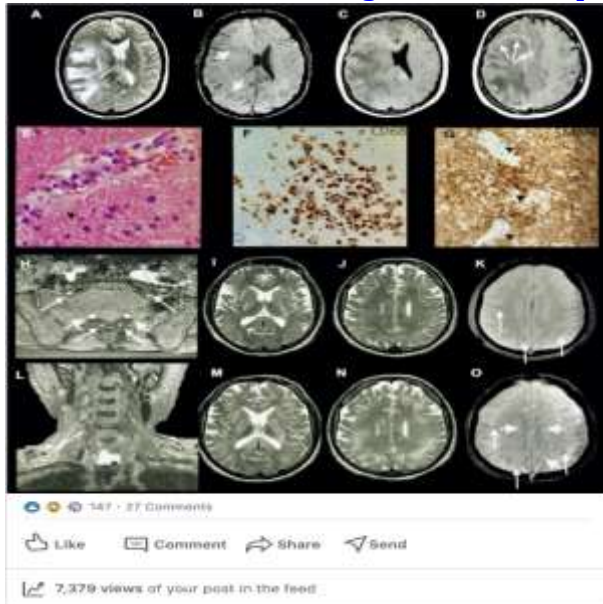


Nature

July 8, 2020

This study explores the risk of death from COVID in the general population using mined EHR from 17 million people in the UK. This study confirms that sex, age, and ethnicity raise a person's chances of dying from COVID. 1) men have higher risk of dying of COVID than women of the same age 2) black and south asian people have higher risk of dying from COVID than white people even after adjustment for other factors 3) all non-white ethnic groups had higher risk than those with white ethnicity 4) obesity, diabetes, severe asthma, compromised immunity were all linked to poor outcomes 5) patients over 80 years were 20x more likely to die from COVID than those in their 50s 6) patients over 80 years were 100s of times more likely to die than those below the age of 40.

[COVID-Linked Brain Damage Found In People With Mild Symptoms](#)



Brain, Journal of Neurology

July 8, 2020

Researchers at University College London report that preliminary clinical data indicates that COVID can lead to severe neurological complications and neuropsychiatric illness including inflammation, psychosis, delirium, strokes, haemorrhage, nerve damage and serious brain damage. 1) 24 males and 19 females 2) ages ranging from 16–85 years 3) 53% were non-white 4) COVID severity varied from mild to critical 5) neurological problems from 6 days before to 27 days after onset of COVID symptoms 6) potential mechanisms underpinning the syndromes described include direct viral injury and secondary hyperinflammation syndrome related to cytokines.

References

Additional statistics on research papers can be found at [Nature Index](#)

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This article was written by [Margaretta Colangelo](#). Margaretta is Co-founder and Managing Director of Deep Knowledge Group. She is Co-founder and Managing Partner of Deep Knowledge Ventures, Longevity Capital, and

AI Pharma Capital. She is Co-founder of Longevity Bank, Aging Analytics Agency and Deep Knowledge Analytics. She is Co-founder and CEO of Jthereum an Enterprise Blockchain technology company. Margaretta serves on the Advisory Boards of the AI Precision Health Institute at the University of Hawai'i Cancer Center and the Longevity AI Consortium at King's College London. Margaretta is based in San Francisco.

Deep Knowledge Group is an international consortium of commercial and non-profit organizations focused on the synergetic convergence of DeepTech and Frontier Technologies including AI, Longevity, FinTech, GovTech, and InvestTech. Deep Knowledge Group's subsidiaries and associated organizations include Deep Knowledge Ventures, Longevity Capital, AI-Pharma Capital, Longevity Bank, Longevity FinTech Company, Deep Knowledge Analytics, Aging Analytics Agency, NeuroTech Analytics, Biogerontology Research Foundation, Longevity Swiss Foundation, Longevity International UK - Secretariat for the UK All-Party Parliamentary on Longevity, and the Longevity AI Consortium at King's College London.

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Co-Founder & Managing Director Deep Knowledge Group

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Over the past 6 months I've read, summarized, and shared about 400 research papers on COVID-19. This article is a consolidation of highlights from 40 of the papers that I shared in July.

[#coronavirus](#) [#artificialintelligence](#)

[#innovation](#)

GLOBAL HEALTH NOW

COVID-19 Expert Reality Check

April 6, 2020



Image credit

This scanning electron microscope image shows SARS-CoV-2 (round magenta objects), also known as COVID-19, emerging from the surface of cells cultured in the lab. Image: NIAID-RML

As the media swarms the coronavirus story, most news articles focus on numbers of cases and deaths, new locations of cases, etc.

Lost in the shuffle are the important public health insights about how viruses work and humans respond. To help improve understanding of an emerging outbreak's complex dynamics, GHN has reached out to some of the world's most respected global health experts for their quick "reality checks" on key issues related to the outbreak.

Ed. Note: See the [Johns Hopkins Coronavirus Resource Center](#) for more information and updates.

The Latest

[Does an overreaction by the immune system play a role in COVID-19 deaths, or are they caused strictly by damage inflicted by the virus itself? By Jay Bream](#)

[Can my kids go and play with friends? By Crystal Watson](#)

[Does COVID-19 pose a risk to blood donors or recipients? By Harpreet Sandhu](#)

Virus

[What can we expect from the coronavirus circulating now? Will it change to become more lethal or more easily transmitted? By Ralph Baric](#)

[Will most of humanity be infected by the new coronavirus? By Justin Lessler](#)

[How does a virus shift from zoonotic to human-to-human transmission? By David Quammen](#)

[Is it possible to be reinfected with the novel coronavirus? By Rachel Graham](#)

[What is viral load, and does it mean doctors and nurses face greater risk of infection or getting more severely ill? By Ray Viscidi](#)

[What is cryptic transmission, and what is its significance in the COVID-19 outbreak? By Ingrid Katz](#)

[Given that coronaviruses can cause the common cold, does that mean humans likely have some protection against this new virus? Or are we immunologically "naive"? By Angela Rasmussen](#)

[How do you go about creating a vaccine against a new virus? By Peter Hotez](#)

[How does this particular coronavirus compare with other coronaviruses like SARS and MERS? By Tom Frieden](#)

Outbreak

[There have been news reports that the coronavirus epidemic will last for 18 months or longer and come in multiple waves. If so, how long will social distancing be necessary in that situation? By Eric Toner](#)

[What's the worst case scenario for this pandemic? By Laurie Garrett](#)

[How much will mortality rates vary from country-to-country given differing levels of health system preparedness and response resources? By Antonia Ho](#)

[When does an outbreak become a pandemic? By Eric Toner](#)

[Why are wild animals believed to be the source of this outbreak? By Sonia Shah](#)

[How do disease detectives find the source of an outbreak like this? By Michael Mina](#)

[What are super spreaders and how can they affect the trajectory of an outbreak? By Justin Lessler](#)

[What's a reproductive number and what does it tell us about an outbreak's future? By Michael Osterholm](#)

[What does successful risk communication look like? By Amanda McClelland](#)

[What are some of the major challenges to global cooperation in this coronavirus outbreak? By Sarah McCool](#)

Response

[What is contact tracing, why is it important, and how is it done? By Anita Cicero](#)

[Do health care workers present a risk to the community by returning home after work? By Marisa Holubar and Yvonne \(Bonnie\) Maldonado](#)

[Why will it likely take longer to develop a vaccine than a drug for COVID-19? By William Moss](#)

[Does the COVID-19 pandemic automatically mean setbacks for ongoing global health programs? By Loyce Pace](#)

[What's the most important thing that WHO can do in the fight against COVID-19? By Ilona Kickbusch](#)

[How can public health advocates encourage citizens to trust their advice in countries roiled by attacks on science? By Keiji Fukuda](#)

[What does "preparedness" in a country really mean? By Caitlin Rivers](#)

[In the absence of approved treatments, what can health care providers do? By Nahid Bhadelia](#)

[What's the best way to counter misinformation in the media? By Amesh Adalja](#)

[What is it like inside a hospital biocontainment room? By Lauren Sauer](#)

[What's the best way to respond to the coronavirus outbreak? By Tom Inglesby](#)

[Can travel restrictions and quarantines stem the spread of the coronavirus? By Jennifer B. Nuzzo](#)

[What should a country like the US be doing to prepare when an outbreak like this begins to spread globally? By Tom Frieden](#)

[Are strong national health systems all we need for pandemic preparedness? By Gavin Yamey](#)

[What do frontline health care workers need most when they face an outbreak like this? By Amanda McClelland](#)

[What are the ethical considerations of using quarantines? By Jeffrey Kahn](#)

Minimize Your Risk

[As COVID-19 symptoms mimic those of common cold and flu viruses, how do you know when you should seek testing or special care? By Preeti Malani](#)

[What should the average person in a non-outbreak area be doing to prepare? By Michael Osterholm](#)

[What precautions should I take when I have to go out to get food? By Crystal Watson](#)

[What are the special risks of COVID-19 to pregnant women? By David Baud](#)

[Could export goods transmit SARS-CoV-2 infection around the world? By Sulzhan Bali](#)

[Can the new coronavirus be transmitted via paper money? By Marilyn Roberts](#)

Have more questions? Please send GHN any questions you'd like to see answered related to the coronavirus outbreak. Just email Dayna (dkerecm1 at jhu.edu). And, for GHN's latest coverage of the coronavirus, [visit here](#) - and, if you don't already subscribe to our free daily enewsletter, you can [sign up here](#).

Virus

Does an overreaction by the immune system play a role in COVID-19 deaths, or are they caused strictly by damage inflicted by the virus itself?

Infection with SARS-CoV-2 is associated with respiratory tissue damage that can impair lung function and even cause death. Though it is likely that both the virus and immune system contribute to this process, it can be difficult to determine which mechanism causes the most

Jay Bream, PhD, is an associate professor in Molecular Microbiology and Immunology at the Johns Hopkins Bloomberg School of Public Health.

“What can we expect from the coronavirus circulating now? Will it change to become more lethal or more easily transmitted?”

The SARS-CoV-2 virus that causes COVID-19 will likely continue with minimal variation. It will probably stay stable because very few people are immune—so many “naïve” human hosts are still available for maintaining current transmission cycles.

Ralph Baric, PhD, is a professor in the Department of Epidemiology and in the Department of Microbiology and Immunology at the University of North Carolina Gillings School of Global Public Health.

Will most of humanity be infected by the new coronavirus?

It is likely that eventually it will become endemic, and most of us will get infected. But one question is super important: How long will it take for that to happen?

Justin Lessler is an associate professor of Epidemiology at the Johns Hopkins Bloomberg School of Public Health.

How does a virus shift from zoonotic to human-to-human transmission?

When a virus passes from a nonhuman animal into a human, we call that moment of spillover a *zoonotic* transmission. It’s an ecological event. What happens next depends on evolutionary potential and chance. If the virus is adaptable, it may succeed in replicating and proliferating in the new human host. Maybe it kills the person and the line of transmission comes to an end there—as happens with rabies. But if the virus is even more adaptable, it may acquire the ability to pass from one human host to another, perhaps by sexual contact (as with HIV), perhaps in bodily fluids such as blood (as with Ebola), perhaps in respiratory droplets launched by coughing or sneezing (as with influenza or SARS). What makes a virus adaptable? The changeability of its genome, plus Darwinian natural selection. Those viruses with single-stranded RNA genomes, which replicate themselves inaccurately and therefore have highly changeable genomes, are among the most adaptable. Coronaviruses belong to that group.

David Quammen is the author of more than a dozen books, including Spillover: Animal Infections and the Next Human Pandemic, and hundreds of articles for publications including National Geographic, The Atlantic, Harper’s, Rolling Stone, and many others.

<https://www.globalhealthnow.org/2020-02/coronavirus-expert-reality-check>

Coronavirus (Coverage in Science Magazine News)

Coronavirus: Research, Commentary, and News

The Science journals are striving to provide the best and most timely research, analysis, and news coverage of COVID-19 and the coronavirus that causes it. All content is free to access.

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<https://www.sciencemag.org/tags/coronavirus>

Scientists Used AI to Crack COVID19's Genetic Signature and Identify Its Origin. Gurjit Randhawa and his colleagues developed a ML method that achieved 100% accuracy in classifying the COVID19 sequences and discovered the most relevant relationships among more than 5,000 viral genomes within minutes. Their study supports the hypothesis that COVID19 has its origin in bats. Their paper demonstrates how ML can use genomic signatures to provide ultra fast classification of novel pathogens. They used a graphics based classification system that delivered highly accurate classifications of the virus without a priori biological knowledge. This new AI tool will allow researchers to quickly and easily classify other deadly viruses in minutes which is extremely important for strategic planning and mobilizing medical needs during a pandemic. The tool will be an essential component in the toolkit for vaccine and drug developers, front-line health-care workers, researchers and scientists during this global pandemic and beyond.

Link to paper in PLOS: https://lnkd.in/gVaE3_g

Reference: "Machine learning using intrinsic genomic signatures for rapid classification of novel pathogens: COVID-19 case study" by Gurjit S. Randhawa, Maximillian P. M. Soltysiak, Hadi El Roz, Camila P. E. de Souza, Kathleen A. Hill and Lila Kari, 24 April 2020, PLOS ONE.
DOI: 10.1371/journal.pone.0232391

<https://scitechdaily.com/researchers-crack-covid-19-genetic-signature-using-ai-identify-origin/>

Research Article

SARS-CoV-2 productively infects human gut enterocytes

Mart M. Lamers^{1,*}, Joep Beumer^{2,*}, Jelte van der Vaart^{2,*}, Kèvin Knoops³, Jens Puschhof², Tim I. Breugem¹, Raimond B. G. Ravelli³, J. Paul van Schayck³, Anna Z. Mykytyn¹, Hans Q. Duimel³, Elly van Donselaar³, Samra Riesebosch¹, Helma J. H. Kuijpers³, Debby Schippers¹, Willine J. van de Wetering³, Miranda de Graaf¹, Marion Koopmans¹, Edwin Cuppen^{4,5}, Peter J. Peters³, Bart L. Haagmans^{1,†}, Hans Clevers^{2,†,‡}

See all authors and affiliations

Science 01 May 2020:

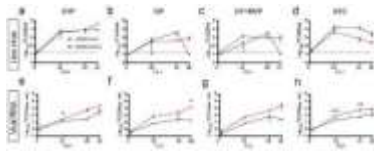
eabc1669

DOI: 10.1126/science.abc1669

Abstract

The virus severe acute respiratory syndrome–coronavirus 2 (SARS-CoV-2) can cause coronavirus disease 2019 (COVID-19), an influenza-like disease that is primarily thought to infect the lungs with transmission via the respiratory route. However, clinical evidence suggests that the intestine may present another viral target organ. Indeed, the SARS-CoV-2 receptor angiotensin converting enzyme 2 (ACE2) is highly expressed on differentiated enterocytes. In human small intestinal organoids (hSIOs), enterocytes were readily infected by SARS-CoV and SARS-CoV-2 as demonstrated by confocal- and electron-microscopy. Consequently, significant titers of infectious viral particles were detected. mRNA expression analysis revealed strong induction of a generic viral response program. Hence, intestinal epithelium supports SARS-CoV-2 replication, and hSIOs serve as an experimental model for coronavirus infection and biology

Fig. 2 SARS-CoV and SARS-CoV-2 replicate in hSIOs.



(a to d) Live virus titers can be observed by virus titrations on VeroE6 cells of lysed organoids at 2, 24, 48 and 60h after infection with SARS-CoV (blue) and SARS-CoV-2 (red). Different medium compositions show similar results. (e to h) qPCR analysis targeting the E gene of similar timepoints and medium compositions as (a) to (d). The dotted line indicates the lower limit of detection. Error bars represent SEM. N=3. *P<0.05, **P<0.01, ***P<0.001.

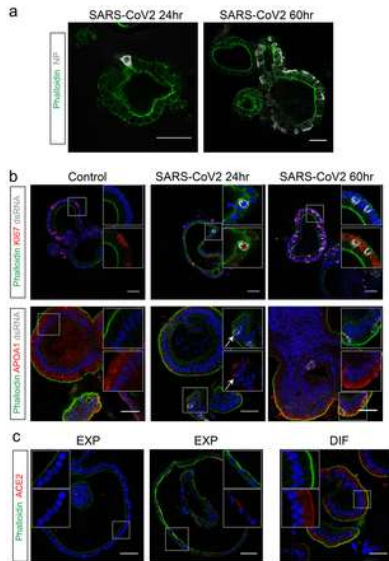


Fig. 3 SARS-CoV-2 infects proliferating cells and enterocytes.

(a) Immunofluorescent staining of SARS-CoV-2-infected intestinal organoids. Nucleoprotein (NP) stains viral capsid. After 24 hours, single virus-infected cells are generally observed in organoids. These small infection clusters spread through the whole organoid after 60 hours. (b) SARS-CoV-2 infects both post-mitotic enterocytes identified by Apolipoprotein A1 (APOA1) and dividing cells that are KI67-positive. Infected cells are visualized by dsRNA staining. Enterocytes are shown in differentiated organoids, and proliferating cells in expanding organoids. Arrows point to APOA1-positive cells. (c) Immunofluorescent staining of ACE2 in intestinal organoids in expansion and differentiation condition. All scale bars are 50 µm.

<https://science.sciencemag.org/content/early/2020/04/30/science.abc1669>

[Via William A Haseltine](#)

• 1st

[President, ACCESS Health International](#)

[A report from Shanghai shows that despite differences in the genome of 2 different SARS-CoV-2 strains, the disease caused by infection was the same. The health of patients before infection was the major determinant of the severity of symptoms not the virus variant.](#)

<http://ow.ly/dltj50zN5mx> ; <https://www.genomeweb.com/infectious-disease/host-factors-influence-covid-19-severity-more-viral-genetic-variation-study-finds#.Xz1aIX57nX4>

Host Factors Influence COVID-19 Severity More Than Viral Genetic Variation, Study Finds

[genomeweb.com](https://www.genomeweb.com) • 1 min read

Host Factors Influence COVID-19 Severity More Than Viral Genetic Variation, Study Finds

May 20, 2020

|

[staff reporter](#)



Scanning electron microscope image of SARS-CoV-2 emerging from cultured cells; Credit: NIAID-RML

NEW YORK – Host factors rather than viral genetic differences appear to influence disease outcomes among COVID-19 patients, according to a new study from China.

Researchers in Shanghai examined clinical, molecular, and immunological data from more than 300 people with confirmed COVID-19. While infection with SARS-CoV-2 can lead to severe respiratory disease and death, it also can result in more mild pneumonia in some patients.

As they [reported Wednesday in *Nature*](#), researchers led by Hongzhou Lu at Fudan University uncovered two different SARS-CoV-2 strains within their patient cohort, but found these genetic viral variations did not significantly affect patient outcomes. Instead, having low levels of lymphocytes appeared to predict disease severity.

"The determinants of disease severity seemed to stem mostly from host factors such as age, lymphocytopenia, and its associated cytokine storm, whereas viral genetic variation did not significantly affect the outcomes," Lu and his colleagues wrote in their paper.

The researchers analyzed data collected from 326 individuals. Of these, five were asymptomatic and had no fever, respiratory symptoms, or radiological evidence of disease, though they had confirmed SARS-CoV-2 infections. Most of the cohort, though, 293 individuals, had mild disease, defined as having a fever and

radiological evidence of pneumonia. Twelve patients had severe disease with shortness of breath and ground-glass opacity in their lungs, and 16 patients had critical disease, developed acute respiratory distress syndrome, and needed a ventilator or extracorporeal membrane oxygenation. As of the beginning of April, almost all of these patients had been discharged, but six had died.

Viral sequencing data was available for 112 samples. When the researchers compared their viral genome data from patients in Shanghai to the initially reported SARS-CoV-2 virus from Wuhan, they identified 66 synonymous and 103 non-synonymous variants in nine protein-coding regions.

Using the viral genomes from 94 cases and 221 other SARS-CoV-2 sequences in the GISAID database, the researchers conducted a phylogenetic analysis of their samples. They separated into two major clades and indicated the earliest zoonotic spillover event may have occurred in late November, which the researchers noted was in line with others' findings.

However, viruses from both clades led to similar disease among patients. The researchers uncovered no statistical differences in disease severity, lymphocyte count, CD3 T cell count, C-reactive protein, D-dimer, or viral shedding duration.

Instead, host factors appeared to affect disease severity. In particular, leukocytopenia was more common among severe and critically ill patients, which the researchers said confirmed prior reports. CD3+ T cells were most severely affected and were suppressed in severe and critical patients. They also noted that CD4+ and CD8+ cell counts were reduced in these patients.

Additionally, patients with critical and severe COVID-19 had high levels of the cytokines IL-6 and IL-8 upon admission and treatment. These levels correlated with decreased lymphocyte count and suggested a link between inflammatory cytokines and COVID-19 severity.

"[B]y closely monitoring the molecular and immunological data in 326 cases of COVID-19 patients, we suggest that adverse outcome is associated with depletion of CD3+ T lymphocytes that is tightly linked to bursts of cytokines such as IL-6 and IL-8," Lu and his colleagues wrote.

Age, the presence of pre-existing conditions, and gender also influenced disease severity, they noted.

<https://www.genomeweb.com/infectious-disease/host-factors-influence-covid-19-severity-more-viral-genetic-variation-study-finds-.XsrJJDI7nX4>Top of FormBottom of Form

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

- [Open Access](#)¹
- [Published: 16 June 2016](#)

Nasal commensal *Staphylococcus epidermidis* counteracts influenza virus

- [Hui-Wen Chen,](#)
- [Pei-Feng Liu,](#)
- [Yu-Tsueng Liu,](#)
- [Sherwin Kuo,](#)
- [Xing-Quan Zhang,](#)
- [Robert T. Schooley,](#)
- [Holger Rohde,](#)
- [Richard L. Gallo](#) &
- [Chun-Ming Huang](#)

[Scientific Reports](#) volume 6, Article number: 27870 (2016)

The Microbiome and other Host Factors are becoming significant contributors to curbing viral infections eg nasal Staphylococcus epidermidis: 'S. epidermidis culture supernatants significantly suppressed the infectivity of various influenza viruses. Using HPLC together with MS, we identified a giant extracellular matrix-binding protein (Embp) as the major component involved in the anti-influenza effect of S. epidermidis. This anti-influenza activity was abrogated when Embp was mutated, confirming that Embp is essential for S. epidermidis activity against viral infection. We also showed that both S. epidermidis bacterial particles and Embp can directly bind to influenza virus. Furthermore, the injection of a recombinant Embp fragment containing a fibronectin-binding domain into embryonated eggs increased the survival rate of virus-infected chicken embryos. For an in vivo challenge study, prior Embp intranasal inoculation in chickens suppressed the viral titres and induced the expression of antiviral cytokines in the nasal tissues. These results suggest that S. epidermidis in the nasal cavity may serve as a defence mechanism against influenza virus infection.'

<https://www.nature.com/articles/srep27870>

The Coronavirus Is Evolving Before Our Eyes

The virus is mutating as expected. We can still stop it.

- Story by [James Hamblin](#)

In the final, darkest days of the [deadliest](#) year in U.S. history, the world received ominous news of a mutation in the SARS-CoV-2 coronavirus. Scientists in the U.K. had identified a form of the virus that was spreading rapidly throughout the nation. Then, on January 4, Prime Minister Boris Johnson announced a [lockdown](#) that began almost immediately and will last until at least the middle of February. "It's been both frustrating and alarming to see the speed with which the new variant is spreading," he [said](#) in an address, noting that "our scientists have confirmed this new variant is between 50 and 70 percent more transmissible" than previous strains.

Those figures, based on an early estimate by British government scientists in late December, made for terrifying [push alerts](#) and headlines. Though this strain of the virus (officially called "B.1.1.7") quickly became known as "the U.K. variant," it has already been found in [45 countries](#), suggesting that the opportunity to contain it with travel restrictions has passed. On January 8, Australia [locked down](#) Brisbane, a city of 2.3 million people, after discovering a single case.

Each day, B.1.1.7 is [being found](#) in more people in more places, including [all around](#) the United States. Experts have raised dire [warnings](#) that a 70 percent more transmissible form of the virus would overwhelm already severely stretched medical systems. Daily deaths have already tripled in recent months, and the virus is killing more than 3,000 Americans every day. From a purely mathematical perspective, considering exponential growth, a significantly more transmissible strain could theoretically lead to tens of thousands of daily deaths, with hospital beds lining sidewalks and filling parking lots.

[Read: The problem with stories about dangerous coronavirus mutations](#)

To make matters worse, the warnings from Britain were followed by headlines about yet another variant, B.1.351, in [South Africa](#). Then *another* concerning variant was identified in [Brazil](#). News reports speculated that these strains may [resist vaccines](#). Some experts cautioned that the mutations [could](#) render current treatments less effective. Scott Gottlieb, the former director of the FDA, [said](#) last week: "The South Africa variant is very concerning right now because it does appear that it may obviate some of our medical countermeasures, particularly the antibody drugs." On Tuesday, Anthony Fauci echoed that concern, [calling](#) the variant "disturbing."

Related Stories

- [The Mutated Virus Is a Ticking Time Bomb](#)

- [The Next Phase of Vaccination Will Be Even Harder](#)
- [Where Year Two of the Pandemic Will Take Us](#)

These new variants demand to be taken seriously. [Skyrocketing](#) case counts in the U.K. suggest a potential to do enormous damage, and the identification of B.1.1.7 in so many countries is noteworthy. Still, we don't yet know whether either variant will become as dominant worldwide as they have in their respective countries. They might spread widely and cause tremendous harm. They might also do neither.

The sheer scale and capacity of this virus are challenging many things we thought we knew, but the basic laws governing its evolution are not among them. All viruses are constantly evolving and changing, just as human populations are. When a virus is spreading as widely and rapidly as SARS-CoV-2, spinning through trillions of generations each minute, adaptation is inevitable. The transmissibility of the virus will change. The severity of the disease it causes will change. Its ability to evade our immune system will change. It very well may evolve to circumvent our current vaccines.

Thanks to genetic-sequencing technology, we can watch this evolution in real time. We can see the changes in a virus's genes before we even know what they mean for the spread of disease. Charting the course of this evolution, and assessing its significance, has quickly become a foremost challenge of the pandemic. The peril is not that the virus will suddenly change in an extraordinary way that transforms the pandemic, but that it is changing in small, ordinary ways that are playing out on a vast scale, and whose significance we may not appreciate until it's too late.

<https://www.theatlantic.com/health/archive/2021/01/coronavirus-mutations-variants/617694/>

HARVARD CHAN COMMUNITY – LATEST ON COVID-19:

<https://www.hsph.harvard.edu/news/hsph-in-the-news/the-latest-on-the-coronavirus/>

SEE LINKS BELOW:

For the Harvard Chan community: Find the latest updates, guidance, useful information, and resources about Coronavirus Disease 2019 (COVID-19) [here](#).

In the wake of an outbreak of [coronavirus](#) that began in China in late December 2019, Harvard T.H. Chan School of Public Health experts have been speaking to a variety of media outlets. We'll be updating this article on a regular basis. Here's a selection of stories in which they offer comments and context:

May 1: [All the Coronavirus Terminology You Need to Know](#) (Elemental)

This primer on coronavirus terminology defines terms such as "aerosols," "cytokine storm," "herd immunity," and "viral load." [Joseph Allen](#), assistant professor of exposure assessment science, and [Michael Mina](#), assistant professor of epidemiology, were both quoted.

May 1: [Amazon has launched a pilot COVID-19 testing program for warehouse employees](#) (Business Insider)

With some Amazon warehouse facilities experiencing COVID-19 outbreaks, the company has reportedly begun in-house testing for some employees. But Amazon, by pursuing its own testing, is competing with governments for finite testing resources, said [Ashish Jha](#), K.T. Li Professor of Global Health and director of the [Harvard Global Health Institute \(HGHI\)](#). "I'm also not sure it's super useful for every private company to build a testing infrastructure for their own employees," he said. "That raises a whole set of different issues, like sick people not working at Amazon can't get tested, but healthy people working at Amazon can get tested."

May 1: [The Critical Condition of Health Care in 2020](#) (U.S. News & World Report)

With people losing their jobs—and their health insurance—due to the fiscal collapse caused by the COVID-19 pandemic, voters in battleground states may seek an alternative to President Trump if he can't improve the situation, according to [Robert Blendon](#), professor of health policy and political analysis.

May 1: [Trust, testing and tracing: How South Korea succeeded where the US stumbled in coronavirus response](#) (ABC News)

South Korea has been more successful than the U.S. at fighting the coronavirus outbreak, thanks to widespread testing and contact tracing, cheap and effective care for those who were infected, and trust in the government, say experts. "We had a chance to contain this outbreak, but we didn't," said [HGHI](#) director [Ashish Jha](#). "And as a result of that testing failure, over 60,000 Americans are dead and our economy has been shut down. It didn't have to be this way."

April 30: [Tracking the coronavirus through crowdsourcing](#) (Harvard Gazette)

A new crowdsourcing app, [How We Feel](#), is gathering data on the spread of COVID-19. The app was launched as part of a collaboration involving Pinterest and researchers from Harvard and other institutions. One of the collaborators is [Xihong Lin](#), professor of biostatistics.

April 30: [What to know about the efforts in Massachusetts to require masks in public](#) (Boston.com)

As of May 6, Massachusetts will require everyone in the state to wear masks in public if they can't remain six feet away from other people, in order to curb the spread of COVID-19. Some cities and towns, such as Brookline, Cambridge, and Somerville, are already requiring masks everywhere, all the time. Experts say that risk of infection is low in uncrowded outdoor areas. But [William Hanage](#), associate professor of epidemiology, said that requiring face masks in all outside settings can reduce the chance that someone will move into a crowded area without a mask. And [Barry Bloom](#), Joan L. and Julius H. Jacobson Research Professor of Public Health, said he is a "big believer" in masks, because they can help reduce the amount of virus particles that can get into a person's lungs.

April 29: [End of Trump's social distancing policy spurs fears of virus rebound](#) (Politico)

The Trump administration is ending its national campaign to get people to stay home to limit the spread of the coronavirus, leaving it up to states to figure out their own plans. Experts worry that the lack of national guidelines could drive a resurgence of COVID-19 or prolong the current outbreak. In response to President Trump's statements that he expects warmer temperatures and sunny days in summer to contain the spread of the virus, [HGHI](#) director [Ashish Jha](#) said, "It might help on the margins. But we shouldn't expect big help from temperature."

April 29: [Op-ed: Infectious Disease Expert: Scientists Need To Collaborate Across Borders To Fight The Coronavirus Pandemic](#) (Forbes)

Public health research professor [Barry Bloom](#) wrote that scientists in China, the U.S., and other countries are working together to provide the best scientific evidence they can to beat COVID-19. "It's the international sharing of scientific knowledge and values that will ultimately defeat this disease," he wrote.

April 29: [CRISPR-based diagnostic chips perform thousands of tests simultaneously to detect viruses](#) (Broad Institute)

A new diagnostic platform developed at the [Broad Institute](#) uses CRISPR-based detection technology and microfluidic chips to run thousands of tests at the same time to check for viruses, with same-day results. One chip can range from detecting a single type of virus in more than 1,000 samples to searching a small number of samples for more than 160 viruses, including the coronavirus that causes COVID-19. [Pardis Sabeti](#), professor of immunology and infectious diseases, was co-senior author of a paper in Nature that described the technology. “The current pandemic has only underscored that rapid and sensitive tools are critical for diagnosing, surveilling, and characterizing an infection within a population,” she said.

April 29: [Researchers Built Various Models To Predict Pandemic Shifts. Right Now, They Show ‘A Tremendous Amount Of Uncertainty’](#) (WBUR)

There’s not much data available for mathematical forecasts of the COVID-19 pandemic because the disease is only a few months old—and that makes it difficult for experts to predict how various policies could affect the severity of the outbreak, said [Caroline Buckee](#), associate professor of epidemiology and associate director of the [Center for Communicable Disease Dynamics](#). “The reality is that we all want answers,” she said. “How many hospital beds do I need? When can we start rolling back physical distancing interventions? And people put out models, but they can be misapplied if they’re read too literally. That’s a tension between the reality of the uncertainty in the science and the public’s need to have some sense of what’s going to happen.”

April 28: [How Contagious? Likely Before You Know You’re Sick](#) (WebMD)

Experts say it’s likely that people are transmitting COVID-19 before they feel sick, but it’s not clear how long before. Epidemiologist [William Hanage](#) said that infected people with no symptoms may be just as contagious as those with symptoms, such as a dry cough, fever, and aches. As for when people are no longer contagious, epidemiologist [Michael Mina](#) said, “A good rule of thumb for this virus ... is to wait for about 2 weeks after symptom onset before assuming that you’re most likely not transmissible.”

April 28: [UK on track for one of Europe’s worst virus death tolls](#) (Reuters)

Recent data showed that COVID-19 deaths in Britain topped 24,000, giving it one of the worst coronavirus death tolls in Europe. “The United Kingdom is going to be right up there among the worst-hit nations in the initial surge,” said epidemiologist [William Hanage](#). “With the most optimistic views of the amount of immunity that might be being generated, it would still not be close to having enough to be able to return to normal. The crucial part of the next stage is to have enough testing and early warning systems to avoid ending up back where the UK is now.”

April 28: [Trump guidance puts burden on states to reach Covid-19 testing targets](#) (The Guardian)

With the Trump administration placing most of the burden on states to ramp up testing for COVID-19, experts say current testing levels are still far from where they need to be. [HHS](#) director [Ashish Jha](#) said that the U.S. should be performing a “bare minimum” of 500,000 tests per day—a threshold it has not reached yet. “Identifying who’s infected, who’s not is like public health, disease control 101,” said Jha. “Without that, you’ve got nothing. If you can’t test people for the virus, you cannot figure out who’s infected, you can’t keep them away from susceptible people, you can’t run your economy.”

April 28: [The Immunity Numbers Are Too Low](#) (The Atlantic)

Initial results from antibody surveys—tests that can show if a person has had COVID-19—suggest that there are still too many Americans vulnerable to infection. Even if someone does have antibodies to COVID-19, it’s not clear if that makes them immune, or if they were immune, how long it would last. And many antibody tests on the market are unreliable. Further, current antibody surveys are revealing that potential immunity to COVID-19 can vary widely from location to location. So although the pandemic is global, “it is made up of hyperlocal epidemics that are differentially impacting communities,” said [Yonatan Grad](#), assistant professor

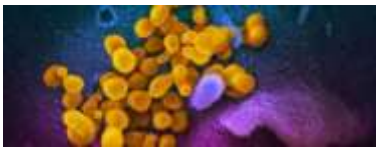
of immunology and infectious diseases. “At some point, we’re going to need to think about *How do we all get to the same place?*”

Use left and right arrow keys to navigate between menu items. Use right arrow key to move into submenus. Use escape to exit the menu. Use up and down arrow keys to explore. Use left arrow key to move back to the parent list.

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[Animals](#)

[5 reasons you might be seeing more wildlife during the COVID-19 pandemic](#)

By [Bethany Brookshire](#) June 5, 2020



[Health & Medicine](#)

[Taking hydroxychloroquine may not prevent COVID-19 after exposure](#)

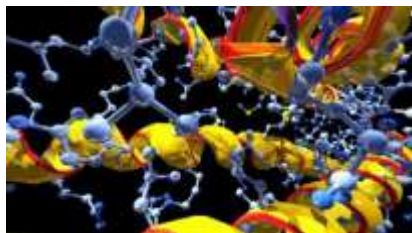
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[What parents need to know about kids in the summer of COVID-19](#)

By [Aimee Cunningham](#) June 3, 2020



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[Genetic risk factors for Alzheimer's also raise the risk of getting COVID-19](#)

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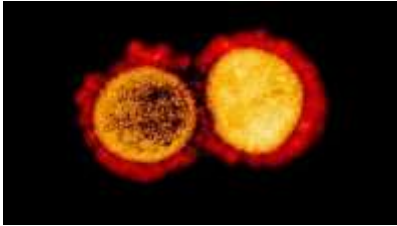
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By [Tina Hesman Saey](#) May 21, 2020



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Coronavirus in N.Y.: Toll Soars to Nearly 3,000 as State Pleads for Aid

"It is hard to put fully into words what we are all grappling with as we navigate our way through this pandemic," a hospital official said.

By [Alan Feuer](#)

April 3, 2020

[#COVID19](#) [#NYC](#) [#Epicenter](#) [#DPA](#)!? 'NY, the increasingly battered epicenter of the nation's coronavirus outbreak, on Friday reported its highest number of deaths in a single day, prompting state officials to beg the rest of the United States for assistance and to enact an emergency order designed to stave off medical catastrophe.'

In the 24 hours through 12 a.m. on Friday, 562 people..died from the virus in NY State, bringing the total~3,000, double..three days before..same period, 1,427 newly sick..poured into the hosp..although the rate of increase in hospitalizations seemed to stabilize, suggesting that the extreme social-distancing measures put in place last month may have started working..Despite the glimmer..new statistics..reminder of the gale-force strength of the crisis that is thr NY, where >102,000 people — nearly as many as in Italy and Spain.. — have now tested positive for the virus. The situation, as it has been for wks, was part. dire in NYC, where some hospitals have reported running out of body bags & others..plan for the unthinkable prosp. of rationing care. "It is hard to put fully into words what we are all grappling with as we navigate our way through this pandemic," Vicki L. LoPachin, the chief medical officer of the Mount Sinai Health System,'

<https://www.nytimes.com/2020/04/03/nyregion/coronavirus-new-york-death-toll.html>



Coronavirus in N.Y.: Toll Soars to Nearly 3,000 as State Pleads for Aid

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C.D.C. Recommends Wearing Masks in Public; Trump Says, 'I'm Choosing Not to Do It'

Alabama became the 41st state to issue a stay-at-home order, and the attorney general expanded the pool of prisoners eligible for early release from federal prisons.

Published April 3, 2020 Updated April 28, 2020

This briefing has ended.

[Read our global live coverage on the coronavirus pandemic here.](#)

Here's what you need to know:

- [C.D.C. says all Americans should wear masks. Trump says the rule is voluntary.](#)
- [Trump will nominate an inspector general to oversee the Treasury's \\$500 billion bailout fund.](#)
- [Barr expands early release of inmates at federal prisons with coronavirus cases.](#)
- [Death toll in New York soars to nearly 3,000 as state pleads for aid.](#)
- [Half the planet is on lockdown, but not every U.S. state is, even after Alabama issues an order.](#)
- [Texas reports its largest outbreak at a nursing home. Its staff members worked in at least seven others.](#)
- [Trump says U.S. election will take place on schedule in November, but opposes voting by mail.](#)

C.D.C. says all Americans should wear masks. Trump says the rule is voluntary.

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID10 #WHO #CDCP #ReleaseData #UrgeWearingMasks #Selfisolation](#)

[#PresTrumpDeclaresVoluntaryStatesRights](#) 'Pres. Trump said..CDC & P was urging all Americans to wear a mask when they leave their homes, but he immed.undercut the msg. by repeat. calling the recomm. vol. & prom. that he would not wear one himself. Sr. off. at the C.D.C. have been pushing the pres. for days to advise everyone — even people who appear to be healthy — to wear a mask or a scarf that covers their mouth & nose when shopp. at the grocery store or while in other pub. places..The researchers asked 246 people w/ susp. resp. viral inf. to breathe into a machine for 30 minutes to measure the amt. of virus they exhaled. Half of the particip. wore a face mask, while the other half perf. the expt. w/o any face covering. Among 111 people whose infections were later confirmed with a lab test, masks stopped the spread of all seasonal coronavirus and more than 70% of flu virus infections.. Masks were not as eff. in red. transmission of rhinoviruses, or the common cold. For the current coronavirus pandemic, all health officials, including those at the W.H.O. & C.D.C., agree that masks should be worn by anyone w/ symptoms like a cough or fever, & anyone caring for someone with a confirmed or suspected case.'



<https://www.nytimes.com/2020/04/03/world/coronavirus-news-updates.html>

[A Debate Over Masks Uncovers Deep White House Divisions](#)

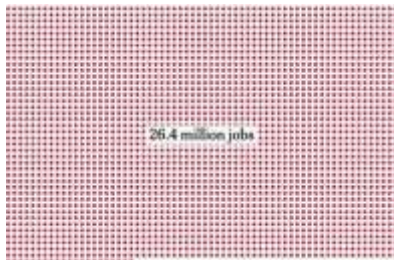
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(6)Economic impact of Pandemic (related to the Specific Squash Topic: proposals to ameliorate the Economic Impact of the Pandemic on the Squash community # 3)

A deep recession and ballooning unemployment in Europe darken the global economic picture.

[A deep recession and ballooning unemployment in Europe darken the global economic picture.](#)



Government figures due Friday will undoubtedly show that job losses in April were the worst ever. But they could provide [key hints about the recovery](#).

Economists surveyed by MarketWatch expect the Labor Department report to show that U.S. payrolls fell by 22 million jobs last month — a decade's worth of gains wiped out in weeks. The payroll processing company ADP said on Wednesday that the private sector [lost more than 20 million jobs](#) in April, with the cuts spread across every sector and size of employer.

It is no surprise that employers have cut millions of jobs; weekly data on filings for unemployment benefits, released every Thursday, have tracked the destruction. But the monthly numbers due on Friday are more comprehensive than the weekly ones

which [almost certainly understate](#) the damage.

The report on Friday could also help answer a question that could be crucial to the eventual recovery: How far has the damage spread?

If the losses are concentrated in sectors that have been directly affected by the virus, like retail and services that were hit by stay-at-home orders, that could bode well for the recovery, because it suggests the damage has been contained. But if it has spread to industries like finance and professional services, that could suggest a cascade effect is underway, with laid-off workers pulling back on spending, leading to lost revenues and still more layoffs. It could take much longer to climb out of that kind of hole.

The downturn has rippled through the world. The European Union's economy is set to [shrink by 7.4 percent this year](#), investment is expected to collapse, and unemployment rates, debts and deficits will balloon after the pandemic, the European Commission said on Wednesday.

To put those figures in perspective, the European Union's economy had been predicted to grow by 1.2 percent this year. In its worst recession, during the financial crisis in 2009, the economy shrank by 4.5 percent.

JOBS REPORT

The numbers will be terrible. Here's [how to interpret them](#).

A firm set up by two G.O.P. operatives said it could supply medical gear. Customers are still waiting.

A company created six weeks ago by a pair of Republican operatives collected hundreds of millions of dollars in payments from state and local governments desperate for coronavirus supplies. That company is now facing a federal criminal investigation and a rising chorus of complaints from customers who say their orders never arrived.

The company, Blue Flame Medical, had boasted [that it could quickly obtain](#) coveted test kits, N95 masks and other personal protective equipment through a Chinese government-owned company with which it had joined, according to documents obtained by The New York Times.

The company was started by two Republican political consultants, Mike Gula and John Thomas, who had little experience in the medical supply field. Mr. Gula's fund-raising firm has been paid more than \$36 million since 2008 by a range of top Republican politicians and political committees. Mr. Thomas has served as a general consultant to a number of campaigns.

Mr. Thomas had asserted in [an interview in March](#) that the connections he and Mr. Gula made through their political work helped them find suppliers and connect to customers, such as large medical systems and law enforcement agencies around the world.

Orders came in from state governments, local police departments and airports in California, Florida and Maryland. But things have not gone as planned.

California quickly clawed back a \$457 million payment for 100 million masks, as first [reported by CalMatters](#). Other state and local agencies that paid Blue Flame said that the supplies never arrived or that orders were only partially filled.

The Justice Department is pursuing a criminal investigation into the company, according to people familiar with the investigation, which was first [reported by The Washington Post](#). Some of the company's clients are requesting refunds or threatening their own investigations.

Trump says meatpacking plants will reopen soon, despite outbreaks.

Trump administration officials said on Wednesday that meat shortages at grocery stores and fast food chains would be short-lived, despite outbreaks that have shut meatpacking plants around the country and sickened thousands of workers.

In an Oval Office meeting with President Trump and Gov. Kim Reynolds of Iowa, a Republican, Agriculture Secretary Sonny Perdue said meat shortages should end within 10 days as plants come online.

The crowded conditions at America's largest meatpacking plants have turned them into hot spots and led to the deaths of dozens of workers.

Factories across the Midwest have been temporarily shuttered, cutting down on the country's supply of ground meat, pork loins and chicken. Hundreds of Wendy's restaurants have [run out of hamburgers](#), while Costco and Kroger have limited the number of meat items customers can buy.

The Trump administration [issued an executive order last week](#) to put more pressure on meatpacking facilities to remain open and help them reduce their liability in worker lawsuits.

Meatpacking plants have installed new safety features including barriers between workers and new requirements for protective gear. But many workers say they are still nervous to return to facilities that had become hotbeds of infection.

On Wednesday, Ms. Reynolds vowed to get the facilities up and running to help ensure the food supply.

Senate Democrats take airlines to task over employee pay, refunds and new fees.

The top Democrat on the Senate Commerce, Science and Transportation Committee on Wednesday singled out United Airlines, Delta Air Lines and JetBlue for their decisions to cut employee hours. United reversed one such plan on Wednesday that would have made thousands of full-time workers into part-time employees.

"Mandatory or forced reductions in payroll hours is not" what was intended by the recent law that authorized \$50 billion to help airlines continue operating during the pandemic, the lawmaker, Maria Cantwell of Washington State, said during the Senate hearing. Half of that funding was intended to pay employees through September, provided that airlines refrained from pay or staff cuts.

A union representing thousands of United employees sued the airline over the plan on Tuesday. The company called the lawsuit "meritless."

Executives from United and other airlines did not participate in the hearing, and were represented by the chief executive of their trade group Airlines for America, Nicholas E. Calio. He said airlines were doing what they could to survive.

"The duration and breadth of the impacts directly on our industry compounded by the larger economy leave no doubt that the U.S. airline industry will emerge a shadow of what it was on March 1st of this year," Mr. Calio said.

That did not satisfy Democrats like Senator Edward Markey of Massachusetts and Senator Richard Blumenthal of Connecticut who said the industry's practices around refunds were misleading or deceptive. Many airlines have been encouraging travelers to take vouchers for future travel instead of cash.

And Senator Amy Klobuchar of Minnesota criticized the low-cost carrier Frontier Airlines for saying that it would charge customers \$39 to \$89 to keep the middle seat next to them empty. Many larger airlines are not putting any passengers in middle seats by default.

"I don't think it's appropriate for some passengers who can't afford to pay an additional charge for a seat to be less safe than other travelers," she said.



The Future of Travel

Perhaps no industry has been as hard hit by the pandemic as tourism. As restrictions on companies and travelers ease, what will the new world look like?

There is no compelling evidence that the virus is becoming more contagious or deadly.

All viruses mutate, and the coronavirus is no exception. But there is no compelling evidence yet that it is evolving in a way that has made it more contagious or more deadly.

A preprint study — posted online, but not published in a scientific journal and not yet peer-reviewed — has attracted significant online interest by suggesting otherwise.

On April 30, researchers at Los Alamos National Laboratory in New Mexico claimed to have found a mutation in the coronavirus that arose in Europe in February and then rapidly spread, becoming dominant as the virus was introduced in new countries.

The mutation, they wrote, “is of urgent concern” because it made the virus more transmissible. But experts in viral evolution are not persuaded.

Mutations are tiny changes to genetic material that occur as it is copied. Human cells have many so-called proofreading proteins that keep mutations rare.

Viruses are far sloppier, producing many mutants every time they infect a cell. Natural selection can favor viruses carrying a beneficial mutation, leading them to spread more widely.

But it is also possible for a neutral mutation to become more common simply by chance, a process known as genetic drift.

“I don’t think they provide evidence to claim transmissibility enhancement,” Sergei Pond, an evolutionary biologist at Temple University, said of the new report in an email.

In fact, Dr. Pond said, the mutation, known as D614G, has arisen not just once but several times independently. On some of those occasions, viruses carrying the mutation didn’t take off in the population.

Instead, the gene reverted to its original form, suggesting that D614G did not give the virus any special advantage.

No one has ruled out the possibility that a mutation could arise that would make the virus more transmissible. And it is possible that D614G has provided some sort of edge.

But it will take much more evidence to rule out other explanations.

Trump met with Iowa’s governor as the state reopens and faces outbreaks at meatpacking plants.

Kids bike at the Broadway Skate Park in Council Bluffs, Iowa on Friday, Credit...Calla Kessler/The New York Times

President Trump met in the Oval Office on Wednesday with Gov. Kim Reynolds of Iowa, and Vice President Mike Pence plans to visit the state this week, as the White House increasingly turns its attention to a state that never fully shut down and has recently had a persistent uptick in cases.

Ms. Reynolds, a Republican, was among [a handful of governors](#) who declined to issue stay-at-home orders as the rest of the country locked down this spring, a [decision that was criticized](#) by health officials, mayors in the state and Democratic lawmakers. The governor relied instead on the shutdown of schools and businesses and messages to the public urging personal responsibility.

Nearly half of all states in the United States have recently reported increases in new cases, including Iowa, which has seen outbreaks at several meatpacking plants. As cases were increasing, Ms. Reynolds last week [lifted restrictions on certain businesses](#) in 77 of the state's 99 counties. The changes do not apply to the state's most populous areas and counties that have been hot spots for the virus.

Iowa has more than 10,000 confirmed cases and more than 200 deaths. On Tuesday, state health officials reported 19 deaths, [the most in a single day](#), and announced that [more than 1,600 people](#) had been infected at meatpacking plants in the state.

Addressing growing shortages of meat in the country because of outbreaks at meatpacking plants, Ms. Reynolds, whose state is a national meatpacking center, said that only one Iowa meatpacking plant was shut.

The agriculture secretary, Sonny Perdue, said meat shortages should end within 10 days as meat plants in other states come back on line.

"I think we've turned the corner," he said.

Other states continued to take steps to ease some restrictions.

In Maryland, [which has had a recent growth in cases](#), Gov. Larry Hogan said Wednesday that he would allow more elective medical procedures to resume, and that the state would allow what he described as ["lower-risk outdoor activities"](#) including golf, tennis, boating, fishing and camping.

But he urged patience as the state develops a plan to safely ease more restrictions, saying that "I realize that these are only small steps, and that they may be of little comfort to those who are out of work and who are struggling financially," but adding that the state was making progress against the virus.

Also on Wednesday, the Supreme Court rejected a request from a political committee and several businesses in Pennsylvania to suspend the governor's order shutting down much of the state's economy to address the virus.

The court's ruling was one-sentence long, gave no reasons and included no dissents.

The governor's order, entered March 19, called for the closing of the physical operations of "non-life-sustaining" businesses.

When can we start up child care again?

Here are some points to consider before you call your babysitter.

Reporting was contributed by Reed Abelson, Katie Benner, Katrin Bennhold, Alan Blinder, Nicholas Bogel-Burroughs, Keith Bradsher, Jonah Engel Bromwich, Ben Casselman, Niraj Chokshi, Helene Cooper, Michael Cooper, Michael Crowley, Elizabeth Dias, Caitlin Dickerson, Melissa Eddy, Nicholas Fandos, Christina Goldbaum, Maggie Haberman, Andrew Jacobs, Zolan Kanno-Youngs, Jodi Kantor, Josh Katz, Jillian Kramer, Michael Levenson, Adam Liptak, Denise Lu, Neil MacFarquhar, Apoorva Mandavilli, Sarah Mervosh, Andy Newman, Michael Powell, Simon Romero, David E. Sanger, Margot Sanger-Katz, Marc Santora, Ed Shanahan, Ana Swanson, Kenneth P. Vogel, David Waldstein, Noah Weiland, Edward Wong and Carl Zimmer.

The bankruptcy wave is here

In no particular order and with varying degrees of urgency, here's a list of companies I've read about at [CNN Business](#) just in recent days that are under extreme stress as a result of the coronavirus. These are companies that have filed for bankruptcy, have publicly said they may go out of business or otherwise appear to be in trouble.

What happens in bankruptcy?

Just because a company files for bankruptcy doesn't mean it will cease to exist. I asked CNN's Chris Isidore, [a certified expert in covering bankruptcies](#), what's likely to happen to companies that file for bankruptcy during or because of the coronavirus lockdown

Note that despite the President saying he would invoke the Defense Production Act to keep meat plants open, the Trump administration **has yet to keep any meat plants open**. And meat processing plants continue to have problems keeping their workers safe.

That's why Tyson Foods **warned that more closures will be coming**.

Can we handle a second lockdown? A third?

Infections that happen today or tomorrow won't present right away. It will take two weeks or more to know if it is spreading right now. That's part of the reason this virus is so dangerous. But CNN's Holly Yan **dives a bit deeper**. She looks at countries that began easing restrictions and then had to reimpose them because the virus started spreading again, and going back to anything like normalcy now means more people get sick and more people die.

The ugly trade-off of this pandemic was bluntly vocalized by Dr. Anthony Fauci on CNN Monday night, the same day we looked at the growing death toll projections related to Covid-19 -- one key model has factored in the opening of US states and said the toll will be more than 100,000 Americans.

"How many deaths and how much suffering are you willing to accept to get back to what you want to be some form of normality sooner rather than later?" he asked Chris Cuomo. **Watch the whole thing here.**

https://view.newsletters.cnn.com/messages/15887232328220054280b8c9b/raw?utm_term=15887232328220054280b8c9b&utm_source=What+Matters+for+May+5%2C+2020&utm_medium=email&utm_campaign=204209_1588723232825&bt_e=0ZMjlyzZdaNq0wF4R9rtdpZl%2BhtvxnCWhGIYSjGo7aOZ00%2B0a%2FqEXXlwn%2FeDKi1n&bt_ts=1588723232825

US election: Does Trump have power to delay it?

[Anthony Zurcher](#) North America reporter [@awzurcher on Twitter](#)

30 July 2020

[#USelect2020](#) [#Mand3rdNov](#) [#LawPrecedFr1845](#) [#AmendReqCongMajority](#)

'Prim. contests have been delayed or disrupted, w/ in-person polling places closed & absentee ballot. proc. thrown into doubt. Politicians have engaged in content. fights over the electoral proc. in legisl. & the courts. In November voters are scheduled to head to the polls to select the next presid., much of Congress and thousands of state-govt. candidates. But what could Election Day look like - or if it will even be held on schedule - is very much the subject of debate. Here are answers to some key questions.

Could President Trump postpone the election?

A total of 15 states have delayed their presid. primaries at this point, with most pushing them back until at least June. That presents the pressing question of whether the presidential election in November itself could be delayed.

Under a law dating back to 1845, the US presidential election is slated for the Tuesday after the first Monday of November every four years - 3 November in 2020. It would take an act of Congress - approved by majorities in the Democratic-controlled House of Representatives and the Republican-controlled Senate - to change that.

The prospect of a bipartisan legislative consensus signing off on any delay is unlikely in the extreme.'

<https://www.bbc.com/news/world-us-canada-52326166>

Herd immunity is not happening

Despite more than 27,000 confirmed deaths from COVID-19 in France, only 4.4% of people have actually been infected. The percentage is far below the required level — something more than 50% — to achieve herd immunity. Herd immunity would slow — but not stop — the outbreak. Results announced by Spain's health minister show a similar situation: more than 27,000 deaths and just 5% of the population tested had antibodies to the virus. "Population immunity appears insufficient to avoid a second wave" if lockdown measures are removed, say the authors of the French study. (Reuters | 2 min read)

Reference: *Science* paper

https://uk.reuters.com/article/uk-health-coronavirus-france-immunity/only-44-of-french-population-infected-by-coronavirus-pasteur-institute-idUKKBN22Q0RM?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

How Bad Is Unemployment? 'Literally Off the Charts'

[nytimes.com](https://www.nytimes.com)

"The American economy plunged deeper into crisis last month, losing 20.5 million jobs as the unemployment rate jumped to 14.7 percent, the worst devastation since the Great Depression.

Job losses have encompassed the entire economy, affecting every major industry. Areas like leisure and hospitality had the biggest losses in April, but even health care shed more than a million jobs. Low-wage workers, including many women and members of racial and ethnic minorities, have been hit especially hard. "It's literally off the charts," said Michelle Meyer, head of U.S. economics at Bank of America. "What would typically take months or quarters to play out in a recession happened in a matter of weeks this time."

<https://www.nytimes.com/interactive/2020/05/08/business/economy/april-jobs-report.html?smid=li-share>

[A deep recession and ballooning unemployment in Europe darken the global economic picture.](#)

Coronavirus: Trump knows economic meltdown brings political pain

[Anthony Zurcher](#) North America reporter [@awzurcher on Twitter](#)

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#BBC](#) [#Covid19Quarantine](#) [#US](#) [#Econ](#) [#InDeepFreezeOverNight](#) [#Unlike9/11](#) [#USelect2020!?](#)

'The latest US unemployment numbers were predicted to be catastrophic. The actual total, 3.3 million, turned out to be even worse than expected..deep-freeze almost overnight. The government-ordered shutdown hasn't just shuttered businesses temporarily, it has vaporised the jobs of millions of Americans..vulnerable hourly service workers who live paycheck to paycheck.

Like Congress, the White House has also seen the coming economic tsunami - and what it could portend.

Earlier this week, Donald Trump said he was anxious to reopen businesses and get Americans back to work, representing a shift of focus..

The political reality for Trump is there will be very real consequences for his presidency not only if the US death toll from the coronavirus pandemic continues to mount, but also if the US spirals into a deep recession..

While this is uncharted territory, a nation in economic turmoil early in an election year is a serious threat to a president's political hopes..The president's rhetoric sets up a potential conflict in the coming days with many governors, Republican and Democrat, who have the ultimate authority in their states and will be reluctant to ease the restrictions on their populations..' [Status is online](#)

<https://www.bbc.com/news/52053676>

An unlikely coronavirus hotspot in forgotten US corner

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#COVID19](#) [#DisproportionateImpact](#) [#ViaExacerbation](#) [#OfEndemicPovertyDispossession](#)

[#FanningThePandemic](#) 'An unlikely coronavirus hotspot in forgotten US corner

As the coronavirus sweeps across the US, it has been infecting and killing black Americans at a disproportionate rate. In Albany, Georgia, decades of poverty and economic inequality are threatening an entire generation of African Americans in the pandemic.

Produced by Xinyan Yu, Chelsea Bailey and Roderick Macleod'

<https://www.bbc.com/news/av/world-us-canada-52460408/an-unlikely-coronavirus-hotspot-in-forgotten-us-corner>

South Korea says recovered coronavirus patients who tested positive again did not relapse: Tests picked up 'dead virus fragments'

[Sinéad Baker](#)

Apr 30, 2020, 9:36 AM



Experts in South Korea said that recovered coronavirus patients who tested positive again were not reinfected and that their virus was not reactivated, as was previously feared.

More than 260 people who recovered and tested negative subsequently tested positive again. The Korea Centers for Disease Control and Prevention worried that the virus had reactivated after going dormant.

But the country's infectious-disease experts said on Thursday that the tests were detecting dead fragments of the virus left in patients' bodies.

South Korea was one of the first countries to report a virus outbreak but quickly implemented widespread testing and contact tracing. It had reported 247 deaths as of Thursday.

<https://www.businessinsider-com.cdn.ampproject.org/c/s/www.businessinsider.com/coronavirus-south-korean-reactivated-cases-not-reinfected-experts-2020-4?amp>

European Commission



European Commission

915,341 followers

We have come together against the coronavirus! 🌐 The pandemic is affecting every single country in the world. It has brought heartache and heartbreak, pain and suffering to millions of people. It has put enormous strain on healthcare and welfare systems, but it has also brought the best out of humanity.

Governments from across the world teamed up with health organisations and partners to contribute to the worldwide pledging marathon, which will run until the end of May.

We at the European Commission have mobilised €1.4 billion for the Coronavirus Global Response. All together, we raised €7.4 billion (\$8 billion) in initial funding to develop diagnostics, treatments and vaccines and make them accessible for everyone globally. But this is only the beginning.

[After governments, civil society and people worldwide need to join in, in a global mobilisation of hope and resolve. This is the true power of unity and humanity. The world is united against the coronavirus, and the world will win! More about this initiative: <https://europa.eu/!DB63HJ>](#)

[#UnitedAgainstCoronavirus](#) [#Coronavirus](#) [#COVID19](#)

https://ec.europa.eu/commission/presscorner/detail/en/ip_20_797

Coronavirus Global Response: €7.4 billion raised for universal access to vaccines

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Today, the Commission registered €7.4 billion, equivalent to \$8 billion, in pledges from donors worldwide during the Coronavirus Global Response pledging event. This includes a pledge of €1.4 billion by the Commission. This almost reaches the [initial target](#) of €7.5 billion and is a solid starting point for the worldwide pledging marathon, which begins today. The aim is to gather significant funding to ensure the collaborative development and universal deployment of **diagnostics**, **treatments** and **vaccines** against coronavirus.

President of the European Commission, Ursula **von der Leyen**, said: *"Today the world showed extraordinary unity for the common good. Governments and global health organisations joined forces against coronavirus. With such commitment, we are on track for developing, producing and deploying a vaccine for all. However, this is only the beginning. We need to sustain the effort and to stand ready to contribute more. The pledging marathon will continue. After governments, civil society and people worldwide need to join in, in a global mobilisation of hope and resolve."*

The pledging event was co-convened by the European Union, Canada, France, Germany, Italy (also incoming G20 presidency), Japan, the Kingdom of Saudi Arabia (also holding the G20 presidency), Norway, Spain and the United Kingdom. The initiative is a response to the [call](#) from the World Health Organization (WHO) and a group of health actors for a global collaboration for the accelerated development, production and equitable global access to new coronavirus essential health technologies. The Coronavirus Global Response Initiative is comprised of **three partnerships** for testing, treating and preventing underpinned by health systems strengthening.

An ongoing pledging marathon

Today is an extraordinary achievement but also the start of a process to mobilise more resources. The initial target of €7.5 billion will not be enough to ensure the distribution of coronavirus health technologies worldwide, as this involves significant costs in terms of production, procurement and distribution.

To help reach the objectives of the Coronavirus Global Response, the European Commission is committing €1 billion in grants and €400 million in guarantees on loans through reprioritisation of [Horizon 2020](#) (€1 billion), [RescEU](#) (€80 million), the [Emergency Support Instrument](#) (€150 million) and [external instruments](#) (€170 million).

€100 million will be donated to CEPI and €158 million to the World Health Organization. EU-funded calls for proposals and subsequent projects under Horizon 2020 will be aligned with the objectives of the three partnerships and subject to open access to data. Funding under RescEU will go towards the procurement, stockpiling and distribution of vaccines, therapeutics and diagnostics.

Donors are invited to continue pledging to the Coronavirus Global Response. They can choose which priority to donate to – Test, Treat or Prevent. They can also donate to the horizontal work stream of the Coronavirus Global Response, aiming to help health systems in the world cope with the pandemic.

The Commission will soon announce the breakdown of the amount raised today and how much will go to vaccines, therapeutics, diagnostics and health systems strengthening related to COVID-19.

A cooperation framework to align global efforts

A universal and affordable **Access to COVID-19 Tools** (ACT-Accelerator) was the main objective of the 24 April [call to action](#) from global health partners. For this, significant funding is needed, as well as a solid collaborative structure, with a clarity of purpose to ensure that the donated money is put to good use and to avoid fragmentation of efforts.

Based on discussions with public and private sector partners as well as non-profit organisations, the European Commission proposes a collaborative framework for the ACT-accelerator global response. This framework is designed as a coordination structure to steer and oversee progress made globally in accelerating work on developing vaccines, therapeutics and diagnostics with universal access as well as strengthening health systems as required for meeting these three priorities.

This collaboration framework is intended to be time-bound (2 years, renewable) and build on existing organisations without creating any new structures. In the European Commission's view, it would bring together partners like the WHO, the Bill and Melinda Gates Foundation, the Wellcome Trust and some of the initial convenor countries as well as many recognised global health actors such as CEPI, Gavi, the Vaccine Alliance, the Global Fund or UNITAID.

The core of the framework would be **three partnerships** based on the three priorities of the Coronavirus Global Response. They gather industry, research, foundations, regulators and international organisations, with a “whole-value-chain” approach: from research to manufacturing and deployment. The three partnerships would work as autonomously as possible, with a transversal work stream on enhancing the capacity of health systems and knowledge and data sharing.

The Commission registers and keeps track of pledges up until end of May but will not receive any payments into its accounts. Funds go directly to the recipients. Recipients will, however, not decide alone on the use of the donation, but deploy it in concertation with the partnership. The commitment is for all new vaccines, diagnostics and treatments against coronavirus to be made available globally for an affordable price, regardless of where they were developed.

Next steps

The global response must also include civil society, and the global community of citizens. For that reason, the European Commission is joining forces with NGOs such as Global Citizen and other partners.

The Global Vaccines Summit that Gavi, the Vaccine Alliance, will organise on 4 June will mobilise additional funding to protect the next generation with vaccines. As the world relies on Gavi's work for making vaccination available everywhere, the success of Gavi's replenishment will be crucial to the success of the Coronavirus Global Response.

Background

The Coronavirus Global Response builds on the commitment made by G20 leaders on 26 March.

Grounded in a vision of a planet protected from human suffering and the devastating social and economic consequences of the coronavirus, an initial group of global health actors launched a call to action for global collaboration for the accelerated development, production and equitable global access to new coronavirus essential health technologies.

On 24 April, the World Health Organization (WHO) and an initial group of health actors launched a collaboration for the accelerated development, production and equitable global Access to COVID-19 Tools – the ACT Accelerator. Together, they issued a [call to action](#).

The European Commission responded to this call by joining forces with global partners to host a pledging event – the Coronavirus Global Response Initiative – as of 4 May 2020.

Funding, including the EU contribution, pledged since 30 January 2020 – the date when the WHO declared coronavirus a global health emergency – will be counted as part of the Coronavirus Global Response funding target with the commitment that these will contribute to and align with the ACT-Accelerator framework.

For More Information

[Coronavirus Global Response website](#)

[Questions and Answers: the Coronavirus Global Response](#)

[Factsheet – The Coronavirus Global Response](#)

[The Commission's Coronavirus Response](#)

https://ec.europa.eu/commission/presscorner/detail/en/ip_20_797

Feinberg Says He's Had Initial Talks About a Virus Victim Fund WHO Chief Tedros: The Worst Is Yet Ahead of Us

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Controversial given the high risk of deaths, a coronavirus strategy discarded by the U.K. is being touted as the solution for poor but young countries like India.

Herd immunity, which allows a majority of the population to gain resistance to the virus by becoming infected and then recovering, could result in less economic devastation and human suffering than restrictive lockdowns designed to stop its spread, according to a growing group of experts.

“No country can afford a prolonged period of lockdowns, and least of all a country like India,” said Jayaprakash Muliyil, a prominent Indian epidemiologist. “You may be able to reach a point of herd immunity without infection really catching up with the elderly. And when the herd immunity reaches a sufficient number the outbreak will stop, and the elderly are also safe.”

A team of researchers at Princeton University and the Center for Disease Dynamics, Economics and Policy, a public health advocacy group based in New Delhi and Washington, has identified India as a place where this strategy could be successful because its disproportionately young population would face less risk of hospitalization and death.

They said allowing the virus to be unleashed in a controlled way for the next seven months would give 60% of the country's people immunity by November, and thus halt the disease.

Mortality could be limited as the virus spreads compared to European nations like Italy given that 93.5% of the Indian population is younger than 65, they said, though no death toll projections were released.

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[Pompeo Links Outbreak to Lab; N.Y. Deaths Slowing: Virus Update](#)

[Roche Covid-19 Antibody Test Gets Emergency FDA Approval](#)

[Italy Reports Fewest Virus Deaths Since Lockdown Started](#)

The radical proposal underscores the challenges that poorer developing countries -- including nations like Indonesia and some in sub-Saharan Africa -- face in curbing the epidemic using the lockdown measures that have been adopted by advanced economies.

The impossibility of social distancing in crowded living conditions like in many cities and villages in India, the lack of testing kits to detect infections and the human suffering that occurs in lockdowns suggests a different path may be needed in these places.

The Journey to Herd Immunity

*According to a study published April 7, 2020

To do this, the Princeton and CDDEP team recommends lifting India's strict lockdown -- which has been extended to May 3 -- and letting most of the population younger than 60 return to normal life, though social distancing still would be encouraged, masks would be required and large gatherings would be banned. The reopening would be accompanied by an effort to test as many people as possible and isolate confirmed and suspected cases.

People over 60 would essentially have to remain under lockdown until herd immunity is achieved, and be prioritized for testing and treatment if they fell sick.

The government of Prime Minister Narendra Modi has given no indication it plans to adopt such a strategy.



Markings on the pavement for social distancing at a temporary market in Chennai on April 7.

Photographer: Arun Sankar/AFP via Getty Images

Yet India's government has laid out criteria that effectively rations coronavirus tests, limiting them to the very sick or most at risk. Critics who suspect the disease has dispersed much more widely than the official numbers suggest say the government's restrictive criteria amounts to allowing the disease to spread.

[Pessimistic Indian Doctors Brace for Tsunami of Virus Cases](#)

“In some sense, you are saying, we will let them get infected and recover, and take care only of those who are sick,” said T. Sundararaman, the New Delhi-based global coordinator of the People’s Health Movement, a public health group. “That’s the policy, that’s what it amounts to.”

The government has maintained its testing criteria gives an accurate tally of India’s number of cases, and says the disease is not spreading untracked in the community. Nevertheless, as India has ramped up testing, it is finding more cases each day, bringing the nationwide tally to 20,080, with 645 deaths, as of April 21.



A coronavirus testing site inside the Dharavi slums in Mumbai on April 16.

Photographer: Indranil Mukherjee/AFP via Getty Images

But while questions remain as to the extent and severity of India’s outbreak, the costs of the lockdown are clear. Local governments have had to set up camps to house 1.25 million migrants who left cities when they lost work, while food camps feed 7.5 million daily wage earners also rendered destitute by the lockdown. There are already signs these stopgap measures are starting to fray.

India Workers Paid \$4 a Day Are Trapped Between Hunger and Virus

“We’re dealing with a trade-off against starvation, hunger, all this other stuff,” said Ramanan Laxminarayan, the director of the CDDEP and a Princeton researcher. By allowing the coronavirus to spread in a controlled way, “undoubtedly there will be deaths, but it will be much smaller this way, and it opens us up for business by November,” he said.

But the strategy has already proved controversial internationally. The U.K. adopted and then abandoned it early in the pandemic after projections showed its health care system would be overwhelmed by the resulting hospitalizations. That brief dalliance is still being blamed for the British government’s slow response in testing for the virus.

Risky Strategy

Even in a country like India with a young population, the concept has inherent risks. Allowing people to become infected will inevitably bring many more patients to hospitals. The researchers say India will have to urgently expand critical care and isolation-bed capacity to ensure that multiple waves of patients don’t become casualties before herd immunity is reached.

Another risk is that India’s worst-in the-world air pollution and high rates of hypertension and diabetes have compromised young people’s health, meaning that mortality from the virus could be higher than expected. People may let their guards down and fail to follow social distancing guidelines.



A policeman sends a motorist back after he tried to cross a barricade during a lockdown in New Delhi on April 20.

Photographer: Yawar Nazir/Getty Images

"I would worry that it would relax concerns of younger individuals, who still remain at substantial risk themselves," Jason Andrews, an assistant professor of medicine at Stanford University, said in an email. "The messaging in particular may lead younger people to perceive themselves as at lower risk than they are, and to fail to understand their potential role in transmission."

And given the novel coronavirus only made its debut in humans some time late last year, there's still a lot that's unknown. Immunity from the virus may be a more complex process than expected. One group of researchers [estimated](#) as much as 82% of the population would have to be infected before herd immunity is reached.

"My view is there are a number of questions about whether it can work," said Marc Lipsitch, a professor of epidemiology at Harvard University's T.H. Chan School of Public Health. "The main questions being how much immunity do we need in the population, and how much immunity does each person get as a result of infection."

Then there's also the question of whether it's possible to wall off the higher-risk portion of the population in densely packed India, where multiple generations commonly live under one roof.

Ultimately, the researchers lobbying for the strategy argue that cultivating herd immunity may be the best of various bad options.

"I think eventually all countries will follow this Indian model," Laxminarayan said. "Because otherwise we are going to be in lockdown on and off all the way through until June of next year."

(Updates with fresh headline; to include strategy for those over 60 in 10th paragraph; virus numbers in 14th.)

[https://www.bloomberg.com/news/articles/2020-04-21/a-herd-immunity-strategy-could-actually-work-in-you thful-india](https://www.bloomberg.com/news/articles/2020-04-21/a-herd-immunity-strategy-could-actually-work-in-you-thful-india)

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by [Zachary B. Wolf](#)

The Latest

Dr. Rick Bright, [the ousted director of the office involved in developing a coronavirus vaccine](#), formally filed an extensive whistleblower complaint Tuesday alleging his early warnings about the coronavirus were ignored and that his caution at a treatment favored by President Donald Trump led to his removal. In a statement, an HHS spokesperson said: "Dr. Bright was transferred to NIH to work on diagnostics testing -- critical to combatting Covid-19 -- where he has been entrusted to spend upwards of \$1 billion to advance that effort." [Read more here.](#)

Separately, the White House will [wind down its coronavirus task force](#) at the end of the month, a senior White House official told CNN.

We Were Planning an Inequality Project. Then History Lurched.

Times Opinion will be arguing its way to some proposals for how America can emerge stronger from this crisis.

By [James Bennet](#)

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#NYTOpEd](#) [#COVID19catalysed](#) [#AlterrationInDebate](#) 'Last fall, I polled my colleg. in Times Opinion about..subjects they thought we should focus on in 2020. The overwhel. answer was that we should bear down on how inequality of wealth & income had distorted Amer. society. And then history lurched..coronavirus scamb. our plans, along with those of the rest of the world. It cast a searing light on the ideas we were debating..Yes, the pandemic reminded Amer. that they were all still bound together. But it also began revealing, day by day, how dangerously far apart they'd become..through this project, Times Opinion will be arguing its way toward a set of proposals for how American society can eventually emerge from this crucible stronger, fairer & more free. We will examine the geography of opportunity in America, the relationship between employers & workers, the gaps in wealth and income among generations & races. We will hear from poor people & rich people, business people, activists, philosophers..As always, we will be soliciting dissenting views as we go. Our goal, also as always, is not to tell you what to think — we don't presume to do that — but to aid you in the project of thinking for yourself, & the United States in the never-ending project of renewing itself.'

<https://www.linkedin.com/in/ferrez-soli-nallaseth-m-s-ph-d-3112a714/detail/recent-activity/shares/>



The bankruptcy wave is here

In no particular order and with varying degrees of urgency, here's a list of companies I've read about at [CNN Business](#) just in recent days that are under extreme stress as a result of the coronavirus. These are companies that have filed for bankruptcy, have publicly said they may go out of business or otherwise appear to be in trouble.

What happens in bankruptcy?

Just because a company files for bankruptcy doesn't mean it will cease to exist. I asked CNN's Chris Isidore, [a certified expert in covering bankruptcies](#), what's likely to happen to companies that file for bankruptcy during or because of the coronavirus lockdown

Note that despite the President saying he would invoke the Defense Production Act to keep meat plants open, the Trump administration **has yet to keep any meat plants open**. And meat processing plants continue to have problems keeping their workers safe.

That's why Tyson Foods [warned that more closures will be coming](#)

Coronavirus: Boris Johnson moved to intensive care as symptoms worsen

Prime Minister Boris Johnson has been moved to intensive care in hospital after his coronavirus symptoms "worsened", Downing Street has said.

A spokesman said he was moved on the advice of his medical team and was receiving "excellent care".

Mr Johnson has asked Foreign Secretary Dominic Raab to deputise "where necessary", the spokesman added.

The prime minister, 55, was admitted to hospital in London with "persistent symptoms" on Sunday evening.

<https://www.bbc.com/news/uk-52192604>



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by [Zachary B. Wolf](#)

The Latest

A model often cited by the US government has [nearly doubled its projection of US coronavirus deaths](#) from more than 70,000 to more than 130,000. Separately, a Trump administration model projects a rise in coronavirus cases and deaths in the weeks ahead, up to about 3,000 daily deaths in the US by June 1, [according to an internal document obtained by The New York Times](#).

Read [all the bizarre quotes here](#).

https://view.newsletters.cnn.com/messages/15886368531105921feecdab0/raw?utm_term=15886368531105921feecdab0&utm_source=What+Matters+for+May+4%2C+2020&utm_medium=email&utm_campaign=203908_1588636853113&bt_ee=vZFywLzvIwkmT0QhOI1huWCIUJfPCC8cUOoUy8XcXTHCLsXytCCBTlRnADBRwME&bt_ts=1588636853113

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by [Zachary B. Wolf](#)

The Latest

Dr. Rick Bright, [the ousted director of the office involved in developing a coronavirus vaccine](#), formally filed an extensive whistleblower complaint Tuesday alleging his early warnings about the coronavirus were ignored and that his caution at a treatment favored by President Donald Trump led to his removal. In a

statement, an HHS spokesperson said: "Dr. Bright was transferred to NIH to work on diagnostics testing -- critical to combatting Covid-19 -- where he has been entrusted to spend upwards of \$1 billion to advance that effort." [Read more here.](#)

Separately, the White House will **wind down its coronavirus task force** at the end of the month, a senior White House official told CNN.

The bankruptcy wave is here

In no particular order and with varying degrees of urgency, here's a list of companies I've read about at [CNN Business](#) just in recent days that are under extreme stress as a result of the coronavirus. These are companies that have filed for bankruptcy, have publicly said they may go out of business or otherwise appear to be in trouble.

What happens in bankruptcy?

Just because a company files for bankruptcy doesn't mean it will cease to exist. I asked CNN's Chris Isidore, [a certified expert in covering bankruptcies](#), what's likely to happen to companies that file for bankruptcy during or because of the coronavirus lockdown

Note that despite the President saying he would invoke the Defense Production Act to keep meat plants open, the Trump administration **has yet to keep any meat plants open**. And meat processing plants continue to have problems keeping their workers safe.

That's why Tyson Foods **warned that more closures will be coming**.

Can we handle a second lockdown? A third?

Infections that happen today or tomorrow won't present right away. It will take two weeks or more to know if it is spreading right now. That's part of the reason this virus is so dangerous. But CNN's Holly Yan **dives a bit deeper**. She looks at countries that began easing restrictions and then had to reimpose them because the virus started spreading again, and going back to anything like normalcy now means more people get sick and more people die.

The ugly trade-off of this pandemic was bluntly vocalized by Dr. Anthony Fauci on CNN Monday night, the same day we looked at the growing death toll projections related to Covid-19 -- one key model has factored in the opening of US states and said the toll will be more than 100,000 Americans.

"How many deaths and how much suffering are you willing to accept to get back to what you want to be some form of normality sooner rather than later?" he asked Chris Cuomo. [Watch the whole thing here.](#)

https://view.newsletters.cnn.com/messages/15887232328220054280b8c9b/raw?utm_term=15887232328220054280b8c9b&utm_source=What+Matters+for+May+5%2C+2020&utm_medium=email&utm_campaign=204209_1588723232825&bt_e=0ZMjlyzZdaNq0wF4R9rtdpZl%2BhtvxnCWhGIYSjGo7aOZ00%2B0a%2FqEXXlwn%2FeDKi1n&bt_ts=1588723232825

(7) Leaders, Leadership, Domestic Politics and Geopolitics driving or containing the COVID – 19 Pandemic: (i) From Vaccines to Dissemination of 'Herd Immunity', (ii) Socioeconomics, Sociopolitics and Policy decisions of Governments – good, bad and ugly (Xenophobia) that either fanned or tamped down the flames of the Pandemic as well as, (iii) Fatalities of Physicians 'falling out of windows', (iv) armed resistance

to the 'lockdown' perceived and presented as a conspiracy of the elites, (v) Socioeconomics, Sociopolitics and Policy decisions of Governments

The Coronavirus in America: The Year Ahead

There will be no quick return to our previous lives, according to nearly two dozen experts. But there is hope for managing the scourge now and in the long term.

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#NYT](#) [#COVID19](#) [#20Experts](#) [#AllForeseeableDimensions](#) [#HammerAndDance](#)
[#USApproachContrastedWithAsianNations](#) [#OutlookForVaccines](#) [#HavesHaveNots](#) [#SelfIsolation](#)
[#SelfInfection](#) [#PlayingPokerWithABandana](#)!? [#VirusWillTellUs](#)!

'In truth, it is not clear to anyone where this crisis is leading us. More than 20 experts in public health, medicine, epidemiology and history shared their thoughts on the future during in-depth interviews. When can we emerge from our homes? How long,

realistically, before we have a treatment or vaccine? How will we keep the virus at bay?

Some felt that American ingenuity, once fully engaged, might well produce advances to ease the burdens. The path forward depends on factors that are certainly difficult but doable, they said: a carefully staggered approach to reopening, widespread testing and surveillance, a treatment that works, adequate resources for health care providers — and eventually an effective vaccine.'

<https://www.nytimes.com/2020/04/18/health/coronavirus-america-future.html?smid=li-share>

We Were Planning an Inequality Project. Then History Lurched.

Times Opinion will be arguing its way to some proposals for how America can emerge stronger from this crisis.

By [James Bennet](#)

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[#NYT](#)[OpEd](#) [#COVID19](#)[catalysed](#) [#AlterrationInDebate](#) 'Last fall, I polled my colleg. in Times Opinion about..subjects they thought we should focus on in 2020. The overwhel. answer was that we should bear down on how inequality of wealth & income had distorted Amer. society. And then history lurched..coronavirus scamb. our plans, along with those of the rest of the world. It cast a searing light on the ideas we were debating..Yes, the pandemic reminded Amer. that they were all still bound together. But it also began revealing, day by day, how dangerously far apart they'd become..through this project, Times Opinion will be arguing its way toward a set of proposals for how American society can eventually emerge from this crucible stronger, fairer & more free. We will examine the geography of opportunity in America, the relationship between employers & workers, the gaps in wealth and income among generations & races. We will hear from poor people & rich people, business people, activists, philosophers..As always, we will be soliciting dissenting views as we go. Our goal, also as always, is not to tell you what to think — we don't presume to do that — but to aid you in the project of thinking for yourself, & the United States in the never-ending project of renewing itself.'

<https://www.linkedin.com/in/ferez-soli-nallaseth-m-s-ph-d-3112a714/detail/recent-activity/shares/>

With New Hot Spots Emerging, No Sign of a Respite

May 5, 2020

While cities like New York have seen a hopeful drop in cases, upticks in other major cities and smaller communities have offset those decreases.

<https://www.nytimes.com/2020/05/05/us/coronavirus-deaths-cases-united-states.html>

Coronavirus: Obama says US response a 'chaotic disaster'

10 May 2020

[Status is online](#)

[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

#COVID19 #PresObama #RePresTrump #EvaluatingWHResponse #RallyingFormerStaffers
#US2020Elections #RestorationOfUSA

'Former US President Barack Obama has strongly criticised his successor Donald Trump over his response to the coronavirus crisis.

In a private conference call, he called the US handling of the pandemic "an absolute chaotic disaster". His remarks were made while encouraging former staff to work for Joe Biden's presidential election team, CNN says.

The White House said in response that President Trump's "unprecedented" action had "saved Americans' lives".

During the call, Mr Obama said his Republican successor's approach to government was partly to blame for the US response to coronavirus.

"It would have been bad even with the best of government," he was quoted as saying in the call. "It has been an absolute chaotic disaster when that mindset of 'what's in it for me' and 'to heck with everybody else', when that mindset is operationalised in our government."

Mr Obama also strongly criticised the decision to drop criminal charges against former National Security Adviser Michael Flynn.'

<https://www.bbc.com/news/world-us-canada-52602580>

Jacinda Ardern Sold a Drastic Lockdown With Straight Talk and Mom Jokes

Leading New Zealand from isolation, Ms. Ardern coaxed her "team of five million" into accepting extreme restrictions. But the lessons of her success go beyond personality or charm.



Prime Minister Jacinda Ardern of New Zealand at a news conference at Parliament in Wellington, the capital, last month. Credit...Hagen Hopkins/Getty Images

By [Damien Cave](#)

Published May 23, 2020 Updated May 24, 2020

Halfway into a [Facebook Live video](#) last week, updating the world on New Zealand's plan to reopen restaurants, schools and even movie theaters, Prime Minister Jacinda Ardern noticed a concern cropping up among the commenters: They thought she looked tired.

She had plenty of reason to be exhausted, managing a pandemic as well as a daughter in diapers. But instead, she blamed the unflattering beige curtains behind her, then spun her phone around to show off the vintage cane furniture with green frond upholstery in her favorite room at the prime minister's residence.

"This is a fabulous chair," said Ms. Ardern, [a global progressive icon](#), plopping down after the brief tour. "And this is a much better corner, because where I was sitting before was right next to the nappy bucket, which I'm going to admit was not the freshest place to be sitting."

"So," she continued after a deep breath, "when it comes to health services, you'll see those starting to wind back up."

https://www.nytimes.com/2020/05/23/world/asia/jacinda-ardern-coronavirus-new-zealand.html?campaign_id=2&emc=edit_th_200524&instance_id=18743&nl=todaysheadlines®i_id=29747032&segment_id=29014&user_id=c32bb24514e7532676495d039447dd68

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#COVID19 #DeathRates #USvSouthKoreavPeoplesRepubChina

'Coronavirus: US death rates v China, Italy and South Korea

The US has seen its cases spike dramatically in recent days and these graphs show what could be in store. Produced by the BBC's Franz Strasser, narrated by Hannah Long-Higgins.'

<https://www.bbc.com/news/av/world-us-canada-52066105/coronavirus-us-death-rates-v-china-italy-and-south-korea>

Technology

How Hong Kong Did It

With the government flailing, the city's citizens decided to organize their own coronavirus response.

Zeynep Tufekci
May 12, 2020

[Via Margaretta Colangelo](#)

[Co-Founder & Managing Partner at Deep Knowledge Ventures](#)

Hong Kong has had only 4 COVID deaths without a lockdown. How they did it -- With over 7 million people Hong Kong is densely populated, has more cross-border traffic with China than anywhere else in the world, and has a crowded mass-transportation system. Hong Kong is connected to Wuhan via a high-speed-train and many daily flights. More than 2.5 million people came to Hong Kong from mainland China in January of 2020. When the initial outbreak occurred, Hong Kong's citizens acted swiftly, collectively, and efficiently against the virus. The organizational capacity and the civic infrastructure built by the protest movement played a central role in Hong Kong's grassroots response. Groups of organized citizens built a website to track COVID cases, monitor hot spots, warn people of places selling fake PPE, and report hospital wait times and other relevant information. Hong Kongers were so successful in their efforts that even the flu season ended 6 weeks earlier than usual. Life is returning to normal in Hong Kong.

#artificialintelligence #datascience #innovation #coronavirus #economy The Atlantic Zeynep Tufekci

<https://www.theatlantic.com/technology/archive/2020/05/how-hong-kong-beating-coronavirus/611524/>

As governments fumbled their coronavirus response, these four got it right. Here's how.

By Angela Dewan, Henrik Pettersson and Natalie Croker, CNN

Updated 8:38 AM ET, Thu April 16, 2020

London (CNN) Like a line of dominoes, country after country has been shut down by the novel coronavirus. Despite signs the threat was making its way across the globe, there was a clear pattern of response in many parts of the world -- denial, fumbling and, eventually, lockdown.

In our globalized world, it's puzzling that so few lessons were learned in the early weeks of each country's outbreak, when the chances of containing and stopping the virus were highest. Now the focus is on flattening the curve, or slowing the virus' spread, to keep death tolls from climbing further.

As much of the world mulls gradually lifting lockdowns, there are still lessons to be learned from these four places that got it right. Here are 12 of those lessons.

Taiwan

Sitting just 180 kilometers (110 miles) off the coast of mainland China, Taiwan's outbreak could have been disastrous. At the end of January, the island was estimated to have had the second-highest number of cases in the world, according to Johns Hopkins University (JHU).

Top of Form

Bottom of Form

Top of Form

Bottom of Form

But Taiwan, with a population

<https://www.cnn.com/2020/04/16/world/coronavirus-response-lessons-learned-intl/index.html>

'New Zealand says it has stopped community transmission of Covid-19, effectively eliminating the virus.'

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[#COVID19 #MoreExamples #SuccessfulContainment #ToughestLevelsIsolation #Leadership](#)

[#FromAsiaANZAC](#) 'New Zealand says it has stopped community transmission of Covid-19, effectively eliminating the virus.

With new cases in single figures for several days - one on Sunday - Prime Minister Jacinda Ardern said the virus was "currently" eliminated.

But officials have warned against complacency, saying it does not mean a total end to new coronavirus cases.

The news comes hours before New Zealand is set to move out of its toughest level of social restrictions.

From Tuesday, some non-essential business, healthcare and education activity will be able to resume.

Most people will still be required to remain at home at all times and avoid all social interactions.

Follow our live updates from around the world

How New Zealand turned to science and kindness

The 'social bubble' approach to lockdown easing

"We are opening up the economy, but we're not opening up people's social lives," Ms Ardern said at the daily government briefing.

New Zealand has reported fewer than 1,500 confirmed or probable cases of coronavirus and 19 deaths.'

<https://www.bbc.com/news/world-asia-52436658>

Coronavirus: How India's Kerala state 'flattened the curve'

[Status is online](#)

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[#COVID19 #DemocCivilSoc #FlattensCurve](#).. 'the state has 3 deaths & > than 370 conf. cases of the inf..>

100,000 people rem. in isolation..Kerala has flattened the curve at a time when the infection is on the rise all

over India..lockdown a day before the nationwide one,..rig. contact tracing....Covid-19 care centres in all

districts..adv to isolate..H.W. supp. people with sp. needs & the elderly living alone..Counsel. made > 340,000

telephone calls to person. work. in aff. areas to coun. them on how to handle stress..not that Kerala tested

aggress..what really mattered in the end was Kerala's robust pub. hlth sys., & a culture of thriving grassroots

democ. w/ power devolving effectively to the [vill.councils](#)..The Communist govt. released abundant info.

about the develop. every day, analysts say.

"A strong game-changer was the decentralised health care system & village councils took upon themselves to enf. & monitor mass quar. w/ the consent of the people. The shutdown also helped," B Ekbal, a neurosurgeon & head of an exp. panel adv. the govt. on prevention of the virus, told me.

Economists like Jacob John believe that the devolution of power in Kerala - have helped the state tackle two consecutive floods and an outbreak of the vicious Nipah virus in the last three years.'

<https://www.bbc.com/news/world-asia-india-52283748>

[Is France's president fueling the hype over an unproven coronavirus treatment?](#)

[South Africa flattens its coronavirus curve—and considers how to ease restrictions](#)

[‘Suppress and lift’: Hong Kong and Singapore say they have a coronavirus strategy that works](#)

Merkel warns coronavirus crisis 'still just the beginning'

23 April 2020

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[#COVID19 #Advice #FromALeaderWhoListensToHealthProfessionalLieutenants #AcrossTheAtlantic #CoincidesWithOverwhelmingMajorityOpinionOfAmericans #StarkChoices #Darwinian #NaturalSelection #OrAdaptation #TriversReciprocalAltruism #FiguresInUSLastNightApril22nd2020 #Infections833000Fatalities46324 #ItsTheEconomyStupid?!](#)

German Chancellor Angela Merkel says her country must remain "clever and cautious" in handling the coronavirus crisis, as "it's not the end phase but still just the beginning".

"We will be with it for a long time," she warned parliament, ahead of an EU video summit on the crisis.

<https://www.bbc.com/news/world-europe-52394645>

Oliver Dowden announces a relaxation to lockdown measures

Clubs must hold pilot trials to satisfy safety rules before a full reopening

By ALAN THATCHER – Squash Mad Editor

Squash clubs appear to have been given permission to reopen in a restricted fashion on July 25 following today's government announcement, although this seems to be a date for launching a selective trial process to guarantee safety for players and club staff members. England Squash say they will release plans next week but suggest that safe distancing will need to apply.

Culture Secretary Oliver Dowden confirmed today that outdoor sports, including team games, will be able to restart in stages from this weekend, with indoor venues to follow on July 25.

However, all facilities will have to follow distancing guidelines introduced following the spread of the Covid-19 pandemic.

Dowden stated that indoor clubs will need to hold "pilot" trial sessions before being allowed to fully reopen. "Sports will publish sport-specific guidance," he said.

Gyms have been instructed to allow 100 square feet per person, so how that kind of advice will translate to squash facilities is currently unclear.

Squash, of course, has been rated as a "high-risk activity" in a number of recent medical surveys because potentially infectious droplets of breath can be trapped inside poorly ventilated courts.

Today's announcement will apply to England only. The Scottish government confirmed that indoor sports would have to continue to wait. Irish Squash was given the green light to return to full play last week but they

has chose to adopt a more cautious approach, with solo hitting and two-player training sessions that observe safe distancing protocols.

Sport England chief executive Tim Hollingsworth has welcomed the government's announcement that recreational sport can continue its return on a larger scale, and that gym and leisure facilities are set to reopen.

In a Sport England statement, Hollingsworth said: "The Secretary of State for Digital, Culture, Media and Sport, Oliver Dowden, announced today that:

- indoor gyms, leisure facilities and swimming pools will be able to reopen from 25 July
- outdoor pools and cricket can begin this coming weekend
- the return of team sports will be facilitated by the relevant national governing body having their own sport-specific guidance approved by government.

"For the millions of people who have missed going to the gym, playing their favourite sport indoors, heading for a swim or training with their team-mates, today's news is an important step forward and testament to the hard work so many have put in to preparing to restart and reopen," he said.

"Now, more than ever, there is recognition of the vital role sport and activity plays in supporting people's physical and mental health so there is a massive opportunity as we emerge from lockdown to truly embrace the idea that exercise is essential to our wellbeing and to recognise the opportunities all around us to be more active.

"We are also acutely aware that many providers, specifically public leisure centres which are such valuable assets in their communities, are facing significant financial challenges and many are at risk of being unable to reopen fully or may remain closed.

"Indoor facilities will need to prepare for reopening, so as the sport and physical activity sector gets ready for the continuing 'return to play', we've collated advice, guidance and resources (below) to help.

"With advice likely to evolve as restrictions change, we'll monitor and update our guidance to ensure it's in line with the what the government is advising and we'll continue to listen to providers when they tell us what resources will help most.

"We will continue to work closely with government and key partners to help these operators to get as much as support as possible."

England Squash has been contacted for a statement. In a post on Twitter, they said: "The UK Government has just announced that indoor sports facilities in England can reopen from 25th July with social distancing in place.

"In the meantime, we are interpreting the newly-released Government guidance. We will finalise and release full guidance for clubs and venues to facilitate safe play next week."

Mike Hegarty, a director of Lexden Rackets and Fitness Club in Colchester, has offered to make the club available to England Squash for testing procedures.

Government figures today revealed that another 85 people have died after testing positive for coronavirus in the UK, taking the total number of deaths to 44,602 from 288,000 cases of infection.

In America, College sports programmes have been cancelled for the remainder of this year and a number of universities, including Stanford and Brown, have axed their squash teams in a bid to save money.

The USA has so far seen more than three million cases of coronavirus, with 134,000 deaths. In New York, where the iconic Tournament of Champions is due to take place early next year, there have been 400,000 infections and 32,000 deaths. Neighbouring New Jersey has 176,000 cases of infection with 15,000 deaths.

+++ UK Government advice published today for providers of [grassroots sport and indoor gym and leisure facilities](#)

Posted on July 9, 2020

<https://squashmad.com/breaking-news/squash-on-trial-as-indoor-facilities-are-allowed-to-reopen-in-uk-on-july-25/>

[Status is online](#)

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George W. Bush's Coronavirus Video Has Critics Nostalgic

Politics

By

[Hailey Waller](#)

May 2, 2020, 6:54 PM EDT Updated on May 3, 2020, 12:32 PM EDT

- Bush warns of 'emotional isolation' and of partisan politics
- Critics credit Bush for speaking to entire nation about unity

<https://www.bloomberg.com/news/articles/2020-05-02/george-w-bush-s-coronavirus-video-has-some-critics-nostalgic>

Infect Everyone: How Herd Immunity Could Work for Poor Countries

[Ari Altstedter](#)

April 21, 2020, 5:00 PM EDT Updated on April 22, 2020, 1:44 AM EDT

- Letting virus spread less costly than lockdowns: researchers
- Young population means not as many deaths as European nations

<https://www.bloomberg.com/news/articles/2020-04-21/a-herd-immunity-strategy-could-actually-work-in-youthful-india>

Herd immunity is not happening

Despite more than 27,000 confirmed deaths from COVID-19 in France, only 4.4% of people have actually been infected. The percentage is far below the required level — something more than 50% — to achieve herd immunity. Herd immunity would slow — but not stop — the outbreak. Results announced by Spain's health minister show a similar situation: more than 27,000 deaths and just 5% of the population tested had antibodies to the virus. "Population immunity appears insufficient to avoid a second wave" if lockdown measures are removed, say the authors of the French study. (Reuters | 2 min read)

Reference: *Science* paper

https://uk.reuters.com/article/uk-health-coronavirus-france-immunity/only-44-of-french-population-infected-by-coronavirus-pasteur-institute-idUKKBN22Q0RM?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

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Coronavirus lockdown: Nobel prize economist says India must do more for poor

By Soutik Biswas India correspondent

- 24 April 2020

[#COVID19](#) [#India](#) [#NobelLaureateEconomist](#) [#ProfAVBanerjee](#)

'A Nobel-prize winning economist has said India needs to be "much more generous" in providing relief to the millions of people who have been direly hit by the ongoing lockdown.

"We haven't done anything close to enough," Indian-American academic Abhijit Vinayak Banerjee, told the BBC.

Professor Banerjee, who won the Nobel Prize in economics in 2019 with co-researchers Esther Dufflo and Michael Kremer, said the "government was right in its thinking to throw a shock in the system" to contain the spread of the Covid-19 infection. "But the lockdown is not the end of the story. This disease is going to be with us for a long time until a vaccine arrives, which is not anytime soon," the economist who teaches at Massachusetts Institute of Technology (MIT) said.

"India needs to think of a clear, well-articulated plan on what should be done next. The economy was already facing a demand slump. The [coronavirus] outbreak is a double whammy and many people have lost their earning capacity. There's an additional demand slump now."

Prof Banerjee added that India's government should be more liberal about spending money to bail out people who could be facing poverty because of loss of earnings.'

<https://www.bbc.com/news/world-asia-india-52403589>



[**European Commission**](#)

[**915,341 followers**](#)

[We have come together against the coronavirus! 🇪🇺 The pandemic is affecting every single country in the world. It has brought heartache and heartbreak, pain and suffering to millions of people. It has put enormous strain on healthcare and welfare systems, but it has also brought the best out of humanity.](#)

[Governments from across the world teamed up with health organisations and partners to contribute to the worldwide pledging marathon, which will run until the end of May.](#)

[We at the European Commission have mobilised €1.4 billion for the Coronavirus Global Response. All together, we raised €7.4 billion \(\\$8 billion\) in initial funding to develop diagnostics, treatments and vaccines and make them accessible for everyone globally. But this is only the beginning.](#)

[After governments, civil society and people worldwide need to join in, in a global mobilisation of hope and resolve. This is the true power of unity and humanity. The world is united against the coronavirus, and the world will win! More about this initiative: <https://europa.eu/!DB63HJ>](#)

[#UnitedAgainstCoronavirus #Coronavirus #COVID19](#)

https://ec.europa.eu/commission/presscorner/detail/en/ip_20_797

Coronavirus Global Response: €7.4 billion raised for universal access to vaccines

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Today, the Commission registered €7.4 billion, equivalent to \$8 billion, in pledges from donors worldwide during the Coronavirus Global Response pledging event. This includes a pledge of €1.4 billion by the Commission. This almost reaches the [initial target](#) of €7.5 billion and is a solid starting point for the worldwide pledging marathon, which begins today. The aim is to gather significant funding to ensure the collaborative development and universal deployment of **diagnostics, treatments and vaccines** against coronavirus.

President of the European Commission, Ursula **von der Leyen**, said: *"Today the world showed extraordinary unity for the common good. Governments and global health organisations joined forces against coronavirus. With such commitment, we are on track for developing, producing and deploying a vaccine for all. However, this is only the beginning. We need to sustain the effort and to stand ready to contribute more. The pledging marathon will continue. After governments, civil society and people worldwide need to join in, in a global mobilisation of hope and resolve."*

The pledging event was co-convened by the European Union, Canada, France, Germany, Italy (also incoming G20 presidency), Japan, the Kingdom of Saudi Arabia (also holding the G20 presidency), Norway, Spain and the United Kingdom. The initiative is a response to the [call](#) from the World Health Organization (WHO) and a group of health actors for a global collaboration for the accelerated development, production and equitable global access to new coronavirus essential health technologies. The Coronavirus Global Response Initiative is comprised of **three partnerships** for testing, treating and preventing underpinned by health systems strengthening.

An ongoing pledging marathon

Today is an extraordinary achievement but also the start of a process to mobilise more resources. The initial target of €7.5 billion will not be enough to ensure the distribution of coronavirus health technologies worldwide, as this involves significant costs in terms of production, procurement and distribution.

To help reach the objectives of the Coronavirus Global Response, the European Commission is committing €1 billion in grants and €400 million in guarantees on loans through reprioritisation of [Horizon 2020](#) (€1 billion), [RescEU](#) (€80 million), the [Emergency Support Instrument](#) (€150 million) and [external instruments](#) (€170 million).

€100 million will be donated to CEPI and €158 million to the World Health Organization. EU-funded calls for proposals and subsequent projects under Horizon 2020 will be aligned with the objectives of the three partnerships and subject to open access to data. Funding under RescEU will go towards the procurement, stockpiling and distribution of vaccines, therapeutics and diagnostics.

Donors are invited to continue pledging to the Coronavirus Global Response. They can choose which priority to donate to – Test, Treat or Prevent. They can also donate to the horizontal work stream of the Coronavirus Global Response, aiming to help health systems in the world cope with the pandemic.

The Commission will soon announce the breakdown of the amount raised today and how much will go to vaccines, therapeutics, diagnostics and health systems strengthening related to COVID-19.

A cooperation framework to align global efforts

A universal and affordable **Access to COVID-19 Tools** (ACT-Accelerator) was the main objective of the 24 April [call to action](#) from global health partners. For this, significant funding is needed, as well as a solid collaborative structure, with a clarity of purpose to ensure that the donated money is put to good use and to avoid fragmentation of efforts.

Based on discussions with public and private sector partners as well as non-profit organisations, the European Commission proposes a collaborative framework for the ACT-accelerator global response. This framework is designed as a coordination structure to steer and oversee progress made globally in accelerating work on developing vaccines, therapeutics and diagnostics with universal access as well as strengthening health systems as required for meeting these three priorities.

This collaboration framework is intended to be time-bound (2 years, renewable) and build on existing organisations without creating any new structures. In the European Commission's view, it would bring together partners like the WHO, the Bill and Melinda Gates Foundation, the Wellcome Trust and some of the initial convenor countries as well as many recognised global health actors such as CEPI, Gavi, the Vaccine Alliance, the Global Fund or UNITAID.

The core of the framework would be **three partnerships** based on the three priorities of the Coronavirus Global Response. They gather industry, research, foundations, regulators and international organisations, with a “whole-value-chain” approach: from research to manufacturing and deployment. The three partnerships would work as autonomously as possible, with a transversal work stream on enhancing the capacity of health systems and knowledge and data sharing.

The Commission registers and keeps track of pledges up until end of May but will not receive any payments into its accounts. Funds go directly to the recipients. Recipients will, however, not decide alone on the use of the donation, but deploy it in concertation with the partnership. The commitment is for all new vaccines, diagnostics and treatments against coronavirus to be made available globally for an affordable price, regardless of where they were developed.

Next steps

The global response must also include civil society, and the global community of citizens. For that reason, the European Commission is joining forces with NGOs such as Global Citizen and other partners.

The Global Vaccines Summit that Gavi, the Vaccine Alliance, will organise on 4 June will mobilise additional funding to protect the next generation with vaccines. As the world relies on Gavi's work for making vaccination available everywhere, the success of Gavi's replenishment will be crucial to the success of the Coronavirus Global Response.

Background

The Coronavirus Global Response builds on the commitment made by G20 leaders on 26 March.

Grounded in a vision of a planet protected from human suffering and the devastating social and economic consequences of the coronavirus, an initial group of global health actors launched a call to action for global collaboration for the accelerated development, production and equitable global access to new coronavirus essential health technologies.

On 24 April, the World Health Organization (WHO) and an initial group of health actors launched a collaboration for the accelerated development, production and equitable global Access to COVID-19 Tools – the ACT Accelerator. Together, they issued a [call to action](#).

The European Commission responded to this call by joining forces with global partners to host a pledging event – the Coronavirus Global Response Initiative – as of 4 May 2020.

Funding, including the EU contribution, pledged since 30 January 2020 – the date when the WHO declared coronavirus a global health emergency – will be counted as part of the Coronavirus Global Response funding target with the commitment that these will contribute to and align with the ACT-Accelerator framework.

For More Information

[Coronavirus Global Response website](#)

[Questions and Answers: the Coronavirus Global Response](#)

[Factsheet – The Coronavirus Global Response](#)

[The Commission's Coronavirus Response](#)

https://ec.europa.eu/commission/presscorner/detail/en/ip_20_797

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[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

How Upbeat Vaccine News Fueled a Stock Surge, and an Uproar

The desperate hunt for treatments and vaccines has changed how researchers, regulators, drug companies like Moderna, investors and journalists do their jobs.

Hours after announcing positive results from a small trial of its coronavirus vaccine, Moderna Therapeutics unveiled a stock offering that sought to raise \$1.3 billion. Credit...Brian Snyder/Reuters

By [Katie Thomas](#) and [Denise Grady](#)

May 23, 2020

When the biotech company Moderna announced early on Monday morning positive results from a small, preliminary trial of its coronavirus vaccine, the company's chief medical officer described the news as a "triumphant day for us."

Moderna's stock price jumped as much as 30 percent. Its announcement helped lift the stock market and was widely reported by news organizations, including The New York Times.

Nine hours after its initial news release — and after the markets closed — the company announced a stock offering with the aim of raising more than \$1 billion to help bankroll vaccine development. That offering had not been mentioned in Moderna's briefings of investors and journalists that morning, and the company chairman later said it was decided on only that afternoon....

Dr. Fauci said he and his research team decided to report some results when the study was stopped after an independent safety board found that the treated patients were recovering faster than those receiving placebos. For ethical reasons, all patients had to be offered the drug.

The information would likely have leaked out — especially given that, [two weeks earlier](#), information from another remdesivir trial had been disclosed to the news site STAT, sending Gilead's stock up.

Dr. Fauci announced that patients treated with remdesivir recovered in 11 days, compared with 15 days for those getting placebos.

"That was all the data we had," he said. The [full results were published](#) on Friday in The New England Journal of Medicine.

Gilead Sciences has developed an experimental treatment for Covid-19, remdesivir. Credit...Mike Blake/Reuters

The fast pace of research has caught many news organizations off guard, prompting case-by-case discussions on tight deadlines to decide whether — and how — to cover scientific news even when the quality of studies wouldn't normally meet their standards.

Scientific articles normally take months to go through peer review. But now, many papers are being published on preprint servers, where scientists are posting research before it is accepted by a journal. The site [medRxiv](#), which was founded last June, had 10 million views in April and has posted nearly 3,100 papers related to Covid-19 since January. A similar site, bioRxiv, has posted about 760 papers on the virus.

https://www.nytimes.com/2020/05/23/health/coronavirus-vaccine-moderna.html?campaign_id=2&emc=edit_th_200524&instance_id=18743&nl=todaysheadlines®i_i_d=29747032&segment_id=29014&user_id=c32bb24514e7532676495d039447dd68

Federal Scientists Finally Publish Remdesivir Data

A clinical trial led to the authorization of the only drug shown to work in Covid-19 patients. But until now, few experts had seen the numbers.



"For God's sake, this is a pandemic — we need some data," said Dr. Judith Feinberg, vice chair of research at West Virginia University School of Medicine. Credit...Pool photo by Ulrich Perrey

By [Gina Kolata](#)

May 23, 2020

Nearly a month after federal scientists claimed that an experimental drug had helped patients severely ill with the coronavirus, the research has been published.

The drug, remdesivir, was quickly authorized by the Food and Drug Administration for treatment of coronavirus patients, and hospitals rushed to obtain supplies.

But until now, researchers and physicians had not seen the actual data. And remdesivir, made by Gilead Sciences, has a spotty history. It was originally intended to treat hepatitis, but it failed to. It was tested against Ebola, but results were lackluster.

So far, remdesivir has not been officially approved for any purpose. The F.D.A.'s emergency use authorization was not a formal approval...

The best outcome would have been a decline in the death rate among patients given remdesivir, but there were only hints that this had occurred.

Despite generally positive results, the researchers caution that the drug is far from ideal.

"Given high mortality despite the use of remdesivir, it is clear that treatment with an antiviral drug alone is not likely to be sufficient," they concluded.

https://www.nytimes.com/2020/05/23/health/coronavirus-remdesivir.html?campaign_id=2&emc=edit_th_200524&instance_id=18743&nl=todaysheadlines®_i_id=29747032&segment_id=29014&user_id=c32bb24514e7532676495d039447dd68

Feinberg Says He's Had Initial Talks About a Virus Victim Fund WHO Chief Tedros: The Worst Is Yet Ahead of Us

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6:31

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Controversial given the high risk of deaths, a coronavirus strategy discarded by the U.K. is being touted as the solution for poor but young countries like India.

Herd immunity, which allows a majority of the population to gain resistance to the virus by becoming infected and then recovering, could result in less economic devastation and human suffering than restrictive lockdowns designed to stop its spread, according to a growing group of experts.

"No country can afford a prolonged period of lockdowns, and least of all a country like India," said Jayaprakash Muliyil, a prominent Indian epidemiologist. "You may be able to reach a point of herd immunity without infection really catching up with the elderly. And when the herd immunity reaches a sufficient number the outbreak will stop, and the elderly are also safe."

A team of researchers at Princeton University and the Center for Disease Dynamics, Economics and Policy, a public health advocacy group based in New Delhi and Washington, has identified India as a place where this strategy could be successful because its disproportionately young population would face less risk of hospitalization and death.

They said allowing the virus to be unleashed in a controlled way for the next seven months would give 60% of the country's people immunity by November, and thus halt the disease.

Mortality could be limited as the virus spreads compared to European nations like Italy given that 93.5% of the Indian population is younger than 65, they said, though no death toll projections were released.

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[https://www.bloomberg.com/news/articles/2020-04-21/a-herd-immunity-strategy-could-actually-work-in-you thful-india](https://www.bloomberg.com/news/articles/2020-04-21/a-herd-immunity-strategy-could-actually-work-in-you-thful-india)

BOOK REVIEW

15 May 2020

COVID-19 economics — first book hits shelves

Breakneck triage nails many diagnoses, but deeper treatment is needed.

[Philip Ball](#)



Garment workers in Bangladesh risk their lives in an industry devastated by the collapse in global spending. Credit: Zabeed Hasnain Chowdhury/SOPA Images/LightRocket via Getty

There has never been a harder time to be a political leader. The choices that must be made are enormous, the consequences potentially catastrophic, the science guiding those decisions uncertain — and there is no precedent. As a result, the COVID-19 pandemic has revealed some of the best and the worst in the world's leaders: from opportunism and denial to compassion and clarity.

It's a shame that policymakers did not have books such as Joshua Gans's *Economics in the Age of COVID-19* to lay out the issues for them in January. It is remarkable that they do already. Gans completed this book at breakneck speed, by late March. His attempt to explain the economic thinking that should guide policy is useful, but inevitably limited. With the situation and knowledge changing daily, unfurling events will always render some aspects of such an analysis obsolete. In this sense, Gans, an economist at the University of Toronto in Canada, has taken a brave shot at an impossible task. Ultimately, economic thinking will need wider horizons.



[Without food, there can be no exit from the pandemic](#)

The crisis has forced some politicians, especially on the right, to go against deeply held inclinations by implementing interventions and financial handouts that, in normal times, even most of their opponents would deem excessive. Countries have tried to freeze their economies and prop up the absence of liquidity and wages with eye-watering subsidies until the wheels start turning again.

Therein lies the difference from the oft-cited comparison with wartime economics. In that situation, activity continues, but redirected. The present worldwide lockdowns have drastically shrunk the workforce. Aside from essential workers — in health, care, food and transport, say — only those jobs that can be done alone from home can safely continue (never have I felt luckier to be a writer). This has sometimes been presented, too simplistically, as creating a choice between saving lives or saving the economy. As many countries have now passed the (first?) peak of infections, discussion has turned to the dangers to health posed by an economy left too long in stasis.

That discussion needs to happen, but it risks becoming facile, too. Presenting lives versus livelihoods as a dichotomy is used in defence of leaders who hesitated to impose a lockdown. That, Gans shows, is mistaken. The highly infectious nature and the fatality rate of COVID-19, which were both clear early on, even if exact numbers were not, meant there was never a gradual trade-off to be had: a dash more economy at the price of a few more deaths. “If you know you are going to shut down the country eventually, there are huge returns to doing it quickly,” Gans writes. It is the only way to keep choices open as more is learnt about the virus and its spread.



[Researchers: show world leaders how to behave in a crisis](#)

This is not hindsight: Gans was writing while the UK and US governments were procrastinating. Nor is it just about saving lives in the short term. “Pursuing public health can be consistent with superior long-run economic performance,” Gans writes.

And to be effective, that decision to shutter must be made with “resolve, clarity [and] transparency”. If leaders downplay the enormity of the crisis, prevaricate or issue weak behavioural guidelines — rather than expectations with consequences — then individuals will “do as they often do and pursue their own interest”, and will “keep businesses open and keep engaging in social life”.

Then there's the question of how to manage the crisis in an economy on pause. Again, ideology might clash with reality. If you urgently need masks or ventilators, then there's no time to put it out to tender and let market mechanisms make the choices about who gets the contract and the product. There must be centralized decision-making and allocation, even if that risks a degree of 'inefficiency'.



There has been a surge in COVID-19 cases in meatpackers in the United States. Credit: USDA/Alamy

And how do you keep the economy in suspended animation, without the onset of necrosis? Governments have generally realized that they must help to cover lost wages, but the details are very tricky. The options of providing financial assistance to cover bills, such as rent and mortgages, suspending those costs or covering them directly are not equivalent. Gans says that the aim must be for payments, subsidies and loans to "ensure that people's short-term disruptions are not translated into long-term breakups". One solution, he suggests, is repayment of government loans over time through taxation.

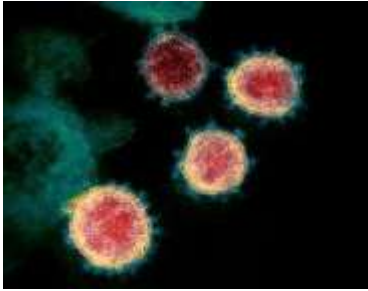


[This physicist-turned-economist is modelling the pandemic's financial fallout](#)

Is the past any guide? Gans touches on the only comparable event in recent times, the 1918 influenza pandemic. The economic consequences of that were complicated because it occurred directly after a global war (mobilization of troops exacerbated that outbreak). Gans might also have mentioned the AIDS epidemic in Africa, which has in some regions been devastating enough to orphan generations, deplete the workforce and hamper economic development. Prioritizing the economy over health is not necessarily taking the long view.

Gans does a good job fleshing out the requirements for an exit strategy. He says we now need to "invest in the testing economy", for example to establish who can safely return to work and to monitor workplace safety. "Countries and regions that were able to test, trace, and then isolate the infected were able to contain the virus quickly and reopen their economies sooner", he points out — in a ringing endorsement of World Health Organization policy. Even with a vaccine, he says, testing is likely to be a part of our daily lives for many years.

He also offers a useful discussion of how to optimally allocate a vaccine when it has not been produced in sufficient quantities for all (although he does not go into the issue of people refusing it, [which is likely to be a problem](#)). And he considers how innovation in vaccine development can be motivated without reliance on market forces and patenting of what is so clearly a global public good. There is previous discussion he might have drawn on here about the development of urgently needed drugs and treatments that seem unlikely to generate profits for pharmaceutical companies, such as new antibiotics and treatments for tuberculosis.



Coronavirus and COVID-19: Keep up to date

As others have done after previous outbreaks, Gans advocates establishing a pan-national institution with a “set of resources to contain future pandemics and ensure an international, harmonized response”. More like the International Monetary Fund than the WHO in his vision, this would focus not just on drugs but also on innovations to enhance protection from infection at work and on public transport. He calls “hundreds of billions of dollars per year to mitigate substantially the risk of global pandemics” a no-brainer, [echoing those after the first Ebola outbreak who drew parallels with defence spending](#).

Here, the book stops short. Realistically, Gans’s word was always going to be the first, not the last. But he paints a picture of a post-COVID-19 world that is largely back to normal, with some inconveniences. The truth is that the pandemic throws much more into question. Whatever landscape emerges, it is unlikely to be same as that at the end of 2019.

There is a moral case for rethinking inequalities in light of what we have learnt about who is truly essential for society’s functioning. Some aspects of neoliberal economic policy are fundamentally in conflict with the needs of a fragile world, with greater risks to come. The behaviour of some leaders has pointed out the dangers of an information economy that has become a ‘marketplace for truth’. And economics itself must incorporate the revision of past preconceptions and habits that will be demanded of the rest of us.

doi: [10.1038/d41586-020-01487-2](https://doi.org/10.1038/d41586-020-01487-2)

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[Ferez Soli Nallaseth, M.S., Ph.D. Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

Herd immunity is not happening

Despite more than 27,000 confirmed deaths from COVID-19 in France, only 4.4% of people have actually been infected. The percentage is far below the required level — something more than 50% — to achieve herd immunity. Herd immunity would slow — but not stop — the outbreak. Results announced by Spain's health minister show a similar situation: more than 27,000 deaths and just 5% of the population tested had antibodies to the virus. "Population immunity appears insufficient to avoid a second wave" if lockdown

measures are removed, say the authors of the French study. (Reuters | 2 min read)

Reference: *Science* paper

https://uk.reuters.com/article/uk-health-coronavirus-france-immunity/only-44-of-french-population-infected-by-coronavirus-pasteur-institute-idUKKBN22Q0RM?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

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Trump signs \$2.2tn stimulus bill after invoking Defense Production Act – as it happened

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“From this day forward, a new vision will govern our land. From this moment on, it’s going to be America First,” he declared.

“I will fight for you with every breath in my body – and I will never, ever let you down. America will start winning again, winning like never before.”

And so it came to pass that America is indeed winning like never before. First among nations, to be sure. With all the new vision that an ostrich has while examining the sand from below.



A Debate Over Masks Uncovers Deep White House Divisions

[nytimes.com](https://www.nytimes.com)

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[#NYTOpenEd](#) [#COVID19](#) [#FrmLegalAdvisorToNSC](#) [#DeployDPA](#) [#Abdication](#)? Gov. & health off. tell us that there is a profound gap bet. the protective equip., hospital equip. & testing res. that are needed (& will be needed) & what is available (or in the pipeline). Bill Gates reminds us that we will need to prod. millions, perhaps billions, of doses of vaccine in 12 to 18 months. This isn’t a passing crisis; we will need more of everything in two months, six months and maybe years..

The [D.P.A.’s](#) industry assess. auth. can be used to measure prod. & distrib. capacity, remove blind spots, plan efficiently & recreate a supply chain at home. The federal govt. can determine now which entities could produce vaccines while it plans for their ethical allocation. The govt. can then use the D.P.A.’s Title III incent. [auth.or.](#) to issue loans, offer antitrust protection and guarantee purchases, creating a secure market for

masks, tests & vaccines..

If I were advising the president (or the secretaries w/ delegated authority), I would say this: Please, tell the public what the need is & how the need will be met today, next week & in the months to come. What specifically has been contracted for, in how many units & on what timeline? Where there is a gap between need & supply, use the D.P.A. to close it.'

[It's High Time We Fought This Virus the American Way](#)

[nytimes.com](https://www.nytimes.com)

The Coronavirus Outbreak

- **Frequently Asked Questions and Advice (listed in section 1)**

Updated April 11, 2020

- **What should I do if I feel sick?**
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- **Can I go to the park?**
- **Should I pull my money from the markets?**
- **What should I do with my 401(k)?**

<https://www.nytimes.com/2020/05/02/us/politics/vaccines-coronavirus-research.html>

Coronavirus: How exposed is your job?

- 14 May 2020

[Coronavirus pandemic](#)

Millions of workers are doing their day jobs from makeshift set-ups in their living rooms and kitchens, while those in England who can't work from home are now encouraged to go back in if they can do so safely.

But how exposed to coronavirus might you be in your job? And how does that compare to others?

Data from the UK's Office for National Statistics, based on a US survey, puts into context the risk of exposure to disease, as well as the amount of close human contact workers had before social distancing and other safety measures were introduced.

See how your job ranks by using the search below.

While most jobs require people to work relatively closely to others - somewhere in the range between arm's length and a shared office environment - there are very few that typically involve exposure to disease more than once a year.

It's important to note that the data on both exposure to disease at work and how close people are to others is based on interviews that took place with US workers before the pandemic broke out and social distancing recommendations were introduced.

Some jobs may find it easier to adjust than others and there may be slightly different working practices and conditions in the US for certain occupations. The results can be expected to be broadly the same in most developed countries.

Almost all the jobs that have a high exposure to both disease and other people are healthcare professions, while those who scored low on both measures include artists, lawyers and those in more typical office jobs like marketing, HR and financial advisers.

Cleaners, prison officers and undertakers are among those who have relatively high exposure to disease without so much close interaction with other people.

But the people who might be most at risk to a new infectious disease like Covid-19, are those who have lots of close contact with people, but aren't used to being exposed to disease.

Bar staff, hairdressers and actors fall into this category, as well as taxi drivers and bricklayers.

What do I need to know about the coronavirus?

- **A SIMPLE GUIDE:** [How do I protect myself?](#)
- **STAYING SAFE:** [Who should wear a face mask or face covering?](#)
- **DO IT FROM HOME:** [How to make your own face mask](#)
- **AVOIDING CONTACT:** [The rules on self-isolation and exercise](#)
- **VIDEO:** [The 20-second hand wash](#)
- **LOOK-UP TOOL:** [Check cases in your area](#)

Other figures released by the ONS this week showed that [deaths in the healthcare sector in the UK are no higher on average than those in the wider community](#), although social care workers were dying at higher rates. Given that these healthcare occupations are so exposed to both disease and other people, why have there not been more deaths?

This could be because [workers in these jobs are more likely to be using personal protective equipment \(PPE\)](#) like masks and gloves, says Ben Humberstone, deputy director for health analysis at the ONS. They also follow regular hygiene measures like washing hands.

One of the jobs which had many more coronavirus deaths than the average was taxi drivers. That's a job which scores highly in terms of closeness to other people, particularly among those jobs which are still actually possible to do at the moment. Bar staff, hairdressers and fitness instructors all score higher, but with bars, gyms and hair salons shut, most of these people will be isolating.

As taxi drivers are less exposed to disease in normal times, there may not be an existing culture of regular hand-washing and wearing PPE. [Some firms are trialling partition screens](#) and distributing gloves and masks to protect their drivers and customers.

Methodology

The data in the look-up comes from [this release by the ONS](#).

The figures on proximity to others and exposure to disease come from a survey carried out by the Occupational Information Network (O*NET) in which they asked respondents in the US to place themselves on a 1-5 scale for the following two questions.

1. How physically close to other people are you when you perform your current job?
2. How often does your current job require you to be exposed to diseases or infection?

For exposure to disease, a score of one means they are never exposed, while a score of five means they are exposed daily. It's referring to any disease, not coronavirus specifically.

For the physical closeness question, one means the respondent works more than 100ft away from the nearest other person, while five means they need to touch or be near to touching other people at work. The survey was carried out before social distancing measures were introduced and workers in certain jobs will of course find it easier to adjust than others.

The responses for people in the same jobs were averaged together and extrapolated to form a score of 100.

We've looked at these scores out of 100 and given each job a ranking.

If any two jobs had the same score we've given them a tied ranking.

By Daniel Dunford, Sean Willmott, Marcos Gurgel and Katie Hassell.

<https://www.bbc.com/news/uk-52637008>

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Beyond the cloistered confines of the White House an alternative interpretation of events was gathering force. On a day in which the US suffered its highest death toll from Covid-19, with a total of more than 680,000 confirmed cases and 34,000 deaths, public health experts were scrutinising the president's new guidelines and coming to rather different conclusions.

"This isn't a plan, it's barely a PowerPoint," spluttered Ron Klain on Twitter. Klain, the US government's Ebola tsar during the last health crisis to test the White House, in 2014, said the proposals contained "no provision to ramp up testing, no standard on levels of disease before opening, no protections for workers or customers".

https://www.theguardian.com/us-news/2020/apr/18/operation-reopen-america-are-we-about-to-witness-a-second-historic-failure-of-leadership-from-trump?utm_term=RWRpdG9yaWFsX0d1YXJkaWFuVG9kYXIVUy0yMDA0MTg%3D&utm_source=esp&utm_medium=Email&CMP=GTUS_email&utm_campaign=GuardianTodayUS

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Will Americans ever forgive Trump for his heartless lack of compassion?

While the nation grieves, the US president has spent less than five minutes expressing compassion for those who are suffering

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- **See all our coronavirus coverage**

Francine Prose

Tue 5 May 2020 06.22 EDT Last modified on Tue 5 May 2020 09.04 EDT

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'We can't help thinking how much less worried we would be if a humane, competent, well-informed adult was making the decisions that affect us all.' Photograph: Andrew Caballero-Reynolds/AFP via Getty Images

To exist at this moment is to navigate (or try to fend off) the flood of grief that threatens to submerge even our rare, buoyant moments. We mourn the death of friends and relatives, the absence of human contact and the everyday pleasures we once took for granted. We can't stop thinking about the tens of thousands of families facing hunger, bankruptcy and homelessness even as they struggle to endure the loss of someone they dearly loved.

What's striking, if not surprising, is that this deluge of sorrow has run dry at the door to the Oval Office.

While the nation grieves, the US president has spent less than five minutes expressing compassion for those who are suffering

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Francine Prose

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[Under Trump, America has gone a bit late Weimar. We know how that ended](#)

Lloyd Green

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One's heart goes out to the reporters who have sifted through the Donald Trump's press briefings on the current pandemic – hour after hour of bombast, self-promotion, vitriol, lies and recklessly unscientific speculation – for any evidence of sympathy for those who are in pain. It's hardly a shock to learn that our president's expressions of care and compassion have occupied a total of less than five minutes, out of all that time.

https://www.theguardian.com/commentisfree/2020/may/05/will-americans-forgive-trump?utm_term=RWRpdG9yaWFsX0d1YXJkaWVuVG9kYXIVUy0yMDA1MDU%3D&utm_source=esp&utm_medium=Email&CMP=GTUS_email&utm_campaign=GuardianTodayUS

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Three Russian doctors fall from hospital windows, raising questions amid coronavirus pandemic

By Mary Ilyushina, CNN

Updated 11:27 AM ET, Tue May 5, 2020

[Russia adds record 10,000 coronavirus cases in dramatic turnaround as Putin's problems stack up](#)

Nepomnyashchaya was reported to have opposed those changes due to the lack of protective gear in the hospital. The Health Ministry's regional health department denied the allegations in a statement, adding that the hospital is in "reserve" for coronavirus patients and its staff has been trained and equipped. The hospital did not respond to CNN's requests for comment.

This story has been updated.

CNN's Matthew Chance contributed to this report.

<https://www.cnn.com/2020/05/04/europe/russia-medical-workers-windows-intl/index.html>

How Fauci got to be demonized and deified

Here's [an interesting read by Ned Potter, who has covered science for decades](#), about the simultaneous deification and demonization of Anthony Fauci.

Fauci has become a hero on the left, with Brad Pitt impersonating and thanking him on "Saturday Night Live," while critics on the right [have called for him to be fired](#). Potter writes about his concern that in a crisis like this one, anti-elitism fuels a distrust of facts. "In a crisis, we need experts," he writes. "If there's an outbreak of disease, I want an epidemiologist; if there's a nuclear accident, I want an engineer."

Russian doctors mysteriously fall out of windows -- On a related note, this story about the deaths and injury of Russian [doctors who criticized the government](#) is distressing.

https://view.newsletters.cnn.com/messages/15886368531105921feecdab0/raw?utm_term=15886368531105921feecdab0&utm_source=What+Matters+for+May+4%2C+2020&utm_medium=email&utm_campaign=203908_1588636853113&bt_e=vZFywLzvlwkmT0QhOI1huWCIUJfPCC8cUOoUy8XcXTHCLsXytCCBTIRnADBRwME&bt_ts=1588636853113

by [Zachary B. Wolf](#)

The Latest

Dr. Rick Bright, [**the ousted director of the office involved in developing a coronavirus vaccine**](#), formally filed an extensive whistleblower complaint Tuesday alleging his early warnings about the coronavirus were ignored and that his caution at a treatment favored by President Donald Trump led to his removal. In a statement, an HHS spokesperson said: "Dr. Bright was transferred to NIH to work on diagnostics testing -- critical to combatting Covid-19 -- where he has been entrusted to spend upwards of \$1 billion to advance that effort." [Read more here.](#)

Separately, the White House will [**wind down its coronavirus task force**](#) at the end of the month, a senior White House official told CNN

Coronavirus: Prof Neil Ferguson quits government role after 'undermining' lockdown

- [Coronavirus pandemic](#)

Prof Neil Ferguson has quit as a government adviser on coronavirus after admitting an "error of judgement".

Prof Ferguson, whose advice to the prime minister led to the UK lockdown, said he regretted "undermining" the messages on social distancing.

Mr Hancock said the social distancing rules "are there for everyone" and are "deadly serious".

The health secretary said it would be a matter for police to decide whether to take any action against Prof Ferguson for any potential breach of lockdown rules.

- [What are social distancing and self-isolation rules?](#)

Prof Ferguson's modelling of the virus's transmission suggested 250,000 people could die without drastic action.

This led Prime Minister Boris Johnson to announce on 23 March that he was imposing [widespread curbs on daily life](#) aimed at stopping the spread of the virus.

Under those measures people were told to go out as little as possible, with partners who live separately later being told [they should "ideally" stay in their own homes.](#)

Security minister James Brokenshire told the BBC that "a range of experts" will continue to support ministers following Prof Ferguson's resignation.

- [Can you compare the UK with Italy?](#)
- [Can you work while furloughed? And other questions](#)
- [What will be the 'new normal'?](#)

Despite Prof Ferguson's comments, it is [currently unclear whether people](#) who have recovered from the virus will be immune or able to catch it again.

He told the BBC that Prof Ferguson had made "an important contribution" but he was sure the group would "continue to provide valuable input".

- A SIMPLE GUIDE: [How do I protect myself?](#)
- AVOIDING CONTACT: [The rules on self-isolation and exercise](#)
- HOPE AND LOSS: [Your coronavirus stories](#)
- LOOK-UP TOOL: [Check cases in your area](#)
- TESTING: [Can I get tested for coronavirus?](#)

It comes after the number of people who have died with coronavirus in the UK reached 29,427 on Tuesday - the highest number of virus deaths in Europe.

However, figures from the Office for National Statistics - which includes deaths where the virus is suspected, not just where tests have been carried out - brings the total number to more than 32,000.

'Like it doesn't count for you'

Prof Ferguson's resignation comes a month after Scotland's chief medical officer, [Dr Catherine Calderwood](#), [quit](#) when it was revealed she had broken lockdown rules by making two trips to her second home.

It showed hundreds if not thousands of people were [likely to have been infected in Wuhan](#), at a time when Chinese officials said there were only a few dozen cases.

But he shot to public attention as "Professor Lockdown".

In mid-March, [the maths showed the UK needed to change course](#) or a quarter of a million people would die in a "catastrophic epidemic".

Those calculations helped transform government policy and all lives.

In other developments:

[Former Prime Minister Theresa May has criticised](#) world leaders for failing "to forge a coherent international response" to the pandemic.

<https://www.bbc.com/news/uk-politics-52553229>

No lockdown, little virus

The most important point: Hong Kong's strategy is working extremely well.

It hasn't reported a new homegrown case in more than two weeks. Over all, only about 1,000 people — out of 7.5 million — [have tested positive](#). Only four have died.

It's a sign that a lockdown isn't the only way to battle the virus. But it's also a reminder of how different life [in a post-reopening United States will be](#) from life in countries that have most effectively stopped the virus's spread.

https://messaging-custom-newsletters.nytimes.com/template/oakv2?uri=nyt://newsletter/b4ad6ab6-237f-4261-bdd2-34067aeef302&productCode=NN&te=1&nl=the-morning&emc=edit_nn_20200506

America: are we about to witness a second historic failure of leadership from Trump?

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[#COVID19 #CurrentNumber680000cases34000deaths #ImpendingCatastrophe](#) "W/o mass testing, contact tracing, & protective equip. for health workers – all in critically short supply – the presid. plan could be disastrous. D. Trump..dec. that he was leading America in a “historic battle against the invisible enemy” that amounted to the “greatest national mobilisation since WWII”.

Beyond the cloistered confines of the White House an alternative interpretation of events was gathering force. On a day the US suffered its highest death toll from Covid-19, with a total of more than 680,000 confirmed cases and 34,000 deaths, public health experts..coming to rather different conclusions.

“This isn’t a plan, it’s barely a powerpoint,” spluttered Ron Klain on Twitter. Klain, the US government’s Ebola tsar during the last health crisis to test the White House, in 2014, said the proposals contained “no provision to ramp up testing, no standard on levels of disease before opening, no protections for workers or customers”.

<https://lnkd.in/erpAAjK>

https://www.theguardian.com/us-news/2020/apr/18/operation-reopen-america-are-we-about-to-witness-a-second-historic-failure-of-leadership-from-trump?utm_term=RWRpdG9yaWFsX0d1YXJkaWFuVG9kYXIVUy0yMDA0MTg%3D&utm_source=esp&utm_medium=Email&CMP=GTUS_email&utm_campaign=GuardianTodayUS

Jack Ma: The billionaire trying to stop coronavirus (and fix China's reputation)

By Celia Hatton BBC News

26 April 2020

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[#COVID19 #PRCPresXiJinjing #BillionJackMa #DomIntPolicyEquilib #MedivacSuppliesTo150Countries #GlobalLeadership #FillingVacOfAmerFirst](#) 'The richest man in China..every one of his posts has been devoted to his unrivalled campaign to deliver medical supplies to almost every country around the world..to more than 150 countries so far, sending face masks and ventilators to many places that have been elbowed out of the global brawl over life-saving equipment..But..aren't sure what he's getting himself into. He appears to be following China's diplomatic rules, particularly when choosing which countries should benefit from his donations, but his growing clout might put him in the crosshairs of the jealous leaders at the top of China's political pyramid..Candid, a US-based philanthropy watchdog..puts Alibaba 12th on a list of private Covid-19 donors..Ma..Alibaba foundations..airlifting supplies to Africa, Asia, Europe, Latin America and even to ..Iran, Israel, Russia and the US..Ma's donations are following Party guidelines: there is no evidence that any of the Jack Ma and Alibaba Foundation donations have gone to countries that have formal ties with Taiwan..Ma's donations are following Party guidelines: ..any of the Jack Ma and Alibaba Foundation donations have gone'..CONTD IN COMMENTS

any of the Jack Ma and Alibaba Foundation donations have gone to countries that have formal ties with Taiwan..all of the foundations' shipments dispatched from China appear to have been gratefully received..As Ma soaks up praise, Xi faces persistent questions about how he handled the early stages of the virus and where, exactly, the outbreak began..the Chinese government has certainly done what it can to capitalise on Ma's generosity..China might just need a popular global Chinese figure so much that Ma has done what no one else can: make himself indispensable..Here's the one key takeaway from all that happened with Jack Ma and Africa: he said he would do something and it got done," exp. Eric Olander..They're taking a leadership role,

the kind of thing they used to be done by the United States," he says. "The most obvious past example is the response to Ebola, the Ebola outbreak in 2014..Chinese donors are taking on that role with this virus.'

<https://www.bbc.com/news/world-asia-china-52325269>

Coronavirus in the U.S.: Latest Map and Case Count

March 3, 2020



<https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html>

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[2d •](#)

Trump says China wants him to lose re-election

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[#COVID19](#) [#USelections2020](#) [#StrangeHarbingers](#)?! 'US President Donald Trump has said China "will do anything they can" to make him lose his re-election bid, stepping up his criticism of Beijing amid the coronavirus pandemic.

In a White House interview with Reuters news agency, he said Beijing faced a "lot" of possible consequences from the US for the outbreak.

He said China should have let the world know about the contagion much sooner.

A spokesperson for China's foreign ministry has denied the allegations.

Geng Shuang said China saw the US election as an internal issue, and said he hoped US politicians would stop using China in their domestic politics.

Mr Trump himself is often accused of not doing enough to tackle the crisis.

The coronavirus has ravaged a formerly humming US economy that had been the president's main selling point for his re-election campaign in November.

Mr Trump, who has waged a trade war with China, offered no specifics about how he might act against Beijing...

The US president also reportedly snapped at his campaign manager, Brad Parscale, who had called in from Florida.

He cursed at Mr Parscale and at one point mentioned suing him, according to CNN and the Washington Post, though it is unclear how serious was his threat of legal action.'

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Trump says China wants him to lose re-election

[bbc.com](#)

<https://www.bbc.com/news/world-us-canada-52482109>

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[Opinion](#)

College Campuses Must Reopen in the Fall. Here's How We Do It.

It won't be easy, but there's a path to get students back on track. Higher education will crumble without it.

By Christina Paxson

Ms. Paxson is the president of Brown University.

April 26, 2020

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[#COVID19](#) [#ControlReop](#). [#CampusNationPlanet?](#) [#CivilLibert?](#) [#Jloplin](#) [#JustAnotherWord?](#)..college camp. have become ghost towns. Stud. & prof. are hunk. down inside, teach. & learn. online..toll ..will continue to rise..As amazing as videoconf. tech., students face finan., pract. & [psychol.barriers](#)..learn remotely. Higher ed. is also imp. to the U.S. econ..employs ~ 3 million people.. 2017-18 school year pumped > than \$600 billion of spend. into the national GDP. The reopen. of coll. & univ. campuses in the fall should be a national prior..Instit. should dev. public hlth plans now that build on 3 basic elements of controll. the spread of infection: test, trace & separate. Although a vast majority of residential coll. stud. will experience only mild sympt. if they contract the coronavirus, students regularly interact with indiv. on & off campus who are at high risk of severe illness, or worse..concerned not only for the students in their charge, but also for the broader comm. they interact with. Aggressive testing, technology-enabled contact tracing & requirements for isolation & quarantine are likely to raise concerns about threats to civil liberty, if this is what it takes to safely reopen our campuses, & provided that students' privacy is scrupulously protected, it is worthwhile.'

<https://www.nytimes.com/2020/04/26/opinion/coronavirus-colleges-universities.html?smid=li-share>

Coronavirus: How India will play a major role in a Covid-19 vaccine

[Soutik Biswas](#) India correspondent

27 April 2020

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[#COVID19](#) [#Vaccines](#) [#GlobalCollab](#). 'India and the US were working..to develop vaccines (vacc.) against the coronavirus..have run an internatly. recog. jnt vacc. dev. prog. for > 3 dec..India is among the largest mfg of generic drugs & vacc. in the world. It is home to half a dozen major vaccine makers..against polio, meningitis, pneumonia, rotavirus, BCG, measles, mumps and rubella, among other diseases..Indian firms are developing vacc. against the virus that causes Covid-19..One.. Serum Institute of India (SRI)..makes 1.5 billion doses every year, mainly from its two facilities in..city of Pune. (small plants in the Netherlands & the Czech Rep.) w/~ 7,000' workers..supplies ~20 vaccines to 165 countries..~80% of its vaccines are exported &, at avg of 50 cents/dose..some of the cheapest in the world..collaboration with Codagenix, an Am. biotech., to develop a "live attenuated" vaccine, among > 80.. in develop" ..the world is going to need hund. of mill. of doses, ideally by the end of this year, to end this pandemic, to lead us out of lockdown," ..David Nabarro, prof..Imperial Coll., London, says..threat of coronavirus "for the foreseeable future" ..Tim Lahey, a vacc. res. at the University of Vermont [Med.Cent.](#), warns that there's a " ..would elicit harmful immune responses too".

<https://www.linkedin.com/feed/update/urn:li:activity:6660511887748317184/>

Herd immunity is not happening

Despite more than 27,000 confirmed deaths from COVID-19 in France, only 4.4% of people have actually been infected. The percentage is far below the required level — something more than 50% — to achieve herd immunity. Herd immunity would slow — but not stop — the outbreak. Results announced by Spain's health minister show a similar situation: more than 27,000 deaths and just 5% of the population tested had antibodies to the virus. "Population immunity appears insufficient to avoid a second wave" if lockdown measures are removed, say the authors of the French study. (Reuters | 2 min read)

Reference: *Science* paper

https://uk.reuters.com/article/uk-health-coronavirus-france-immunity/only-44-of-french-population-infected-by-coronavirus-pasteur-institute-idUKKBN22Q0RM?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

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How to suppress further COVID-19 outbreaks

The only plausible way to achieve herd immunity is through mass vaccination, argues a *Nature Biomedical Engineering* editorial. The alternative — letting the virus spread naturally at an infection fatality rate of something around 0.5–1% — implies that millions would die before transmission slows down. The journal outlines why widespread testing, technology-aided contact tracing, case isolation and the quarantining of contacts will continue to be essential to sustainedly suppress further outbreaks. (Nature Biomedical Engineering | 7 min read)

https://www.nature.com/articles/s41551-020-0567-0?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

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In rare cases, coronavirus might ail children

Pediatric multisystem inflammatory syndrome— a serious condition in children that has been compared with an illness called Kawasaki disease — seems to be linked to the coronavirus. Physicians in Bergamo, at the heart of the COVID-19 outbreak in Italy, report a 30-fold increased incidence of Kawasaki-like disease. New York governor Andrew Cuomo said this week that the syndrome has affected around 100 children in the state, 2 of whom have died. Pediatricians stress that the problem is extremely rare, and most children who have it get better. (BBC | 4 min read)

Reference: *The Lancet* paper

https://www.bbc.com/news/amp/health-52648557?utm_source=Nature+Briefing&utm_campaign=a2b0b4f54f-briefing-dy-20200514&utm_medium=email&utm_term=0_c9dfd39373-a2b0b4f54f-43530905

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Summary

1. Number of people known to have died from the coronavirus passes 200,000 - Johns Hopkins University
2. More than 20,000 deaths in hospitals in the UK - the fifth country to pass that milestone
3. World Health Organization says people who have recovered may not be protected against reinfection
4. Italy marks anniversary of liberation after WWII with socially distanced flag-waving from balconies
5. Belgium unveils plans to reopen shops from 11 May and schools a week later
6. Online scams have cost the UK public £2.4m - criminals also trying to sell fake protective equipment and testing kits

📺 Live Reporting

Edited by Alix Kroeger

1. Posted at 15:23 25 Apr15:23 25 Apr

That's all for now

We are bringing this page to a close now, on a sobering day where the global coronavirus death toll passed 200,000.

The UK became the fifth country to record more than 20,000 fatalities - each one a tragedy for family and friends.

Our writers today were Steve Sutcliffe, Becky Morton, Joseph Lee, Sophie Williams, Frank Keogh, Sean Fanning, David Walker, Tom Gerken, Paul Kirby and Alex Bysouth.

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[Read more about these links.](#)

<https://www.bbc.com/news/live/world-52424263>

Coronavirus: Boris Johnson moved to intensive care as symptoms worsen

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#COVID19 #UK #PM #ICU #CrisisLeadership 'Summary

<https://www.bbc.com/news/uk-52192604>

Trump administration draws up plans to punish China over coronavirus outbreak

By [Kylie Atwood](#) and [Stephen Collinson](#), CNN

Updated 2:51 PM ET, Thu April 30, 2020

[Trump administration draws up plans to punish China over coronavirus outbreak](#)

Washington (CNN) President Donald Trump contradicted a rare on-the-record statement from his own intelligence community by claiming Thursday that he has seen evidence that gives him a "high degree of confidence" the [novel coronavirus](#) originated in a laboratory in Wuhan, China, but declined to provide details to back up his assertion.

The comments undercut a public statement from the Office of the Director of National Intelligence issued just hours earlier which stated no such assessment has been made and continues to "rigorously examine" whether the outbreak "began through contact with infected animals or if it was the result of an accident at a laboratory in Wuhan."

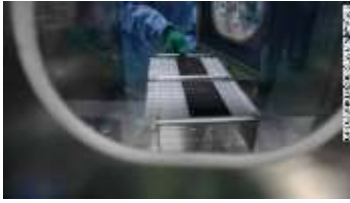
"Yes, I have," Trump said when asked whether he's seen evidence that would suggest [the virus](#) originated in the lab. Later, asked why he was confident in that assessment, Trump demurred.

"I can't tell you that. I'm not allowed to tell you that," he said.



[Trump administration draws up plans to punish China over coronavirus outbreak](#)

[New York Times: Top administration officials have pushed intelligence agencies to link coronavirus to Chinese labs](#)



[US explores possibility that coronavirus spread started in Chinese lab, not a market](#)

While the statement suggests the intelligence community has not yet developed a clear assessment as to how the outbreak started, it does say that officials have ruled out the possibility that the virus was "man-made or genetically modified," agreeing with a near consensus among scientists and refuting conspiracy theories.

Trump was asked about the statement for the first time shortly after it was released but responded by defending his handling of the situation and pushing back on reports that warnings about an emerging outbreak were included in his daily briefs dating back to January and February.

"Well I haven't seen the report yet, but I will tell you, if you speak to the head of intelligence right now, you speak to the head, they did say that I was given a briefing when I said I was given it, not before and they also said that it wasn't specific and it was not a panicked briefing," Trump said, appearing to refer to [acting DNI Richard Grenell](#) despite the fact he wasn't tapped for the job until February.

[US intelligence agencies started tracking coronavirus outbreak in China as early as November](#)

But the lack of evidence to back up claims that the outbreak began in a Chinese lab has not stopped top administration officials, including Pompeo, and some Republican allies of the President from raising the possibility in public comments.

"We still haven't gained access, the world hasn't gained access to the WIV (Wuhan Institute of Virology) there. We don't know precisely where this virus originated from," Pompeo said Wednesday.

[Trump administration draws up plans to punish China over coronavirus outbreak](#)

"No one's able to stay one way or the other," the official said, highlighting -- as American officials have -- the lack of an independent team on the ground. "We just don't know enough," the official added.

Vice President Mike Pence said Thursday that Trump has directed a full investigation into the nature and origination of coronavirus in China as well as China's conduct once the US gets through the ongoing epidemic.

"I fully expect that the President will consider a range of options to ensure that those who were not forthcoming with the American people, be that in China or in the World Health Organization, are held to account."

However, Trump [has praised China on numerous occasions](#), as recently as this month.

CNN's Kevin Liptak contributed to this report.

<https://www.cnn.com/2020/04/30/politics/trump-intelligence-community-china-coronavirus-origins/index.html>

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[#COVID-19](#) [#EconomicImpact](#) [#EventualRecovery](#) [#OrClearingTheRubble?](#)

Trump says he's pulling back from calling novel coronavirus the 'China virus'

Washington (CNN) [President Donald Trump](#) said Tuesday that he has decided to pull back from associating the novel coronavirus with China, which he had previously done by [calling it the "China virus" or the "Chinese virus."](#)

After consulting with medical experts, and receiving guidance from the World Health Organization, CNN has determined that that name is both inaccurate and is considered stigmatizing.

"Look, everyone knows it came out of China, but I decided we shouldn't make any more of a big deal out of it," Trump told Fox News. "I think I've made a big deal. I think people understand it."

The President said he didn't regret using the terms to describe the virus and defended his past adoption of the terms by referencing other infectious diseases that are named after where they originate.

"It came from China," he said.

The President also reiterated that he began using the term after Chinese media accused American soldiers of spreading the virus. He called the media organization which spread the information "a paper that's an organ for pretty much the top people" in the Chinese government.

[CNN previously reported](#) that a prominent Chinese official has promoted a conspiracy theory that the US military could have brought the novel coronavirus to China -- and it did not originate in the Chinese city of Wuhan.

Parts of Chinese social media, and even the country's government, appear to have launched a concerted campaign to question the origin of the novel coronavirus.

Trump's change comes a day after he tweeted that the spread of the novel coronavirus in the US [is not the fault of Asian-Americans](#), a group that has been the target of a growing number of racist and xenophobic attacks related to the virus.

He also denied last week that "Chinese virus" or "China virus" was a racist term to use.

"It's not racist at all, no, not at all. It comes from China, that's why. I want to be accurate," Trump said at the time.

A [photograph](#) taken last week of Trump's notes during a press briefing showed someone crossed out the word "Corona" in coronavirus and replaced it with the word "Chinese."

<https://www.cnn.com/2020/03/24/politics/donald-trump-pull-back-coronavirus-chinese-virus/index.html>

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By [Maegan Vazquez](#), CNN

Pompeo: 'Enormous evidence' virus started in Chinese lab

[Newsroom](#)

Secretary of State Mike Pompeo said that there is "enormous evidence" to support the idea that coronavirus originated in a lab in Wuhan, not in a market.

[Source: CNN](#)

<https://www.cnn.com/videos/politics/2020/05/03/mike-pompeo-coronavirus-china-sot-vpx-nr.cnn>

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[9h •](#)

The first case of SARS-CoV-2 didn't emerge from a Wuhan wet market, according to experts at the Wuhan Institute of Virology (WIV).

Instead, the live animal market may have been the site of a superspreader event, where one person spread the virus to many other people..

..early cases of the outbreak in Wuhan were tied to the Huanan Seafood Wholesale Market. Later, researchers took environmental samples that suggested the virus had landed on surfaces in the market. But in the period since, tissue samples from the market's animals have revealed no trace of the virus. For the virus to jump from animals to humans, the animals have to actually be carrying [it](#). One reason this idea has gained such traction is that it dovetails with conservation efforts. Many wet markets sell exotic, endangered and highly trafficked animals such as pangolins. And it would be a victory for animal conservation, he said, if markets like this one were shut down after being blamed for the disease. But that doesn't mean that the evidence is there.'

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The coronavirus didn't really start at that Wuhan 'wet market'

By [Rafi Letzter - Staff Writer](#) a day ago

Early reports blamed a market where live animals were sold, but evidence now shows they were wrong.

[Comments \(1\)](#)



In a Jan. 24 image, a police officer stood guard outside of Huanan Seafood Wholesale Market, where some reports suggested the pandemic began.

(Image: © HECTOR RETAMAL/AFP via Getty Images)

The first case of SARS-CoV-2 didn't emerge from a Wuhan wet market, according to experts at the Wuhan Institute of Virology (WIV).

Instead, the live animal market may have been the site of a superspreader event, where one person spread the virus to many other people, one US-based expert told Live Science.

Since the early days of the coronavirus [pandemic](#), reports have suggested that SARS-CoV-2 (the virus that causes COVID-19) jumped from animals to humans in [Wuhan's Huanan Seafood Wholesale Market](#). Now, experts at the WIV have said publicly that the theory was wrong, and that the virus must have originated elsewhere, according to [a Wall Street Journal report](#).

"I haven't seen anything that makes me feel, as a researcher who studies [zoonotic disease](#), that this market is a likely option," said Colin Carlson, a professor at Georgetown University who studies the spread of such zoonotic viruses, which transmit between animals and humans. Carlson does not work for the WIV.

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The theory was plausible, he said. For a virus to jump from animals to humans, the animal host needs to come into contact with humans somewhere. And viruses often jump from one animal to another before breaking into the human population. In fact, the genome of SARS-CoV-2 is most closely related to coronaviruses isolated from horseshoe bats in China. From there, scientists suspect the virus may have jumped to another animal and then hopped to humans. Wet markets, where lots of different species of live animals are clustered, and lots of humans come into contact with them, offer opportunities for that sort of transmission. And the outbreak of another coronavirus, dubbed SARS, began at a similar market in 2002, after that virus spread from bats to civets.

A number of [early cases of the outbreak](#) in Wuhan were tied to the Huanan Seafood Wholesale Market. Later, researchers took environmental samples that suggested the virus had landed on surfaces in the market. But in the period since, tissue samples from the market's animals have revealed no trace of the virus. For the virus to jump from animals to humans, the animals have to actually be carrying it.

"None of the animals tested positive. So since January, this has not actually been particularly conclusive. But this has developed into a narrative," he said.

So when will we know for sure where SARS-CoV-2 came from? Ruling out one site took a few months. Finding the definitive origin site will likely take much longer, he said.

- [The 12 deadliest viruses on Earth](#)
- [20 of the worst epidemics and pandemics in history](#)
- [13 Coronavirus myths busted by science](#)

Originally published on [Live Science](#).

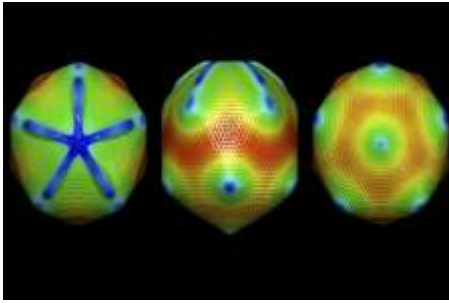
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Giant viruses aren't alive. So why have they stolen genes essential for life?

By [Amanda Heidt](#) Apr. 16, 2020 , 2:10 PM



[#GiantViruses](#) [#ClimateChange](#) [#MagImpactOver](#) [#COVID19](#) 'Viruses..altering life on a global scale..grp of..“giant viruses”..cont. genes assoc. w/ metab..con.. zombified hosts into superch. en. fact...their victims are imp. players in damp. climate ch. & in contr. ocean ecosys..megaviruses may ..unexp. power over life..>than 200,000 kinds of viruses in the world’s oceans..giant viruses (GV)..about 10x bigger than ..avge virus..still tiny—larg. is only 1/5 size of a rbc—..why they went undisc. until 2003..mostly infect amoebas & phytoplankton..pub. datab., scan. 1000..marine genome..DNA fingerprints of giant viruses..extr. 501 susp. GV genomes, mapp. them agst 121..ref. gen. to create a family tree..ext. div., split. into 54 dist. grps. Sev. genomes were new to sci. & likely..new species..many also contained genes for metabolism..a surprise because viruses don’t eat..weren’t a recent add., says first auth. M. Moniruzzaman: Many..evolving inGV for millions of yrs..dram. imp. on sea life. Phytoplankton suck the greenhouse gas carbon dioxide from the atmos. as they photosynth..form the base of the entire food web, the intercon. “who-eats-whom” relat..bet. predator & prey..cautions..Just because a gene helps living organisms metabolize, doesn’t mean it does the same thing for viruses.'

sciencemag.org

<https://www.sciencemag.org/news/2020/04/giant-viruses-aren-t-alive-so-why-have-they-stolen-genes-essential-life>

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PMCID: PMC6906342

PMID: [31823676](https://pubmed.ncbi.nlm.nih.gov/31823676/)

Measles Outbreak in Unvaccinated and Partially Vaccinated Children and Adults in the United States and Canada (2018-2019): A Narrative Review of Cases

[Adekunle Sanyaolu](#),¹ [Chuku Okorie](#),² [Aleksandra Marinkovic](#),³ [Oladapo Ayodele](#),³ [Abu Fahad Abbasi](#),³ [Stephanie Prakash](#),³ [Jessica Gosse](#),⁴ [Sadaf Younis](#),⁴ [Jasmine Mangat](#),⁴ and [Henry Chan](#)⁵

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Abstract

Since 2018 and currently in 2019, the United States and Canada experienced a rapidly spreading measles virus outbreak. The developing outbreak may be due to a lack of vaccination, an inadequate dosage of measles (MMR) vaccine, clusters of intentionally under-vaccinated children, imported measles from global travel, and from those who are immunocompromised or have other life-threatening diseases. The infection originated mainly from travelers who acquired measles abroad and has thus led to a major outbreak and health concern not only in the United States and Canada but also in other parts of the world. According to World Health Organization, from January 2019 through September 2019, 1234 cases of measles have been reported in the United States and 91 reported cases in Canada, while in 2018, 372 and 28 cases were reported in the United States and Canada, respectively. A potential driving factor to the increased cases maybe because fewer children have been vaccinated over the last number of years in both countries. This article is a narrative review of cases discussing the measles outbreak among partially vaccinated and unvaccinated children and adults in the United States and Canada in 2018 and 2019.

Keywords: measles, child, adult, vaccination, disease outbreaks, United States, Canada

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6906342/>

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[Biotech](#)

Why coronavirus testing isn't so simple

At a COVID-19 testing site in downtown, registered nurse Amanda Price (right), working for a company called COVID Clinic, draws blood from Cindy Stirling for an antibody test Thursday in San Diego, California.

(Eduardo Contreras /The San Diego Union-Tribune)

[Access to testing is growing, but so are concerns over the reliability of results.](#)

By [Jonathan Wosen](#) Biotech reporter

May 3, 2020

5:30 AM

It's hard to make evidence-based decisions without evidence. That's what public officials, doctors and scientists have argued in their calls for increased coronavirus testing. But growing evidence demonstrates that performing tests is one thing — accurately interpreting results is another.

Scores of companies have rushed forward with tests to detect past or present infection with the novel coronavirus. The real-world use of these tests can be surprisingly error-prone. Test quality is an issue, but it's not the only one; it's inherently difficult to test for a virus that most of us have not been exposed to.

Why no test is perfect

Ideally, a viral test would always detect those who've been infected, as well as the unexposed.

"If you could achieve 100 percent on both, you would have the perfect test," said Ingo Chakravarty, CEO and president of Mesa Biotech, a local company that [produces a rapid](#) coronavirus molecular test. "That, though, doesn't exist."

Test makers face real-world trade-offs. For molecular tests, that means identifying the genetic material of the coronavirus from a nose or throat swab without picking up similar-looking genetic bits from other viruses. And for antibody tests, this means detecting low amounts of [antibodies](#) to the novel coronavirus without detecting antibodies to related viruses.

When test makers, for lack of a better phrase, test their test, they use samples scientists know are negative or positive. For a molecular test, that means testing a sample with random shards of genetic material or one spiked with viral molecules. These samples tell researchers how often a test produces false positive and false negative results.

In general, a good test correctly identifies known positives and negatives at least 95 percent of the time, says Chakravarty. Many of the new tests have been cleared for use without the usual lengthy Food and Drug Administration review process. And while that has sped things up, it may be causing some issues. Abbott's rapid molecular test, which the company claims can detect the virus in as little as five minutes, has come under fire [after reports](#) that the test fails to detect the virus about 15 percent of the time.

Real-world dilemmas

Testing people is complicated because, of course, we aren't confirmed positive and negative samples. Those who get tested don't know if they're positive — that's why they're getting tested.

The odds that you're infected or have viral antibodies based on a positive test result depend both on how well the test works and how common the disease is.

Think of it this way. Say that 5 percent of people have been infected, and you test 100 random people for antibodies. On average, 5 people should have antibodies and will test positive. Now say that this test has a 2.5 percent false positive rate, which is [about the rate](#) for a test made by Diazyme, a local company that produces the antibody tests used by UC San Diego Medical Center. That means you'd expect nearly 2.5 false positives; in other words, a third of total positives (roughly 7.5) could be wrong. Now imagine testing tens or hundreds of thousands of people knowing that a third of all positive results could be errors.

This is the basic math behind a [firestorm debate](#) ignited after a Stanford study tested 3,300 people in Santa Clara County for antibodies to the coronavirus. The study concluded that the rate of infection in the county may have been between 50 to 85 times greater than previous reports, which would also mean that the death rate of COVID-19 is drastically lower than the [3 percent](#) rate estimated by the World Health Organization.

But very few study participants tested positive, suggesting that the rate of infection is low by any measure. [Experts have pointed out](#) that a third or more of these positive results could have been the result of testing error.

"When you have a large number of people who don't have the disease, and even a small false positive rate, you're going to get a lot of false positives just because there weren't that many people who actually have the disease," said Kristin Sainani, a Stanford biostatistician.

Playing it safe

If the infection rate were high, then a positive test result would be a more reliable sign of infection. But that likely isn't the case in San Diego County. Dr. David Pride, director of UC San Diego's molecular biology lab, says that about 3 percent of his team's molecular tests have come back positive, and he doesn't see any sign of an uptick.

"Right around the end of March, beginning of April, is where we saw our highest number of cases," Pride said. "It's looking like on a daily basis that this curve has flattened out."

Pride says that the numbers suggest that each infected person is, on average, infecting closer to one other person than three or four. But he's also quick to point out that the situation is extremely fluid, and these numbers could easily change.

As long as the infection rate remains at current levels, Pride's team estimates that about 97 percent of negative tests are true negatives. But the researchers will often re-test a negative if a doctor strongly suspects their patient has COVID-19. The team has molecular tests from six different developers and will run a sample on multiple machines to confirm a negative finding. Sometimes the issue is simply that the original swab didn't collect many infected cells, meaning that only the most sensitive tests will detect the virus's genetic material.

With positive results, however, Pride errs on the side of caution.

"If any of our results are positive, we treat the patient as if they've had disease," Pride said. "That's frankly the safest way to move forward."

Since no test is perfect, what's better — a false positive or a false negative? For molecular testing, a false negative risks allowing someone who's infected to go out and get others sick. That's what Pride's team wants to avoid.

For antibody testing, it's a bit more complicated. Want to identify everyone with antibodies because you think these people are now protected and can go back to work? Then avoid false negatives. But what if you don't want to overestimate the number of COVID-19 survivors and underestimate the disease's fatality rate? Then false positives are the problem.

"It depends on the question you're trying to answer," Sainani said.

Testing a given sample several times on multiple machines — as UCSD does with its molecular tests — is probably a good idea in general, says Sainani, because a consistent result is more reliable. And there are plenty of tests out there — over 70 antibody tests nationally and new molecular tests popping up regularly, including [several here](#) in San Diego.

But for every question testing can help us answer — who's infected, who has recovered — there's a question (or two) that these tests can't resolve: Does having antibodies to the virus prevent re-infection — and, if so, how long does protection last? Why are some people asymptomatic while others end up in intensive care units fighting for their lives? Will COVID-19 cases surge in the fall, as they do for flu every year?

"We really do not have much data for this new virus," said Chong Yuan, managing director of Diazyme. "We're still in the data collection (stage) right now."

<https://www.sandiegouniontribune.com/business/biotech/story/2020-05-03/why-coronavirus-testing-isnt-so-simple>

CNN

The Latest

A model often cited by the US government has **nearly doubled its projection of US coronavirus deaths** from more than 70,000 to more than 130,000. Separately, a Trump administration model projects a rise in coronavirus cases and deaths in the weeks ahead, up to about 3,000 daily deaths in the US by June 1, **according to an internal document obtained by The New York Times**.

Read **all the bizarre quotes here**.

The backlash is ugly

Severe backlash to the Covid-19 shutdown may be felt among a minority of the population, according to polls, but it has gotten fierce and deadly.

A belief that it's gone. Norman McNickle is the city manager in Stillwater and during an interview on CNN he gave his theory about the pushback:

"It is as you know, unseen enemy. They don't see it. We've been fortunate here with a low number of cases and a low number of hospitalizations and one death in our county. And I think the belief is that it's just gone. Or that they're young enough that they will catch it and survive. And frankly, many of them don't care much about others that they might pass it on to."

[Watch that interview here.](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[15h •](#)

[#COVID19 #DisInformation #MindlessOfConsequences #GooseVaccinesGoldenEgg!](#) 'In the first few months of 2020, wild conspiracy theories about Bill Gates and the new coronavirus began sprouting online. Gates, the Microsoft co-founder and billionaire philanthropist who has funded efforts to control the virus with treatments, vaccines and technology, had himself created the virus, argued one theory. He had patented it, said another. He'd use vaccines to control people, declared a third. The false claims quietly proliferated among groups predisposed to spread the message — people opposed to vaccines, globalization or the privacy infringements enabled by technology. Then one went mainstream.'

https://www.nature.com/articles/d41586-020-01452-z?utm_source=Nature+Briefing&utm_campaign=b28e91fd0f-briefing-dy-20200526_COPY_01&utm_medium=email&utm_term=0_c9dfd39373-b28e91fd0f-43530905

NEWS FEATURE

27 May 2020

The epic battle against coronavirus misinformation and conspiracy theories

Analysts are tracking false rumours about COVID-19 in hopes of curbing their spread.

[Philip Ball &](#)

[Amy Maxmen](#)



Protesters rallying in Arizona against lockdowns held up signs carrying anti-vaccine messages and promoting unproven treatments. Credit: Adam Waltz/ABC15 Arizona

[PDF version](#)

In the first few months of 2020, wild conspiracy theories about Bill Gates and the new coronavirus began sprouting online. Gates, the Microsoft co-founder and billionaire philanthropist who has funded efforts to control the virus with treatments, vaccines and technology, had himself created the virus, argued one theory. He had patented it, said another. He'd use vaccines to control people, declared a third. The false claims quietly proliferated among groups predisposed to spread the message — people opposed to vaccines, globalization or the privacy infringements enabled by technology. Then one went mainstream.

On 19 March, the website Biohackinfo.com falsely claimed that Gates planned to use a coronavirus vaccine as a ploy to monitor people through an injected microchip or quantum-dot spy software. Two days later, traffic started flowing to a YouTube video on the idea. It's been viewed nearly two million times. The idea reached Roger Stone — a former adviser to US President Donald Trump — who in April discussed the theory on a radio show, adding that he'd never trust a coronavirus vaccine that Gates had funded. The interview was covered by the newspaper the *New York Post*, which didn't debunk the notion. Then that article was liked, shared or commented on by nearly one million people on Facebook. "That's better performance than most mainstream media news stories," says Joan Donovan, a sociologist at Harvard University in Cambridge, Massachusetts.

Donovan charts the path of this piece of disinformation like an epidemiologist tracking the transmission of a new virus. As with epidemics, there are 'superspreader' moments. After the *New York Post* story went live, several high-profile figures with nearly one million Facebook followers each posted their own alarming comments, as if the story about Gates devising vaccines to track people were true.



[Coronavirus misinformation needs researchers to respond](#)

The Gates conspiracy theories are part of an ocean of misinformation on COVID-19 that is spreading online. Every major news event comes drenched in rumours and propaganda. But COVID-19 is "the perfect storm for the diffusion of false rumour and fake news", says data scientist Walter Quattrociocchi at the Ca'Foscari University of Venice, Italy. People are spending more time at home, and searching online for answers to an uncertain and rapidly changing situation. "The topic is polarizing, scary, captivating. And it's really easy for everyone to get information that is consistent with their system of belief," Quattrociocchi says. The World Health Organization (WHO) has called the situation an infodemic: "An over-abundance of information — some accurate and some not — rendering it difficult to find trustworthy sources of information and reliable guidance."

For researchers who track how information spreads, COVID-19 is an experimental subject like no other. "This is an opportunity to see how the whole world pays attention to a topic," says Renée diResta at the Stanford Internet Observatory in California. She and many others have been scrambling to track and analyse the disparate falsehoods floating around — both 'misinformation', which is wrong but not deliberately misleading, and 'disinformation', which refers to organized falsehoods that are intended to deceive. In a global health crisis, inaccurate information doesn't only mislead, but could be a matter of life and death if people start taking unproven drugs, ignoring public-health advice, or refusing a coronavirus vaccine if one becomes available.

By studying the sources and spread of false information about COVID-19, researchers hope to understand where such information comes from, how it grows and — they hope — how to elevate facts over falsehood. It's a battle that can't be won completely, researchers agree — it's not possible to stop people from spreading ill-founded rumours. But in the language of epidemiology, the hope is to come up with effective strategies to 'flatten the curve' of the infodemic, so that bad information can't spread as far and as fast.



An engineer examines a torched 5G phone mast in Belgium. Some were set on fire after a false theory that linked 5G radiation to the coronavirus. Credit: Yorick Jansens/AFP via Getty

No filter

Researchers have been monitoring the flow of information online for years, and have a good sense of how unreliable rumours start and spread. Over the past 15 years, technology and shifting societal norms have removed many of the filters that were once placed on information, says Amil Khan, director of the communications agency Valent Projects in London, who has worked on analysing misinformation for the UK government. Rumour-mongers who might once have been isolated in their local communities can connect with like-minded sceptics anywhere in the world. The social-media platforms they use are run to maximize user engagement, rather than to favour evidence-based information. As these platforms have exploded in popularity over the past decade and a half, so political partisanship and voices that distrust authority have grown too.

To chart the current infodemic, data scientists and communications researchers are now analysing millions of messages on social media. A team led by Emilio Ferrara, a data scientist at the University of Southern California in Los Angeles, has released a data set of more than 120 million tweets on the coronavirus¹. Theoretical physicist Manlio De Domenico at the Bruno Kessler Institute, a research institute for artificial intelligence in Trento, Italy, has set up what he calls a COVID-19 “[infodemic observatory](#)”, using automated software to watch 4.7 million tweets on COVID-19 streaming past every day. (The actual figure is higher, but that is as many as Twitter will allow the team to track.) De Domenico and his team evaluate the tweets' emotional content and, where possible, the region they were sent from. They then estimate their reliability by looking at the sources to which a message links. (Like many data scientists, they rely on the work of fact-checking journalists to distinguish reliable news sources or claims from unreliable ones.) Similarly, in March, Quattrocioni and his co-workers reported² a data set of around 1.3 million posts and 7.5 million comments on COVID-19 from several social-media platforms, including Reddit, WhatsApp, Instagram and Gab (known for its right-wing audience), from 1 January to mid-February.

A study in 2018 suggested that false news generally travels faster than reliable news on Twitter³. But that isn't necessarily the case in this pandemic, says Quattrocioni. His team followed some examples of false and true COVID-19 news — as classified by fact-checker sites — and found that reliable posts saw as many reactions as unreliable posts on Twitter². The analysis is preliminary and hasn't yet been peer reviewed.

How fake news about coronavirus became a second pandemic

Ferrara says that in the millions of tweets about the coronavirus in January, misinformation didn't dominate the discussion. Much of the confusion at the start of the pandemic related to fundamental scientific uncertainties about the outbreak. Key features of the virus — its transmissibility, for instance, and its case-fatality rate — could be estimated only with large error margins. Where expert scientists were honest about this, says biologist Carl Bergstrom at the University of Washington in Seattle, it created an “uncertainty vacuum” that allowed superficially reputable sources to jump in without real expertise. These included

academics with meagre credentials for pronouncing on epidemiology, he says, or analysts who were good at crunching numbers but lacked a deep understanding of the underlying science.

Politics and scams

As the pandemic shifted to the United States and Europe, false information increased, says Donovan. A sizeable part of the problem has been political. A briefing prepared for the European Parliament in April alleged that Russia and China are “driving parallel information campaigns, conveying the overall message that democratic state actors are failing and that European citizens cannot trust their health systems, whereas their authoritarian systems can save the world.” The messages of US President Donald Trump and his administration are sowing their own political chaos. This includes Trump’s insistence on referring to the ‘Chinese’ or ‘Wuhan’ coronavirus and his advocacy of unproven (and even hazardous) ‘cures’, and the allegation by US Secretary of State Mike Pompeo that the virus originated in a laboratory, despite the lack of evidence.

Blocking information on COVID-19 can fuel the spread of misinformation

There are organized scams, too. More than 68,000 website domains have been registered this year with keywords associated with the coronavirus, says Donovan. She’s reviewed ones that sell fake treatments for COVID-19, and others that collect personal information. Google’s search-engine algorithms rank information from the WHO and other public-health agencies higher than that from other sources, but rankings vary depending on what terms a person enters in a search. Some scam sites have managed to come out ahead by using a combination of keywords optimized and targeted to a particular audience, such as newly unemployed people, Donovan says.

Spreading agendas

Many of the falsehoods online don’t have obvious sources or intentions. Rather, they often begin with niche groups mobilizing around their favoured agendas. Neil Johnson, a physicist at George Washington University in Washington DC, has reported⁴ COVID-19 misinformation narratives taking shape among online communities of extremist and far-right ‘hate’ groups, which occupy largely unregulated platforms including VKontakte, Gab and 4Chan, as well as mainstream ones such as Facebook and Instagram.

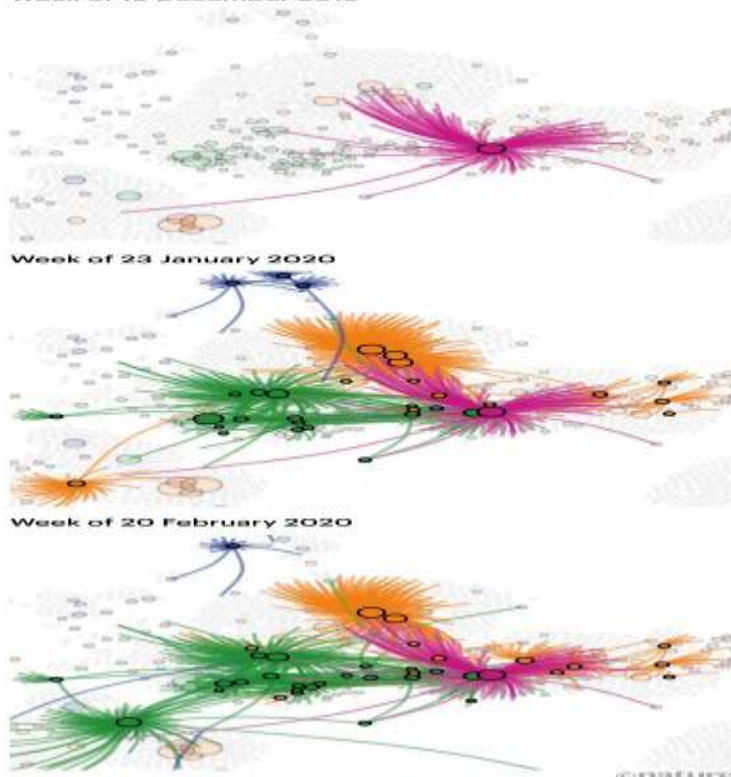
The study says that a “hate multiverse” is exploiting the COVID-19 pandemic to spread racism and other malicious agendas, focusing an initially rather diverse and incoherent set of messages into a few dominant narratives, such as blaming Jews and immigrants for starting or spreading the virus, or asserting that it is a weapon being used by the “Deep State” to control population growth (see ‘Highways of hate’).

HIGHWAYS OF HATE

Neil Johnson at George Washington University in Washington DC and his team mapped how malicious content about a pneumonia-like disease, possibly COVID-19, started on the forum 4chan in December. By January, the content had spread to other social-media platforms — Gab, Telegram and Facebook — through links connecting pages on one platform with another.

— 4chan — Telegram — Gab — Facebook

Week of 19 December 2019



Source: Ref. 4

An alarming feature of this network is its capacity to draw in outside users through what Johnson and his team call “wormhole” links. These are shortcuts from a network engaged with quite different issues. The hate multiverse, the researchers say, “acts like a global funnel that can suck individuals from a mainstream cluster on a platform that invests significant resources in moderation, into less moderated platforms like 4Chan or Telegram”. As a result, Johnson says, racist views are starting to appear in the anti-vaccine communities, too. “The rise of fear and misinformation around COVID-19 has allowed promoters of malicious matter and hate to engage with mainstream audiences around a common topic of interest, and potentially push them toward hateful views,” his team says in the paper.

Donovan has seen odd bedfellows emerge in the trolling of the WHO’s director-general, Tedros Adhanom Ghebreyesus. US-based groups that often post white-nationalist content are circulating racist cartoons of him that are similar to those posted by activists in Taiwan and Hong Kong. The latter groups have long criticized the WHO as colluding with the Chinese Communist Party, because the WHO, like all United Nations agencies, considers the regions as part of mainland China. “We’re seeing some unusual alliances coming together,” Donovan says.

Dangerous spread

As misinformation grows, it sometimes becomes deadly. On Twitter in early March, technology entrepreneurs and investors shared a document prematurely extolling the benefits of chloroquine, an old malaria drug, as an antiviral against COVID-19. The document, which claimed that the drug had produced favourable outcomes in China and South Korea, was widely passed around even before the results of a small, non-randomized French trial of the related drug hydroxychloroquine⁵ were posted [online on 17 March](#). The next day, Fox News aired a segment with one of the authors of the original document. And the following day, Trump called the drugs

“very powerful” at a press briefing, despite the lack of evidence. There were small spikes in Google searches for hydroxychloroquine, chloroquine and their key ingredient, quinine, in mid-March — with the largest surge on the day of Trump’s remarks, Donovan found using Google Trends. “Just like toilet paper, masks and hand sanitizer, if there was a product to be had, it would have sold out,” she says. Indeed, it did in some places, worrying people who need the drugs to treat conditions such as lupus. Hospitals have reported poisonings in people who experienced toxic side effects from pills containing chloroquine, and such a large number of people with COVID-19 have been asking for the drug that it has [derailed clinical trials of other treatments](#).

Fox News has been particularly scrutinized for its part in amplifying dangerous misinformation. In a phone survey of 1,000 randomly chosen Americans in early March⁶, communication researchers found that respondents who tended to get their information from mainstream broadcast and print media had more accurate ideas about the disease’s lethality and how to protect themselves from infection than did those who got their news mostly from conservative media (such as Fox News and Rush Limbaugh’s radio show) or from social media. That held true even after factors such as political affiliation, gender, age and education were controlled for.



Protesters in the Australian city of Melbourne rallied against tough lockdown laws in May, with some claiming that the pandemic is a hoax. Credit: William West/AFP via Getty

Those results [echo another study](#), as yet not peer reviewed, in which economists at the University of Chicago in Illinois tried to analyse the effects of two Fox News presenters on viewers’ opinions during February, as the coronavirus began to spread beyond China. One presenter, Sean Hannity, downplayed the coronavirus’s risk and accused Democrats of using it as a weapon to undermine the president; the other, Tucker Carlson, reported that the disease was serious. The study found that areas of the country where more viewers watched Hannity saw more cases and deaths than did those where more watched Carlson — a divergence that disappeared when Hannity adjusted his position to take the pandemic more seriously.

De Domenico says he is encouraged that, as the crisis has deepened, so has many people’s determination to find more reliable information. “When COVID-19 started to hit each country, we have observed dramatic changes of attitude,” he says. “People started to consume and share more reliable news from trusted sources.” Of course, the goal is to have people listening to the best available advice on risk before they watch people die around them, Donovan says.

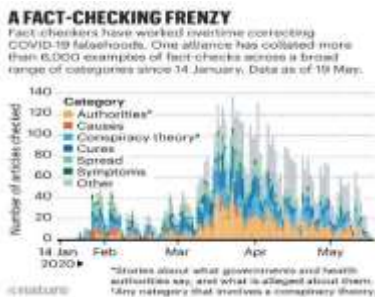
Flattening the curve

In March, Brazilian President Jair Bolsonaro began to spread misinformation on social media — posting a video that falsely said hydroxychloroquine was an effective treatment for COVID-19 — but was stopped in his tracks. Twitter, Facebook and YouTube took the unprecedented step of deleting posts from a head of state, on the grounds that they could cause harm.

[Social media companies must flatten the curve of misinformation](#)

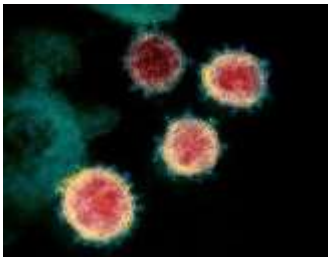
Social-media platforms have stepped up their efforts to flag or remove misinformation and to guide people to reliable sources. In mid-March, Facebook, Google, LinkedIn, Microsoft, Reddit, Twitter and YouTube issued a joint statement saying that they were working together on “combating fraud and misinformation about the virus”. Facebook and Google have banned advertisements for ‘miracle cures’ or overpriced face masks, for example. YouTube is promoting ‘verified’ information videos about the coronavirus.

Social-media platforms often rely on fact-checkers at independent media organizations to flag up misleading content. In January, 88 media organizations around the world joined together to record their fact-checks of COVID-19 claims in a database maintained by the International Fact-checking Network (IFCN), part of the Poynter Institute for Media Studies in St Petersburg, Florida (see ‘A fact-checking frenzy’). The database currently holds more than 6,000 examples, and the IFCN is now [inviting academics to dig into the data](#). (Another site, Google’s fact-check explorer, records more than 2,700 fact-checks about COVID-19.) But some fact-checking organizations, such as Snopes, have admitted to being overwhelmed by the quantity of information they are having to deal with. “The problem with infodemics is its huge scale: collectively, we are producing much more information than what we can really parse and consume,” says De Domenico. “Even having thousands of professional fact-checkers might not be enough.”



Source: IFCN/CoronavirusFactsAlliance

Communication scholar Scott Brennen at the Oxford Internet Institute, UK, and his co-workers have found that social-media companies have done a decent job of removing misleading posts, given the hard task. The team followed up 225 pieces of misinformation about the coronavirus that independent fact-checkers had collated in the IFCN or Google databases as false or misleading. In [a 7 April report](#), the team found that by the end of March, only some 25% of these false claims remained in place without warning labels on YouTube and Facebook, although on Twitter that proportion was 59% (see go.nature.com/2tvhu5). And Ferrara says that about 5% of the 11 million Twitter users his team has studied so far in its COVID-19 database have been shut down for violating the platform’s policies of use, and that these tended to be unusually active accounts.



[Coronavirus and COVID-19: Keep up to date](#)

But some creators of content have found ways to delay detection by social-media moderators, Donovan notes, in what she calls “[hidden virality](#)”. One way is to post content in private groups on Facebook. Because the platform relies largely on its users to flag up bad information, shares of misleading posts in private communities are flagged less often because everyone in the group tends to agree with one another, she says. Donovan used to study white supremacy online, and says a lot of ‘alt-right’ content wasn’t flagged until it leaked into public Facebook domains. Using CrowdTangle, a social-media-tracking tool owned by Facebook, Donovan found that more than 90% of the million or so interactions referring to the *New York Post* article about the Gates vaccine conspiracy were on private pages.

Another way in which manipulators slip past moderation is by sharing the same post from a new location online, says Donovan. For instance, when people on Facebook began sharing an article that alleged that 21 million people had died of COVID-19 in China, Facebook put a label on the article to indicate that it contained

dubious information, and limited its ranking so that it wasn't prioritized in a search (China has confirmed many fewer deaths: 4,638). Immediately, however, people began posting a copy of the article that had been stored on the Internet Archive, a website that preserves content. This copy was shared 118,000 times before Facebook placed a warning on the link. Another post, on the website Medium, was removed by Medium because it falsely claimed that all biomedical information known about COVID-19 was wrong, and put forward a dubious theory. Before it was taken down, it garnered some shares. But a version on an archived site remains. It has garnered 1.6 million interactions and 310,000 shares on Facebook — numbers that are still climbing.

Quattrociocchi says that, faced with regulation of content on platforms such as Twitter and Facebook, some misinformation simply migrates elsewhere: regulation is currently worse, he says, on Gab and WhatsApp. And there is only so much you can do to police social media: "If someone is really committed," says Ferrara, "once you suspend them, they go back and create another account."



[Anti-vaccine movement could undermine efforts to end coronavirus pandemic, researchers warn](#)

Donovan agrees, but argues that social-media companies could implement stronger, faster moderation, such as finding when posts that have already been flagged, or deleted, are revived with alternative links. In addition, she says, social-media firms might need to adjust their policies on permitting political discourse when it threatens lives. She says that health misinformation is increasingly being buried in messages that seem strictly political at first glance. A Facebook group urging protests against stay-at-home restrictions — Re-Open Alabama — featured a video (viewed 868,000 times) of a doctor saying that his colleagues have determined that COVID-19 is similar to influenza, and "it shows healthy people don't need to shelter in place anymore". Those messages could lead people to ignore public-health guidance and endanger many others, says Donovan. But Facebook has been slow to curb these messages because they seem to be expressing political opinions. "It's important to demonstrate to platform companies that they aren't moderating political speech," Donovan says. "They need to look at what kind of health misinformation backs their claims that restrictions are unjustified." (Facebook did not reply to a request for comment.)

Donovan is trying to teach others to spot the trail of misinformation: as with a viral outbreak, it's easier to curb the spread of misinformation if it's spotted close to its source, when fewer people have been exposed. She has grants of more than US\$1 million from funders, including the Hewlett Foundation in Menlo Park, California, and the Ford Foundation in New York City, to collect case studies of the way misinformation spreads, and to use them to teach journalists, university researchers and policymakers how to analyse data on posts and their share patterns.

Gaining trust

Efforts to raise the profile of good information, and slap a warning label on the bad, can only go so far, says DiResta. "If people think the WHO is anti-American, or Anthony Fauci is corrupt, or that Bill Gates is evil, then elevating an alternative source doesn't do much — it just makes people think that platform is colluding with that source," she says. "The problem isn't a lack of facts, it's about what sources people trust."

Brennen agrees. "The people in conspiracy communities think that they are doing what they should: being critical consumers of media," he says. "They think they are doing their own research, and that what the consensus might advocate is itself misinformation."

That sentiment could grow if public-health authorities don't inspire confidence when they change their advice from week to week — on facemasks, for example, or on immunity to COVID-19. Some researchers say the authorities could be doing a better job at explaining the evidence, or lack of it, that guided them.

For now, US polling suggests that the public still supports vaccines. But anti-vaccine protesters are making more noise. At rallies protesting against lockdowns in California in May, for instance, some protestors carried signs saying, “No Mandatory Vaccines”. Anti-vaccination online hubs are leaping on to COVID-19, says Johnson. “It’s almost like they’ve been waiting for this. It crystallizes everything they’ve been saying.”

Nature **581**, 371-374 (2020)

doi: 10.1038/d41586-020-01452-z

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[Download references](#)

[Opinion](#)

It's High Time We Fought This Virus the American Way

The administration has all the authority it needs to produce medical supplies and prepare for a potential vaccine.

By James E. Baker

Mr. Baker is a former legal adviser to the National Security Council.

April 3, 2020



President Trump with a coronavirus testing kit on March 30. The federal government can allocate equipment and supplies based on actual need and best public-health practices.Credit...Al Drago for The New York Times

Every Marine knows better than to pull a knife in a gunfight. But so far, that appears to be the federal government's approach to battling Covid-19. The president has “invoked” the Defense Production Act, but the government [has not used the full authority](#) of the act. There is a difference between invoking a law and using it, just as there is a difference between talk and action.

Governors and health officials tell us that there is a profound gap between the protective equipment, hospital equipment and testing resources that are needed (and will be needed) and what is available (or in the

pipeline). Bill Gates reminds us that we will need to produce millions, perhaps [billions, of doses of vaccine](#) in 12 to 18 months. This isn't a passing crisis; we will need more of everything in two months, six months and maybe years.

Don't let debate over the details of General Motors' and Ventec's honorable [effort to build more ventilators](#) hide the bottom line: The federal government has all the authority it needs to close the supply gap, allocate resources among states, and prepare for the production and distribution of the vaccine to come. Until the federal government demonstrates — with statistics, contracts and timelines — that the gap is closed and the vaccine pipeline is ready, we should ask: Why *isn't* the government bringing its full arsenal to the fight?

The [D.P.A.'s authorities](#) go beyond prioritizing contracts and manufacturing supplies. Its allocation authority addresses the problem of states' competing against one another for scarce resources based on market mechanisms. The federal government can allocate equipment and supplies based on actual need and best public-health practices. The D.P.A.'s industry assessment authority can be used to measure production and distribution capacity, remove blind spots, plan efficiently and recreate a supply chain at home. The federal government can determine now which entities could produce vaccines while it plans for their ethical allocation. The government can then use the D.P.A.'s Title III incentive authorities to issue loans, offer antitrust protection and guarantee purchases, creating a secure market for masks, tests and vaccines.

The law is so broad in places that it is sometimes referred to as a "commandeering" authority. Lawyers prefer to say the president would act at the zenith of his authority under the paradigm presented in Justice Jackson's [concurrency](#) in the Supreme Court's landmark [Youngstown case](#). But its use is not as extraordinary as some suggest, and it is not commandeering. The Defense Department alone uses the prioritization authority some 300,000 times a year, while the government uses Title III incentives 20 to 30 times per year. Although the allocation authority has [not been used since the Cold War](#), some civilian airliners and freighters remain allocated for the Civil Reserve Air Fleet. Nor does exercise of the prioritization and allocation authority equate to state ownership. Under the act, corporations are paid fair market value for their products. Any actual "commandeering" of production would require just compensation under the Fifth Amendment's Takings Clause. Moreover, price controls under the D.P.A. require a joint resolution of Congress signed into law by the president.

The D.P.A. also contains built-in safeguards. A majority of its provisions expire every five years. That is why it has been reauthorized [by Congress over 50 times](#) since its passage in 1950. Congress can decline to do so or do so with amendments when the act comes up for reauthorization in 2025, or sooner. The law also gives federal courts jurisdiction over disputes including the power to determine and award fair market value and forbid the executive branch from using the statute improperly. If a business feels the government is overreaching or unrealistic in its timelines, it can seek relief in court and do so on an emergency basis. Finally, the government reports annually on the D.P.A.'s use: Not only will the Congress know how the act is used, the public will, too.

- Refer your friends to The Times.

What about liability? The first answer is to make equipment that works. The second answer is Title 42, giving the secretary of health and human services authority to determine that the coronavirus pandemic "[constitutes a public health emergency](#)," recommend use of "covered countermeasures" to fight the pandemic and in doing so grant broad protection from liability under both state and federal law, except in the case of "willful misconduct." There are other solutions as well, like special legislation, indemnification clauses to contracts, the government contract defense and, if all else fails, waivers.

Here's the big picture: In times of crisis, when lives are at stake, lawyers and policymakers are supposed to find solutions to problems — to get to yes with honor and within the law — and not to create obstacles.

State and local authorities are imploring the federal government to use the authority it has to secure our medical supply chain. So far, the administration appears to have responded like a parent doling out candy to a child: one piece at a time. This is an "all hands on deck" moment, not merely to flatten the curve but to leap

ahead of the curve. America was once the arsenal of democracy; the D.P.A. can help make us the arsenal of public health.

Editors' Picks

If I were advising the president (or the secretaries with delegated authority), I would say this: Please, tell the public what the need is and how the need will be met today, next week and in the months to come. What specifically has been contracted for, in how many units and on what timeline? Where there is a gap between need and supply, use the D.P.A. to close it.

I've never heard of a commander who complained about having too many tanks or who asked for a few artillery shells and not one too many. It's high time we fought the virus the American way: with everything we've got.

More on the fight against coronavirus

[Opinion | Margaret O'Mara: America Is at War, and There's Only One Enemy](#)

[March 18, 2020](#)

[Opinion | Michelle Goldberg: Of Course Trump Deserves Blame for the Coronavirus Crisis](#)

[March 19, 2020](#)

James E. Baker, the director of Syracuse University's Institute for Security Policy and Law, is a former Marine infantry officer, legal adviser to the National Security Council and chief judge of the U.S. Court of Appeals for the Armed Forces.

<https://www.nytimes.com/2020/04/03/opinion/defense-protection-act-covid.html?smid=li-share>

(8)Dr. Thomas Wilckens, MD (Article posted on LinkedIn & comments exchanged)

JULY 9th update: COVID19 WHAT IF WE ARE ALL WRONG

- Published on April 19, 2020



[Thomas Wilckens \(托马斯\)](#)

Thomas Wilckens, MD #PrecisionMedicine 精密医学 thought & technology leader, Keynote Speaker, industry advisor 29.000+ Followers

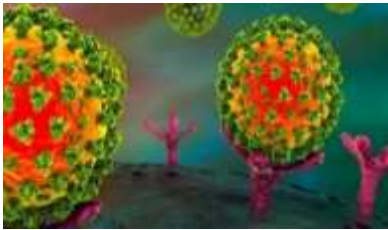
Updated MAY 12th & July 19th: COVID19 WHAT IF WE ARE ALL WRONG

- Published on April 19, 2020

BY

[Thomas Wilckens \(托馬斯\)](#)

MD #PrecisionMedicine 精密医学 thought & technology leader, Keynote Speaker, industry advisor 29.000+ Followers



[15 articles](#)

Prologue:

This analysis is meant to spur a discussion that definitely does not weigh one life against another, nor neglect humanistic thinking, but push to end the current actionism, return to rational, hypothesis driven good science and the application of the principle of logic thinking for decision making.

Hypothesis:

We are lost in speculations and not logic interpolations of data from earlier pandemics, interpretation of incomplete, fragmented data with a strong, social media and public driven bias towards a highly biased view on the pandemic, that does neglects essential facts.

Let's start with what we do NOT know

1: Prevalence:

2: Immunity, antibodies and PCR testing:

3: Who get's infected why and how?

4: Vaccination & Treatment:

Bad news: [More deaths, no benefit from malaria drug in VA virus study](#) April 21st @Politico

5: How does the pandemic spread:

This is not a preprint or peer reviewed paper, yet very interesting analysis

[COVID-19 Superspreader Events in 28 Countries: Critical Patterns and Lessons](#)

6 Herd immunity and a future with COVID-19:

Updated April 28: [Modeling infectious disease dynamics](#) @Science

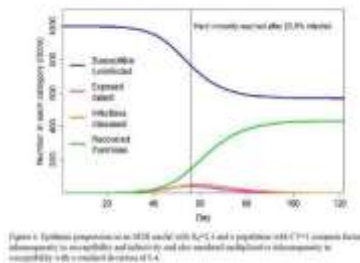
"Substantial asymptomatic and presymptomatic transmission make containment-based interventions, especially those depending on recognition of early symptoms or limited testing, more challenging and potentially infeasible alone."

Update May 6th [Herd Immunity, or Big 2nd Wave? Israel Antibody Testing Hopes to Find Out](#)

6: What can the death rates around the world tell us?

4: In the age of Artificial Intelligence we can predict the future

[Quantifying the effect of quarantine control in Covid-19 infectious spread using machine learning](#) published online April 6th.



outcome in the US considering the very different testing capacities that were applied?

5: The myths around number $R \leq 1$

Data from the Robert-Koch Institute indicate **R was already smaller 1 before the #lockdown...**

6: Early Responders versus Late Responders:

Countries like the UK, the US, and Sweden did not respond to the pandemic early on, yet it seems their curves are flattening, even though they potentially acted too late. At the same time the death rate curve seems to bend in very different regions, i.e. with or without measures. Granted that the numbers from many countries vary greatly, not least due to lack of testing capabilities, differences in post mortem testing, etc.



7: The Diamond Princess analysis:

By the 20th of February, 619 of 3,700 passengers and crew (17%) were tested positive. [What the cruise-ship outbreaks reveal about COVID-19](#)

8: USS Theodore Roosevelt and French flagship aircraft carrier Charles de Gaulle [What the cruise-ship outbreaks reveal about COVID-19](#)

[Sweeping US Navy testing reveals most aircraft carrier sailors infected with coronavirus had no symptoms](#)

[More Than 1,000 French Sailors Test Positive For Coronavirus—On A Single Ship](#) Nearly 60 percent of sailors from the flagship aircraft carrier, the Charles de Gaulle, tested positive for Covid-19, leading to questions, finger-pointing and investigations.

Yet, it seems there are so far no fatalities with most sailors again being asymptomatic, patient 0 remaining obscure. I.e. whenever the virus got on board, chances are high that not all infected are even being tested when they were carrying the virus. App 25 are hospitalized, one sailor is in the ICU.

I wonder if there are any efforts being taken to analyse these well described cohorts, i.e. cruise ship and vessels for antibody presence?

9: Read yourself - Are we risking that the cure becomes worse than the diseases?

[Flattening the curve won't lead to coronavirus turning point, study finds](#)

-
- Projections by Chinese-US team indicate South Korea and New Zealand are among the best in the global crisis at balancing economics with disease controls
- China has been effective in suppressing the epidemic quickly but the strategy comes at too high a cost, researchers say

What I find particularly puzzling is the fact, that the WHO admits that the evidence quality is low or very low for most measures currently imposed on our societies, i.e. social distancing etc. In light of the analysis above, i.e. most countries are not in a position to implement rigid manners like countries in Asia and in particular China, we must reflect if we need not a completely different approach to contain the pandemic . [Weak Evidence for Strong Pandemic Interventions. A 2019 WHO Warning for the Current COVID-19 Crisis](#)

<https://www.linkedin.com/pulse/covid19-what-we-all-wrong-thomas-wilckens-%E6%89%98%E9%A6%AC%E6%96%AF-/>

Weak Evidence for Strong Pandemic Interventions. A 2019 WHO Warning for the Current COVID-19 Crisis

6 Pages • Posted: 13 Apr 2020

Steffen Roth

La Rochelle Business School; University of Turku

Date Written: April 9, 2020

Abstract

Social distancing. Travel bans. Confinement. The purpose of this research note is to document that more than 50% of the world population are affected by WHO (World Health Organization) recommendations for the 2020 coronavirus crisis for whose effectiveness the WHO admits that the evidence quality is low or very low. This self-contradiction is confirmed by a WHO document published in October 2019 as well as supporting documentation from the European Centre for Disease Prevention and Control. The research note concludes that an obvious resolution of this self-contradiction would be to limit restrictions to those for whose effectiveness the WHO's document reported that there was at least moderate evidence.

Keywords: COVID-19, coronavirus, pandemic, evidence, non-pharmaceutical interventions

Update May 1st:

["MESSAGE IN A BOTTLE SOS: THE BLIND LEADING THE BLIND INTO THE TWILIGHT ZONE"](#) SVP Morgan Stanley @Dave Jenny; guess where he suggest we might already be?

Update May 11th: [Collateral Effect of Covid-19 on Stroke Evaluation in the United States](#)

Conclusions:

First of all it would be most arrogant to pretend that all "facts" I collected prior to my hypothesis are reliable and valid. In fact, this would be the same error in applying scientific principles and logic to data that are incomplete, fragmented and where the methodology is often obscure as is the timeframe when and how these data were collected, analyzed and reported! Yet science is all about generating hypotheses and testing them thereafter. **The concept of this article is to put forward a hypothesis that I do not see reflected in any of the discussions** I follow rigorously ever since I learned about the existence of a new mysterious and potentially deadly disease that the US intelligence concluded could be a cataclysmic event [Intelligence report warned of coronavirus crisis as early as November](#)

The anti-CONCLUSIONS - I have only one conclusion:

1: What if all our measures were coming too late to flatten the curve first hand, i.e., we have seen the real peak of the pandemic in most regions of the world already?

2: What if we underestimate the prevalence of SARS-CoV-2 since we do not understand the virus at all.

3: What if we are so shocked to be hit by a deadly virus where there is no herd immunity in our population, so it can kill that many people and spread limitlessly that we are blinded.

4: What if public pressure, press, polls, and social media were directing us to a state of one-dimensional thinking, so that all of us easily accepted only one scenario to be true in order to ease the process of decision making, selling the consequences to the public, **pretending we play it safe** on the best informed basis. After all, what scientist or politician wants to be held responsible for millions of deaths of beloved ones?

5: What is the role of social media in what some call the first infodemic? [How to fight an infodemic](#)
[Coronavirus lies are going viral. It's essential we all fight back](#)

6: What if tests, track and trace is illusive, given the many unknown unknowns, the fact that we too often cannot identify patient 0

7: Do we highly underestimate the detrimental mid- and long term consequences of the current lockdown?
Op-Ed: [We are losing ground on every other disease while fighting COVID-19](#)

8: What if we must prepare for [Scenarios of a superfluous crisis](#) Added April 21st

WE MUST ACCEPT THAT WE FLY BLIND

CONSEQUENCES:

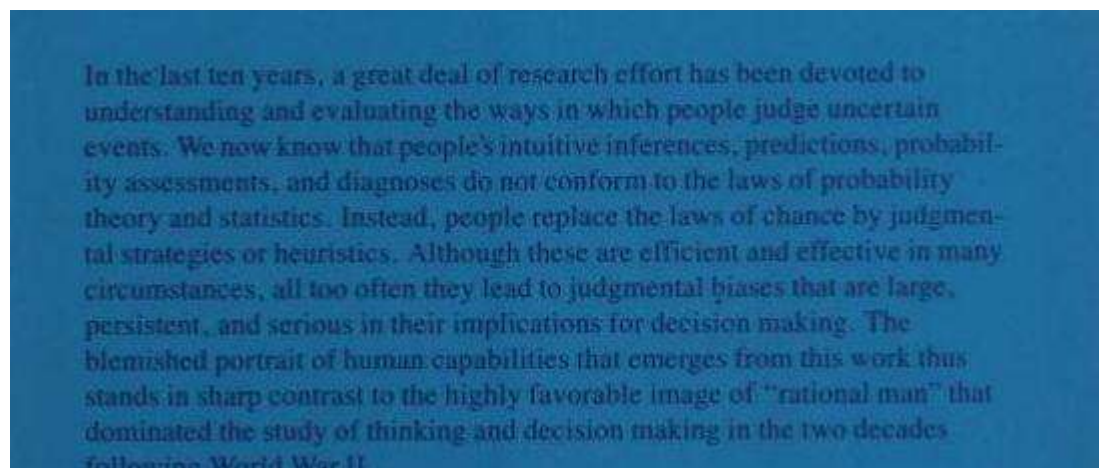
Societies, scientists from all disciplines must reduce their ego, accept their given bias as well as lack of precise knowledge. Politicians must be better advised from various disciplines. We must abandon opinionated interpretation of sketchy limited data. Most importantly, we must look into all possible scenarios and related consequences! Not least the necessity to avoid the melt down of our societies as we know, love and miss.. We see the deterioration of general health due to lockdown, ranging from mental issues to long term physical damage due to lack of medical treatment. We see economic disaster emerge around the world with mostly unpredictable consequences that may include hunger, nationalism, war, you name it!

Off note, it might well be that the emerging regions that are now being hit with little or no way to escape the pandemic, flattening the curve via social distancing may be our best bet to learn faster what this killer is really doing to our world, our societies and future.

EPILOGUE

How could something like this happen? In 2002 Amos Tversky and Daniel Kahneman were awarded the Nobel Prize for their Prospect Theory which is outlined in more depth in [Judgment under Uncertainty](#)

[Heuristics and Biases](#) Editors: Daniel Kahneman Paul Slovic Amos Tversky View all contributors Published: May 1982, see back cover:



In their original article they investigated human decision-making, specifically what human brains tend to do when we are forced to deal with uncertainty or complexity. Based on experiments carried out with volunteers, Tversky and Kahneman discovered that humans make predictable errors of judgement when forced to deal with **ambiguous evidence** or **make challenging decisions**. These errors stem from 'heuristics' and 'biases' – mental shortcuts and assumptions that allow us to make swift, automatic decisions, often usefully and correctly, but occasionally to our detriment.

What we may have seen re COVID-19 is an unprecedented coincidence that created a vision of a reality that may not have existed at any time point; i.e. a complete misinterpretation of the current pandemic.

Thanks to [@Maria-Elena Bernal](#) for editing my German English and correcting some typos

For daily curated content and further discussions pls join the group [Precision Medicine & Digital Health](#) @LinkedIn; off note, did you know group content is searchable?

[15 articles](#)

[#COVID19](#) – WHAT IF WE ARE ALL WRONG! Emerging data may hint towards a very different interpretation of our current situation, but it seems there is currently only one mainstream thinking politically correct and being discussed. The concept of this article is simply to widen our horizon, hint to bias and enable new thinking [#pandemic](#) [#coronavirus](#) [#epidemiology](#) [#heuristics](#) [#biases](#) [#politics](#) [#goverments](#) [#science](#) [#research](#) [#virology](#) [#medicine](#) [#healthcare](#) [#diagnostics](#) [#immunity](#) [#virus](#) [#covid19testing](#) [#covid19research](#) [#covid19vaccine](#)

Reactions

📖 255 Comments Comments on Thomas Wilckens (托馬斯)'s article

[Ferez Soli Nallaseth, M.S., Ph.D. You Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

Carefully presented data that require fermentation (deep thought). The operational term though is 'what if'. Something for which Policy makers, Presidents and Prime Ministers do not have the luxury in an existential

crisis. However we will be studying and including this article in an article including compendium of references, that is being prepared as a cautionary note for a magazine covering a Sport where the notion is to do what the Swedes did! The sport by its very nature of semi-contact and enclosed court is classified in an Italian study as having the highest levels of risk for infection with COVID-19. Finally: I agree. We should watch and learn from those who have offered themselves up for experimentation with 'Herd Immunity.' However, the accepted understanding is that there are clear differences in the 2 viruses in terms of etiology, resistance and environmental tolerance. Therefore with exceptions like EBV, strains of the Herpes virus did not attain anywhere near the pathogenicity and virulence of COVID - 19 or Influenza viruses. Right now the incident rate of infections in Sweden are accelerating relative to its neighboring nations.

<https://www.linkedin.com/pulse/covid19-what-we-all-wrong-thomas-wilckens-%E6%89%98%E9%A6%AC%E6%96%AF-/>

Opposing Arguments and a nail in the coffin!?

[**How coronavirus lockdowns stopped flu in its tracks**](#)

[nature.com • 3 min read](#)

[Ferez Soli Nallaseth, M.S., Ph.D.](#)

[Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

[2d •](#)

[2 days ago](#)

[#Influenza #COVID19 #Lockdown #NorthernHemisphere #SavedThousandsLives #ShortenedSeason6Weeks](#)

Lockdowns stopped flu in its tracks

Social-distancing measures aimed at slowing the spread of coronavirus seem to have shortened the influenza season in the northern hemisphere by about six weeks. A shorter flu season could spare tens of thousands of lives But the net impacts on global health will be hard to tease apart from the large number of deaths from COVID-19 as well as other causes in 2020 and beyond.

Nature | 4 min read



[How coronavirus lockdowns stopped flu in its tracks](#)

[nature.com • 3 min read](#)

[Jason Holzman](#)

[Sr NGS Sales Specialist at Twist Bioscience](#)

[2d •](#)

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Reactions

Reactions

[473 views of your post in the](#)

NEWS

21 May 2020

[How coronavirus lockdowns stopped flu in its tracks](#)

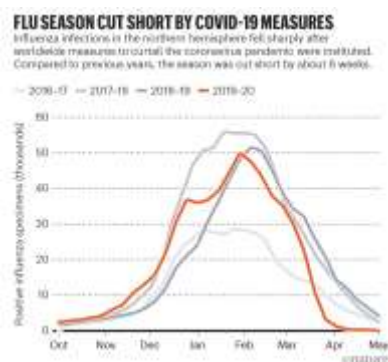
Reported rates of influenza and other infections have fallen sharply, but some communicable diseases may see a rise.

Measures aimed at slowing coronavirus spread are affecting other communicable diseases. Credit: Leon Neal/Getty

Lockdowns and social-distancing measures aimed at slowing the spread of coronavirus seem to have shortened the influenza season in the northern hemisphere by about six weeks.

Globally, an estimated 290,000–650,000 people typically die from seasonal flu, so a shorter flu season could mean tens of thousands of lives are spared. But the net impacts on global health will be hard to unpick against the large number of deaths from COVID-19 as well as other causes in 2020 and beyond. Tracking influenza and other infectious diseases can help to reveal the effectiveness of public-health policies aimed at stopping the coronavirus pandemic.

Seasonal flu cases in the northern hemisphere usually peak in February and tail off by the end of May. This year, unusually, lab-confirmed cases of influenza [dropped precipitously in early April](#), a few weeks after the coronavirus pandemic was declared on 11 March (see ‘Flu season cut short by COVID-19 measures’). The data comes from tests of more than 150,000 samples from national influenza laboratories in 71 countries that report data to [FluNet](#), a global surveillance system.



Source: [FluNet](#) Global Influenza Surveillance and Response System.

The early end to the flu season comes despite the fact that it started with a bang; in January, before the coronavirus pandemic, the influenza season was on track to be the most severe in decades.

There are other possible contributors to the decline: people with flu symptoms might have avoided clinics altogether, for example, isolating at home and so not showing up in the statistics. But the response to the pandemic is likely to be an important factor: “Public-health measures such as movement restrictions, social distancing and increased personal hygiene likely had an effect on decreasing influenza and other respiratory virus transmission,” said the World Health Organization in a statement to *Nature*.

[Coronavirus vaccine trials have delivered their first results — but their promise is still unclear](#)

Local data from the state of New York show a similar pattern. Although the flu season started a few weeks earlier than usual there, the rate of cases fell sharply and the season ended five weeks early. In Hong Kong, the 2019–20 influenza season was 63% shorter than those of the previous five years, and the number of deaths from lab-confirmed flu was 62% lower⁴. A similar decline was seen during the 2003 epidemic of the related coronavirus that causes SARS (severe acute respiratory syndrome).

Other infectious diseases might also have been affected this year, says study co-author, infectious-disease researcher Pak-leung Ho at the University of Hong Kong. In Hong Kong, compared with previous years, the number of chickenpox cases dropped by about half to three-quarters. In April, cases of measles and rubella were their lowest, globally, since at least 2016, according to provisional data available so far — only 36 cases of rubella were reported in April worldwide. Ho notes that typically these are diseases that affect children. “Closure of schools may have had the biggest impact,” he says.



[How to address the coronavirus's outsized toll on people of colour](#)

Sexually transmitted infections (STIs) might also be affected, says Amanda Simanek, an epidemiologist at the University of Wisconsin–Milwaukee. Cases may decline in the absence of close contact, she says, but there may also be a decline in detection and treatment leading to a later surge. Other communicable diseases, such as tuberculosis, are more likely to see an upswing, because programmes to fight the disease have been derailed by the pandemic. The international organization the Stop TB Partnership released a report in May estimating that a 3-month lockdown and a 10-month period of recovery would cause an additional 1.37 million deaths globally during the next 5 years.

The flu season in the southern hemisphere is just starting (it typically peaks in July or August); it is unclear whether a similar flu trend will be seen there.

doi: 10.1038/d41586-020-01538-8

[References](#)

1. 1.

Chan, K. H. *et al. Br. Med. J.* **369**, m1628 (2020).

https://www.nature.com/articles/d41586-020-01538-8?utm_source=Nature+Briefing&utm_campaign=1adfc8e604-briefing-dy-20200522&utm_medium=email&utm_term=0_c9dfd39373-1adfc8e604-43530905

[David A. Sinclair Ph.D., A.O.](#)

[Harvard professor working to extend healthy life. Author of Lifespan.](#)

Even if 10% of the U.S. has been infected, which is on the high side and 30X the reported cases, “it still isn’t enough to stop this virus from roaring back.”

Full article here: <https://bit.ly/3cf4Z9X>

<https://elemental.medium.com/what-if-covid-19-and-flu-both-flare-up-this-fall-7be70e2c68f2> .

Reactions Top of Form

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[Ferez Soli Nallaseth, M.S., Ph.D. You Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

Thank You. Reemergence of COVID-19 in Wuhan reported today supports the idea. Even with 70% of the population immunized by 'Herd Immunity' mutant virions, demonstrated re-infections and susceptibility of putative resistant age groups support this post. Thanks

[Thomas Wilckens \(托馬斯\) 1st degree connection 1st MD #PrecisionMedicine 精密医学 thought & technology leader, Keynote Speaker, industry advisor 29.000+ Followers](#)

Reactions

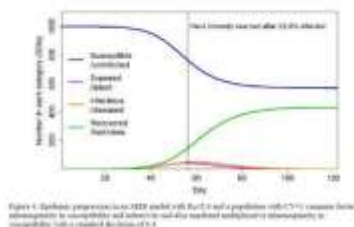
🗨 262 Comments: Comments on Thomas Wilckens (托馬斯)'s article

262 Comments

I believe we just do not know. Pls read carefully including an analysis on the basis of data from Sweden claiming

[#herdimmunity](#) at an infection rate of app 25%

<https://www.linkedin.com/pulse/covid19-what-we-all-wrong-thomas-wilckens-%E6%89%98%E9%A6%AC%E6%96%AF-/>



[Ferez Soli Nallaseth, M.S., Ph.D. You Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

We should watch and learn from those who have offered themselves up for experimentation with 'Herd Immunity.' However, the accepted understanding is that there are clear differences in the 2 viruses in terms of etiology, resistance and environmental tolerance. Therefore with exceptions like EBV, strains of the Herpes

virus did not attain anywhere near the pathogenicity and virulence of COVID - 19 or Influenza viruses. Right now the incident rate of infections in Sweden are accelerating relative to its neighboring nations.

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[Fernando Schwartz 2nd degree connection 2nd Global Head of AI | Chief Data Scientist | Mathematician](#)

In all these models the effective outcome seems to be that most population will get the virus, with variable speed of spread. In my opinion some scenarios are missing. A factor that should be considered is: what are the long term effects of the disease? If long term effects are found, eg in kids, then perhaps no scenario above is reasonable, at least until vaccine is ready (if that ever happens)?

[Gordan Kljajic out of network 3rd+ Entrepreneur and Investor, living in Malaysia](#)

There are viruses that that over the period of a lifetime almost every human will catch ... like the herpes virus ... and Covid19 will be one of them. Better to prepare for THAT. Sweden is going the right path. We should closely watch them, learn and adopt. My 0.1%

[Ferez Soli Nallaseth, M.S., Ph.D. You Founding President, CEO, CSO, CFO & Principal Donor at Life Sciences Institute of New Jersey](#)

We should watch and learn from those who have offered themselves up for experimentation with 'Herd Immunity.' However, the accepted understanding is that there are clear differences in the 2 viruses in terms of etiology, resistance and environmental tolerance. Therefore with exceptions like EBV, strains of the Herpes virus did not attain anywhere near the pathogenicity and virulence of COVID - 19 or Influenza viruses. Right now the incident rate of infections in Sweden are accelerating relative to its neighboring nations.

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[https://www.linkedin.com/feed/update/urn:li:activity:6665649291136167936/?commentUrn=urn%3Ali%3Acomment%3A\(activity%3A6665649291136167936%2C6665894916146765826\)](https://www.linkedin.com/feed/update/urn:li:activity:6665649291136167936/?commentUrn=urn%3Ali%3Acomment%3A(activity%3A6665649291136167936%2C6665894916146765826))

<https://www.linkedin.com/pulse/covid19-what-we-all-wrong-thomas-wilckens-%E6%89%98%E9%A6%AC%E6%96%AF-/>

(9)Fair questions by Players & Coaches on (FSN) Ferez's qualifications and knowledge of the game (Squash) as well as the Pandemic entitling the positions he has taken:

(9A) Ferez, what do you know about virology and epidemiology that qualifies you to make these proposals? Such proposals as restraining play until Science, Medicine, Technology and Policy ensure

safety, non-transmission, non-recurrence and a responsible re-opening of villages, towns and cities – let alone Squash Courts? How do you know that the health and essential services personnel are being further burdened by Squash Players being on court?

(9B) Ferez, ‘How is your own game?’ As a scientist what could you know about Squash - now and in your peak - playing days? Why are you qualified to advise the Pros? What was your peak level of play? What do you know about intensity, training (on and off the court) and performance in match play? Or the joys and pains of losses that the Pros know well - on and off the court?

BESIDES A PARA FROM THE BEGINNING AND ANOTHER FROM THE END OF THIS SECTION (PAGES 569 – 661) OR ALL OF SECTION 9A & 9B AND THE LINKS THEREIN WILL BE ACCESSIBLE VIA A SINGLE LINK POSTED ON MY WEBSITE FEREZ’S SQUASHDOCS AND ENTITLED:
‘Ferez, How is your own game? Analyses of representative games or matches - won or lost!’

Qs: “How is your own game, Ferez?” Ans: analyses - select international matches, results & rankings 1971 - 2010 (REPOST THIS AS A LINK IN ANS To QS IN SEGMENT 9a & 9b)

[FSNa-HowIsYourOwnGameAnOfRepIntlMatches.8.24.2020.v6](#)

[FSNb-HowIsYourOwnGameAnOfRepIntlMatches.8.24.2020.v6](#)

FSN responses: the collage of Google Images for ‘Ferez Squash’ in this link illustrates some of the Players and Team Members in the narrative or responses in 9A and 9B

<https://www.google.com/search?source=univ&tbm=isch&q=Ferez+Squash&sa=X&ved=2ahUKEwi8xpmsvqnqAhV3gXIEHTEzAs4Q7Al6BAgKECM&biw=1280&bih=556#imgsrc=BFMHJ2SI0fi3KM>

(9A) FSN Response:

Between January and July of 2020 it is estimated that on the SARS-CoV-2 driven COVID-19 Pandemic, there were more than 67,753 Scientific publications, let alone articles from news and social media. It is impossible to cover all the dimensions including several that are in transition, subsumed or superceded but necessary for the retaining perspectives on rates and extents of progress in containing the Pandemic. They have also been included as they play both a historical as well as an informative role in revealing all the factors contributing to the progression or regression of the Pandemic. In the 10 segments that we have covered we have attempted to cover all these dimensions suggesting plausible responses for readers.

However, there is also a specific response that emerges from the science of Virology used to characterize SARS - CoV - 2. Over the last 40 years or so I have worked extensively with viruses or their various components for an array of experimental manipulations. They include virions, virus-like particles and bacteriophage as well as their respective cellular hosts. They include mammalian viruses, viral proteins or DNA and UV inactivated virus-like particles such as (Spleen Focus Forming Virus, Vesicular Stomatitis Virus, Retrovirus delivered TERT telomerase, Bovine Papilloma Virus, Polyoma Virus and SV40 Virus and Cytomegalovirus) with various mammalian host cells and mice as hosts. In addition I have worked with Bacteriophage (φ, M13, T7) infecting bacterial host cells. So I am very familiar with ‘hands on’ work such terms in virology such as Burst Size, Multiplicity of Infection, Latency, Lysogeny, Lytic infection, Virulence, Pathogenicity, Superinfection Immunity etc. all of which are undoubtedly used to quantify SARs – CoV -2 infection cycles. However, instead of belaboring these points these links **(in 9A, i to iii)** to my publications might be a selected and helpful index:

(i) Nallaseth et al, <https://www.researchgate.net/project/DNA-replication-DNA-recombination-DNA-repair>

(ii) Nallaseth et al, <https://link.springer.com/article/10.1007/BF00330327>

(iii) Nallaseth et al, <https://www.researchgate.net/project/Expression-secretion-purification-biochemical-functional-and-structural-characterization-of-heterologous-proteins-in-various-host-species>

(9B) FSN Response:

On the recommendation of Bob Callahan the Head Coach of the Men's Squash Team at Princeton University, I was appointed as the Coach of the Lawrenceville School Boys Varsity Team in the 2007 – 2008 season. At the United States National Championships for Schools held at Yale University in 2008, another Coach or Assistant Coach of a High School Varsity Team asked the pointed question 'How is your own game?' The question was both mystifying and surprising because she could not possibly have forgotten the results of several of our games when we regularly played at the Squash Courts of the University of Miami in Florida, between 1996 and 2000. Despite being deep in semi-retirement at that time, due to all manner of work pressures, I had to hold back from running up the points. Furthermore, in the rankings compiled in 1997 by US Squash and the Florida State Squash Rackets Association (FSRA) for Florida State, she was ranked #17 while I was ranked #3 behind 2 top Players, including a former PSA Pro (World #77) rated at the 5.8 to 6.0 level. This High School Coach later coached University teams in the Mid West of the United States. My playing record in the Miami, FL area from 1996 to 2000 is shown below in the section on Miami, Florida (also see **references for section 9b, links i to vb**).

Over the years, others, of similar or playing slightly higher level of games, had also asked similar questions with the same insinuations. Despite their being aware that I had some good results on court and especially given that my game was pretty much 'flying on fumes' as soon as I began University Education in the South of the United States, in September of 1976. Moreover, it was in a tough assortment of fields in the Life Sciences, regrettably leaving little or no time for Squash.

However, given the context of the current article and its significance for the Squash community this and other related questions **(9B)** are fair game, and they **have to be answered to establish my credibility as a Squash Player**. Although select matches in the US Hardball (**US-HB**) Game are included here, most are documented in the links **(references for 9b, links i to vb)**. While results from the selected matches that are indicative of levels of play and that are summarized here, are almost exclusively limited to the **International – Soft Ball (I - SB)** Game

Most of the top Players in the world would never even bother to ask such questions as they are secure in the knowledge that they have always been far beyond the reach of Players at my level of play! That also puts them way beyond scrounging for competitive crumbs! Conversely, for the simple reason that their livelihood depended on that skill, good Players and Coaches recognize realistic signs for levels of play in opponents that also translates to other Players. This skill applies even when they are evaluating Players long after the playing level of the latter, if it was high, had long passed. These top level Pros and Coaches would never allow mindless competitiveness or wishful thinking to endanger their paychecks and reputations. These Coaches and Players evaluating games and past or current standards of play, are like Archaeologists who find buried fossils at a 'dig' which allows them to reconstruct lost cities and civilizations. It is also a skill that does not necessarily correlate with the standard of play attained by Coaches and Players. In other words the best Coaches are not necessarily the ones that attained the highest ranking in the PSA and vice versa.

[**FSNa-How IsYourOwnGameAnOfRepIntlMatches.8.24.2020.v6**](#)

[**FSNb-How IsYourOwnGameAnOfRepIntlMatches.8.24.2020.v6**](#)

SUMMARY & INFERENCES FROM SEGMENT 9 ON THE SCIENTIFIC & PLAYING QUALIFICATIONS OF A CO-AUTHOR FOR ADVISING SQUASH PLAYERS

We have already addressed my scientific experience as represented by peer reviewed and other publications in segment **9A**. It should convince the Squash community that I am sufficiently familiar with the content and process to volunteer the opinions that I expressed. Furthermore there is a very good reason not to volunteer opinions or facts that did not either emerge from reliable sources or were not plausible. Very simply put I

would risk my scientific and professional credibility. At least opinions that are as plausible as permitted by the magnitude, fluidity and changing circumstances of the COVID-19 Pandemic! Credibility, is indispensable to all undertakings and especially to the one that we have launched, which is of crucial significance for the Common Good or Public Interest (see link below):

<https://www.lifesciencesinstitutenj.com/>

That leaves my qualifications oncourt that are likely more in demand in the Squash Community. It s in segment **9B** which is best represented by the question '*Ferez how is your own game?*' Estimated in the necessary response are the levels of Squash at which I played in India at my peak between 1974 and 1976 and again in retirement or in semi-retirement in the USA between 1976 and 2010 spanning a total of 34 years. Included in this analyses were the peaks and valleys of performance caused by various circumstances, as well as the matches won or lost, my coaching and oncourt analytical experience, as well as mentors and competitors who contributed to this estimation. For these and other reasons the levels of play of all players vary at different times in their playing days and so to get an accurate estimate of their highest levels of play current levels have to be normalized to the peak levels that they ever attained. These are shown by a number of indicators that go beyond mere tournament wins and finding them is akin e.g. to an Archaeologist looking for clues!

Although my principal playing days were based in India and the United States some games were picked up in Canada, France and England. These games and matches were played with Squash Players from a wide array of nations and styles of play and so it is reasonable for me to make the claim of an International Squash Player. Furthermore, in speaking to Mentors, Competitors and Coaches based on the analyses in this segment **9B** of this article, a consensus on my peak level of play has emerged. I would have been very conservatively ranked between 8 and 10 in India and 75 and 100 internationally e.g. by the PSA. Furthermore, all the training regimens, all the physical and mental barriers that were overcome were of the nature or type and well within the nature, type and range of those at this level of play in the PSA.

The single greatest block to the further development of my game was an inability to perform in tournaments (similarly to the block in exams). There were a total of four explanations for this 'block' and it is my training as a Biologist as well as a competitive Squash Player that led to the probable explanation which is the inability to manage an extreme form of a well established Stress Response also known as the Flight or Fight Response. For reasons that have been discussed, it is one that also applies to a greater or lesser extent to all Racquet Athletes including those in the PSA. Or for that matter, in other pressure situations, it applies to all forms of Life as a well established response. The Stress or Flight or Fight Response varies and in extreme cases is almost impossible to manage. This was illustrated by the opposing symptoms of the Principal Founder of Evolutionary Biology **Charles Darwin** and 2001 Wimbledon Champion **Goran Ivanišević**, on the one hand, and multiple British Open, World Open and US Open Champion **Jansher Khan** on the other hand.

At around my peak levels of play, I was losing matches to much lower level Players, in tournaments. In fact the symptoms set in within minutes of stepping on the court. This was likely due to the inability to manage an extreme form of the Stress or Flight or Fight Response. A well intentioned Squash Playing Physician at the WSC suggested using tranquilizers and in my desperation I accepted. They had the opposite effect to that which might be predicted. But given the highly coordinated and finely balanced molecular basis of the Stress or Flight or Fight Response this should not have been a surprise! The point being that I would do almost anything to break into and stay in the top levels of Indian Squash so I could play for India in the World Championships. It was something which I had already achieved physically, technically and mentally but only in practice matches and not in tournaments.

The limitations of these Stress or Flight or Fight Response symptoms were finally managed, due to the circumstances of the death of my father while I was oncourt, with the Indian #2, which was the catalyst. These limitations were managed in late stages of my Peak levels of Play in India around late 1975 and mid 1976 - and of course this management was tested to maximal levels later in the USA. All of these details have been presented.

[FSNa-HowIsYourOwnGameAnOfRepIntlMatches.8.24.2020.v6](#)

[FSNb-HowIsYourOwnGameAnOfRepIntlMatches.8.24.2020.v6](#)

I think it is fair to state that all the questions leading to segment 9B have been addressed as well as they can be addressed given that this is a retroactive analyses. Although I never attained playing at anywhere near the highest levels of play in the PSA my experience parallels that of any Pro. It follows that my opinions on a conservative response of Squash Community to the COVID-19 Pandemic does not merely represent the platitudes.

(10)A Humanistic Perspective – *Letter by Coronavirus*, By Poet Vivienne R Reich (communicated by Prof. Dhanjoo Ghista, PhD) (page numbers 413 -

Tue, May 12, 6:23 PM

"Letter To Humanity" by Coronavirus'- A poem by Vivienne R Reich

The earth whispered but you did not hear.
The earth spoke but you did not listen.
The earth screamed but you turned her off.

And so, I was born...

I was not born to punish you...
I was born to awaken you...

The earth cried out for help...

Massive flooding. But you didn't listen.
Burning fires. But you didn't listen.
Strong hurricanes. But you didn't listen.
Terrifying Tornadoes. But you didn't listen.

You still don't listen to the earth when
Ocean animals are dying due to pollutants in the waters.
Glaciers melting at an alarming rate.
Severe drought.
You didn't listen to how much negativity the earth is receiving.

Non-stop wars.
Non-stop greed.

You just kept going on with your life...
No matter how much hate there was...
No matter how many killings daily...
It was more important to get that latest iPhone than worry about what the earth was trying to tell you...

But now I am here

And I've made the world stop on its tracks.
I've made YOU finally listen

I've made you take refuge.
I've made you stop thinking about materialistic things...

Now you are like the earth...
You are only worried about YOUR survival.

How does that feel?

I give you fever ... as the fires burn on earth.
I give you respiratory issues ... as pollution fills the earth air.
I give you weakness as the earth weakens every day.

I took away your comforts...
Your outings.
The things you would use to forget about the planet and its pain

And I made the world stop...

And now...
China has better air quality ... Skies are clear blue because factories are not spewing pollution unto the earth's air.
The water in Venice is clean and dolphins are being seen. Because the gondola boats that pollute the water are not being used.

YOU are having to take time to reflect on what is important in your life.

Again, I am not here to punish you ... I am here to Awaken you...

When all this is over and I am gone... Please remember these moments...

Listen to the earth.
Listen to your soul.
Stop Polluting the Earth.
Stop fighting among each other.
Stop caring about materialistic things.
And start loving your neighbors.
Start caring about the earth and all its creatures.
Start believing in a Creator.

Because next time I may come back even stronger...

*Signed,
Coronavirus*

Written by: Vivienne R Reich

Summary and Inferences

This is an effort to project the complexity, fluidity, unfolding and daunting nature of the COVID-19 Pandemic as well as its ostensible cause, the SARS-CoV-2 virus. We have compiled a series of selected and representative articles from news sources, social media and scientific journals. Included are those from past, sometimes subsumed results, findings and interpretations. These have deliberately been included to emphasize the incremental, unpredictable and complex nature of the unfolding Pandemic. These articles have been compiled in eight main segments (1 – 8) ranging from the containment of the SARS-CoV-2 virus to domestic politics and geopolitics in managing the crisis that contribute to the factors driving or containing the COVID-19 Pandemic. Of necessity they include safety measures as well as those ranging from the fields of virology, epidemiology, and basic sciences. An additional segment (9) establishes the relevant oncourt and

scientific credentials of one of the co-authors (FSN) and closes with a more philosophical and poetic riposte to the Pandemic forwarded by Prof. Dhanjoo N. Ghista. In addition to a graphical snapshot of the unfolding Pandemic these ten segments are listed below:

- (1) Frequently asked 'how to' questions.
- (2) Examples of exceptional Human Spirit emerges as support for and defiance for those who are endangered.
- (3) Squash and the (SARS-CoV-2) virus induced COVID – 19 Pandemic (2020).
- (4) Multiple dimensions of the COVID – 19 Pandemic.
- (5) Biological and Medical Impact of the SARS-CoV-2 virus.
- (6) Economic impact of the Pandemic (Segment #6) related to Specific Segment #3 on Squash.
- (7) Leaders, Leadership, Domestic Politics and Geopolitics driving or containing the COVID – 19 Pandemic.
- (8) Dr. Thomas Wilckens, MD (Article posted & comments exchanged on *LinkedIn*) - What if we are all wrong?
- (9) Fair questions by Players & Coaches on (FSN) Ferez's qualifications and knowledge of the game (Squash) as well as the Pandemic entitling the positions he has taken.
- (10) A Humanistic Perspective - *Letter by Coronavirus, By Poet Vivienne R Reich* (communicated by Prof. Dhanjoo Ghista, PhD) (Page numbers =) :

They have covered all the issues that have emerged during the progression of the Pandemic. Without restating the original (561 + 92 page insert on FSN =) 653 page document it is clear that the spread of the virus as well as the Pandemic can be slowed and the 'curve flattened' with common sense combination of measures such as social distancing, use of Personal Protective Equipment and social distancing or even social isolation.

Furthermore, it is important to emphasize a simple cautionary note. This article is neither a formal scientific paper nor a review nor a policy manual nor does it pretend to project an authoritative analyses for a plausible societal response nor does it pretend to prescribe an approach to successfully containing and terminating the COVID-19 Pandemic. We are simply presenting relevant and even contradictory findings and perspectives in as unbiased a delivery as is possible.

As long as they remain plausible we have simply presented many including sometimes contradictory and conflicting positions that have been published in various news, social and scientific media as long as they are submitted or posted by those who display restraint and responsibility! At least one practical reason for these qualifications is the simple constraint provided by any meaningful attempt at keeping up with the relevance, standards and sheer volume of scientific publications let alone those emerging from news and social media! Between January and July 2020, an [estimated](https://www.linkedin.com/pulse/highlights-from-40-covid-19-research-papers-preprints-colangelo?trk=portfolio_article-card_title) 67,753 research papers and 19,789 preprints have been published on COVID-19 (Margaretta Colangelo, 02nd August 2020, https://www.linkedin.com/pulse/highlights-from-40-covid-19-research-papers-preprints-colangelo?trk=portfolio_article-card_title). This figure does not include postings and discussions on the news and social media. We have even included articles and results that are now subsumed as they graphically illustrate the complexities and so the incremental progress being made in containing the Pandemic.

There are many and continuously emerging dimensions to the SARS-CoV-2 virus and the COVID – 19 Pandemic that it has caused. They go far beyond the boundaries of Health, Medical and Economic causes and consequences. No human activity, which includes Squash, is carried out in isolation and so remains unaffected by these dimensions driving the Pandemic. Breaking minimal constraints and crossing basic boundaries has societal consequences, but particularly so for personnel in the Essential and Health Services who risk their lives to ensure the safety and well-being of their fellow humans – everyhour and everyday! In fact a report by the W.H.O. reported in CBS News today (September 18th 2020) stated that COVID-19 is spreading at "alarming" rates in Europe.

Government responses, responses of private citizens and populations, virology, epidemiology, containment options ('flattening the curve'), lack of healthcare infrastructure (pandemic management labs and resources,

vaccines, and pharmaceuticals), shortages and delayed delivery of personal protective equipment (PPE) and equipment (ventilators) have put Patients, Healthcare and other Essential Workers either at risk or cost them their lives. Like all viruses the SARS - CoV - 2 virus that causes the COVID-19 Pandemic is an inert particle armed with a genetic code which can be activated under a range of appropriate environmental and health conditions. The difference between SARS – CoV - 2 and other virions is the extremely wide spectrum of conditions under which it can unleash an Armageddon in Health Care. On August 2nd 2020 at 18.46 BST the global attributions of COVID-19 to infections and fatalities stood at 18,019,472 cases while the numbers of fatalities stood at 688,369 respectively (Johns Hopkins University of Medicine, COVID – 19 Case Tracker – screen print posted above). Others are coping with the variables in an effort to find an answer in research labs, in vaccine and pharmacological reagent production.

Yet in actions representative of the best in humans, essential support for those at risk, as an internationally coordinated and defiant emotional outpouring at dusk time to financial and material resources which have flowed from Private Citizen to Billionaires, Musicians and Orchestras.

In this highly fluid situation, there are facts that can be and are being double checked by professionals, scientists, news media, health personnel and government or civil servants all the way up to Prime Ministers and Presidents. Whereas their actions are part of the process of variable scrutiny to which any Public Servant is subject, ultimately they do not have the luxury of time for controlled measurements vetted for contradictions and inconsistencies in meeting a crisis. They have to work and risk their lives in an atmosphere where some, with a nihilistic mentality, willfully spew factually unfounded contradictions, rumors, disinformation and even fear among those who are trusting. No one is spared infection and or fatality in COVID - 19! The current situation poses an existential threat and we have to rely on their Judgement and Leadership. This is preferable to triaging and making false choices such as the economy or survival which can be mitigated by foresight.

In this long article we are merely cataloging links from various news and social media, opinion pieces and data papers from scientific journals and magazines, under specific segments of topics. These segments include many if not all dimensions related to the COVID-19 Pandemic and as they have progressed from January to August 2020.

The aim of this article is to provide a representative, relevant, unbiased resource that captures the progression of the Pandemic in assisting the Squash (or for that matter any) Community in making informed decisions. Some articles are now factually superceded or subsumed e.g. by the advent of the antiviral drug Remdisivir and new more reliable tests for detecting the virus. Others include new results qualifying usefulness of concepts and containment methods such as 'Herd Immunity.' All of them continue to be included in the article along with the new results for Historical perspectives since the advent of the virus and its initiation of the Pandemic. This inclusion reveals the complexity, fluidity and progression of the COVID-19 Pandemic and underscores the incremental process of the maturation of the measures that will be required for bringing containment of the causal SARS-CoV-2 virus.

Extracts of exceptional articles are included to greater and even complete lengths while other articles are limited to titles, links and common descriptions. As some links have relevance under more than one topic, for convenience they are included under all those topics.

<https://www.linkedin.com/pulse/highlights-from-40-covid-19-research-papers-preprints-colangelo/> ;
<https://www.sciencemag.org/news/2020/05/scientists-are-drowning-covid-19-papers-can-new-tools-keep-them-afloat>) (Via Co-Founder & Managing Director at Deep Knowledge Ventures Margaretta Colangelo, B.A.)
New Artificial Intelligence tools are being developed to cope with this problem.

It is our hope that all forms, serialised versions of this article will serve some useful purpose for the Public Interest. We include the original sponsors of this article, namely the Squash Mad magazine, its Editor Alan Thatcher and Squash Mad Correspondent and author Dr. Ferez S. Nallaseth M.S., Ph.D. Furthermore the article has been re-configured as a White Paper by the Vice President for Executive Affairs and Scientific Editor,

Dean Emeritus and Prof. George Perry Ph.D., President, C.E.O., C.S.O. & C.F.O. Dr. Ferez S. Nallaseth M.S., Ph.D. and all the Board Members of the nonprofit private foundation Life Sciences Institute of New Jersey.

Acknowledgements:

(1)Initating Co-Author – Alan Thatcher (), *Alan Thatcher*, Owner, Editor and Publisher of *Squash Mad*, <https://squashmad.com/> ; Alan's Blog: <https://squashmad.com/category/alans-blog/> ; Alan Thatcher email: alan@squashmad.com ;

(2)Editor & Principal Author – Ferez S. Nallaseth, MS, PhD; Founding President, CEO, CSO & CFO; *Life Sciences Institute of New Jersey* (Nonprofit), 2468 U.S. Highway 206, Box 1367, Belle Mead, NJ 08502, USA; <https://www.lifesciencesinstitutenj.com/> ; *Ferez'nSquashDocs* website: <https://sites.google.com/site/fereznsquashdocs/>

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Squash News Media:

Daily Squash Report
Professional Squash Association Reports
Squash Mad Online
Squash Player
Squash Site
U.S. Squash
World Squash Federation

Science Journals & Media:

BioRxiv - the preprint server for biology (*Cold Spring Harbor Laboratory*)
Cell
Cold Spring Harbor WireX
Harvard Health Newsletters
<http://microbe.net/2020/04/08/covid19-journal-club>
Johns Hopkins University Coronavirus Resource Center
microBEnet: the microbiology of the Built Environment network
MIT News
Nature
PNAS, USA
Science News
PLOS Journal

Organizations:

European Commission
Life Sciences Institute of New Jersey (LSINJ)
National Institute of Allergy & Infectious Diseases (NIAID)
National Health Services of the United Kingdom (NHS)
National Institutes of Health (NIH)
U.S. Centers for Disease Control and Prevention (CDCP)
U.S. Food & Drug Agency (FDA)
World Economic Forum (WEF)
World Health Organization (WHO)

News Media:

Agence France-Presse
American Broadcasting Company (ABC)
Apple News Online
Bloomberg News Online
British Broadcasting Corporation online (BBC online)
Cable News Network (CNN)
Columbia Broadcasting System News (CBSN)
Google News
Los Angeles Times
Microsoft National Broadcasting System cable news (MSNBC)
National Broadcasting Company (NBC)
San Diego Tribune
Shutterstock
The Atlantic Online
The Daily Telegraph
The Guardian
The New York Times
The Observer
The San Diego Union-Tribune
The Washington Post
Xinhua News Agency
Yahoo News

Social Media:

LinkedIn Articles and Comments Posted by Members: Members are acknowledged as authors of articles and comments in the body of this article
Twitter Posts

LinkedIn or Twitter Posts, Articles and Comments Posted by Members: Members are acknowledged as authors of articles and comments in the body of this article

Bibliography:

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