

# Pharmaceutical Research Sources Available for COVID-19

September 10, 2020

Emily C. Wild, Chemistry, Geosciences and Environmental Studies Librarian

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*Princeton University  
Frick Chemistry Lab*



*Princeton University  
Lewis Science Library*

***New Jersey: “Medicine Chest of the World”***

<https://www.fdlp.gov/fdlp-academy/fdlp-academy-training-repository>

[COVID-19 and Collections Care: Part Two](#)

[U.S. Military COVID-19 Information Resources](#)

[REopening Archives, Libraries, and Museums \(REALM\): An overview of the COVID-19 research project](#)

[Is it an allergy, cold or COVID? Finding answers with Federal health resources.](#)

[Planning for Reopening: FDLP Libraries Recovering from the COVID-19 Pandemic](#)

[Impact of COVID 19 to 2020 Census Operations – Latest Update](#)

[Impact of COVID 19 to 2020 Census Operations](#)

[Overview of COVID-19 and CDC's Response to the Pandemic with a Highlight of Federal COVID-19 Resources](#)

[Coronavirus frauds and scams: What you need to know](#)

[IMLS Webinar: Mitigating COVID-19 When Managing Paper-Based, Circulating, and Other Types of Collections](#)



## Quick Bio



### Emily C. Wild

Lewis Science Library, Princeton University

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**Schedule a Research Consultation :**  
**Monday – Friday**

[Meet Our Specialists – Emily Wild](#)

- **Princeton University Library, 2018-Present**  
**Chemistry, Geosciences and Environmental Studies Librarian**  
<https://library.princeton.edu/staff/ewild>  
**ORCID:** <https://orcid.org/0000-0001-6157-7629>  
**Exposure Project:** <https://www.princeton.edu/news/2020/06/08/funding-next-big-idea-new-projects-receive-dean-research-innovation-awards>
- **U.S. Geological Survey:** <https://www.usgs.gov/staff-profiles/emily-wild>  
**Denver, Colorado : 2008-2018 - Librarian (Physical Scientist)**  
**NH-VT & MA-RI: 1996-2008 - Hydrologist: Water Use, Surface Water, Groundwater, Water Quality, Coastal Waters, Bibliographic Databases**

Pharmaceuticals & Water Resources :

Pharmaceuticals in Water: <https://www.usgs.gov/special-topic/water-science-school/science/pharmaceuticals-water>

USGS publication search results = Pharmaceuticals  
<https://pubs.er.usgs.gov/search?q=Pharmaceuticals>

## Helping : Who & What?

## Who do I help find chemistry information?

Princeton University Sciences/Engineering students/faculty, alumni, future students

Princeton University Humanities/Finance/Policy students/faculty, alumni, future students

Federal librarians, Princeton & NJ communities, Finance (looking to invest in pharmaceuticals)

What are they looking for? Information related to:

- Two types of tests: (1) virus & (2) antibodies
- Vaccines
- Treatments for those that have COVID-19
- Pharmaceuticals in the environment: hydrology/ecosystems
- New Jersey, where 14 (or 13) of the world's 20 largest pharmaceutical companies are located

The screenshot shows a web browser displaying a PubMed article. The browser's address bar shows the URL <https://pubmed.ncbi.nlm.nih.gov/32187834/>. The page header includes the NIH logo and the text "National Library of Medicine National Center for Biotechnology Information". Below this is the "PubMed.gov" logo and a search bar. The article title is "SARS-CoV-2, the Virus That Causes COVID-19: Cytometry and the New Challenge for Global Health". The authors listed are Andrea Cossarizza, Sara De Biasi, Giovanni Guaraldi, Massimo Girardis, and Cristina Mussini. The article is from the journal "Cytometry A", published in 2020. The abstract section indicates that no abstract is available. There are buttons for "View PDF" and "Add to Library". A "Feedback" button is visible at the bottom right of the article content area.

<https://pubmed.ncbi.nlm.nih.gov/32187834/>

*SARS-CoV-2 is the virus that causes COVID-19*

Could the answer to our COVID-19 problems come from a N.J. lab? Here are 13 promising projects.

<https://www.nj.com/coronavirus/2020/06/could-the-answer-to-our-covid-19-problems-come-from-a-nj-lab-here-are-13-promising-projects.html>

NJ Life Sciences Companies Tackle COVID-19

A review of how drug and related diagnostic tech firms are at the forefront of pandemic cure initiatives.

<https://njbmagazine.com/monthly-articles/nj-life-sciences-companies-tackle-covid-19/>

N.J. pharmaceutical companies on the front lines in search for coronavirus cure

<https://www.nj.com/coronavirus/2020/03/nj-is-home-to-dozens-of-pharmaceutical-companies-can-one-find-the-coronavirus-cure.html>

NJ's Pharmaceutical Giants Are All Trying To Find A Cure For COVID-19  
<https://gothamist.com/news/njs-pharmaceutical-giants-are-all-trying-find-cure-covid-19>

**NJ Pharmaceutical Companies Leading The Way In Fight Against COVID-19**

<https://www.wnyc.org/story/nj-pharmaceutical-companies-leading-way-fight-against-covid-19/>

**How Jersey Scientists Are Racing to Strike Down Covid-19**

With unprecedented speed, they're playing an essential role in a global effort.

<https://njmonthly.com/articles/health/covid-19-treatment/>

## Senate Committee on Health, Education, Labor and Pensions (HELP)

### FULL COMMITTEE HEARING

COVID-19: An Update on the Federal Response

Wednesday, September 23, 2020

<https://www.help.senate.gov/hearings/covid-19-an-update-on-the-federal-response>

### FULL COMMITTEE HEARING

**Vaccines: Saving Lives, Ensuring Confidence, and Protecting Public Health**

**Wednesday, September 9, 2020**

<https://www.help.senate.gov/hearings/vaccines-saving-lives-ensuring-confidence-and-protecting-public-health>

**NIH Director testimony: Francis Collins, MD, PhD**

**Surgeon General Of The United States: VADM Jerome M. Adams, MD, MPH**

06/30/20 - [Full Committee Hearing: COVID-19: Update on Progress Toward Safely Getting Back to Work and Back to School](#)

06/23/20 - [Full Committee Hearing: COVID-19: Lessons Learned to Prepare for the Next Pandemic](#)

06/17/20 - [Full Committee Hearing: Telehealth: Lessons from the COVID-19 Pandemic](#)

06/10/20 - [Full Committee Hearing: COVID-19: Going Back to School Safely](#)



<https://chemistry.princeton.edu/research-facilities/frick-chemistry-laboratory>

**Merck Catalysis Center at Princeton University:**

<https://cefr.princeton.edu/Merck%20Catalysis%20Center>

**Through Princeton Catalysis Initiative, Genentech will fund faculty research to accelerate drug discovery** <https://cefr.princeton.edu/news/through-princeton-catalysis-initiative-genentech-will-fund-faculty-research-accelerate-drug>

**9 Drug Companies Pledge to ‘Stand With Science’ on Coronavirus Vaccines**

<https://www.nytimes.com/2020/09/08/health/9-drug-companies-pledge-coronavirus-vaccine.html>

**Pfizer  
Moderna  
AstraZeneca  
BioNTech  
GlaxoSmithKline**

**Johnson & Johnson  
Merck  
Novavax  
Sanofi**

## MACMILLAN, PLOSS LABS TO MAP VIRAL-HOST INTERACTIONS FOR COVID-19

<https://chemistry.princeton.edu/news/macmillan-ploss-labs-map-viral-host-interactions-covid-19>



Postdoctoral Fellow David Fernández, of the MacMillan Group, preparing photocatalysts under a nitrogen atmosphere contained by the colorful balloons. Face masks are currently being worn by researchers to protect each other from virus transmission. There is no active virus in any of the materials that they handle.

*Photo by C. Todd Reichart*

## Princeton University Testing, COVID-19

Princeton University is launching a comprehensive asymptomatic COVID-19 testing protocol for on-campus students, faculty, researchers and staff members as part of our public health plan to prevent the spread of the novel coronavirus.

<https://www.princeton.edu/news/2020/08/18/university-launch-asymptomatic-covid-19-testing-protocol-campus-students-faculty>

New Jersey COVID-19 Information Hub: <https://covid19.nj.gov/>

New York Health: <https://coronavirus.health.ny.gov/latest-news>

Accurate Diagnostic Labs:

<https://accuratediagnosticlabs.com/covid.html>

Saliva tests show promise for widespread COVID-19 surveillance at universities and workplaces

<https://cen.acs.org/analytical-chemistry/diagnostics/Saliva-tests-show-promise-widespread/98/web/2020/08>

First saliva test, Rutgers University, New Jersey  
April 13, 2020 <https://www.rutgers.edu/news/new-rutgers-saliva-test-coronavirus-gets-fda-approval>

FDA Approves First At-Home Saliva Collection Test for Coronavirus, May 8, 2020

<https://support.rutgers.edu/news-stories/fda-approves-first-at-home-saliva-collection-test-for-coronavirus/>

RUCDR becomes Infinity BiologiX (IBX)

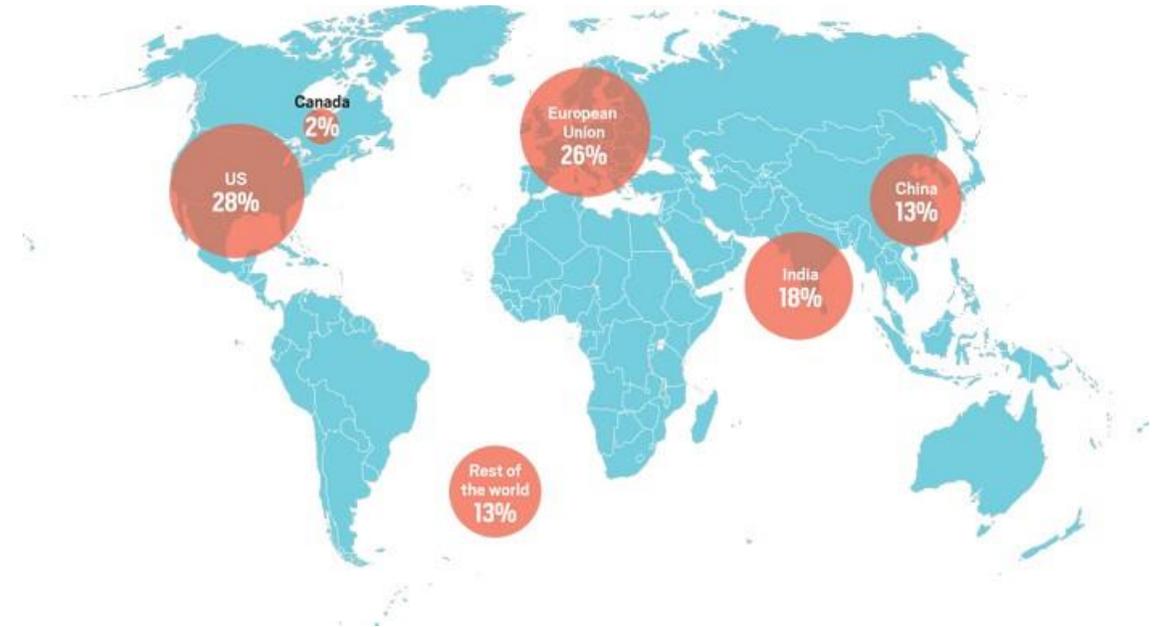
On June 16th the Rutgers University Board of Governors approved a significant investment for RUCDR by an outside investment firm.

This approval result in a change control of RUCDR to Infinity BiologiX, LLC (IBX), which will be managed both operationally and financially independent of Rutgers University. <https://ibx.bio/>

### COVID-19 is reshaping the pharmaceutical supply chain

The coronavirus pandemic may mark a rebalancing of where drugs are made as nations recognize a security imperative

<https://cen.acs.org/business/outsourcing/COVID-19-reshaping-pharmaceutical-supply/98/i16>



Plants that are registered with the US to supply active pharmaceutical ingredients can be found all over the world.  
Source: US Food and Drug Administration, August 2019

**EVERYTHING WE KNOW ABOUT THE COVID-19 CORONAVIRUS**

[HTTPS://CEN.ACS.ORG/COLLECTIONS/TRACKING-THE-NOVEL-CORONAVIRUS.HTML](https://cen.acs.org/collections/tracking-the-novel-coronavirus.html)

## Emergency Use Authorizations (EUAs)

<https://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization>

## Coronavirus Disease 2019 (COVID-19) EUA Information

- [Coronavirus Disease \(COVID-19\) updates from FDA](#)

- **Overviews:**

- [FDA Combating COVID-19 With Medical Devices](#) (PDF, 708 KB)
- [FDA Combating COVID-19 With Therapeutics](#) (PDF, 610 KB)
- [EUA Authorized Serology Test Performance](#)

- **Detailed Information for all COVID-19 EUAs, including authorizations and fact sheets**

- [In Vitro Diagnostic Products](#)
- [High Complexity Molecular-Based Laboratory Developed Tests](#)
- [SARS-CoV-2 Antibody Tests](#)
- [Personal Protective Equipment and Related Devices](#)
- [Ventilators and Other Medical Devices](#)
- [Drug Products](#)

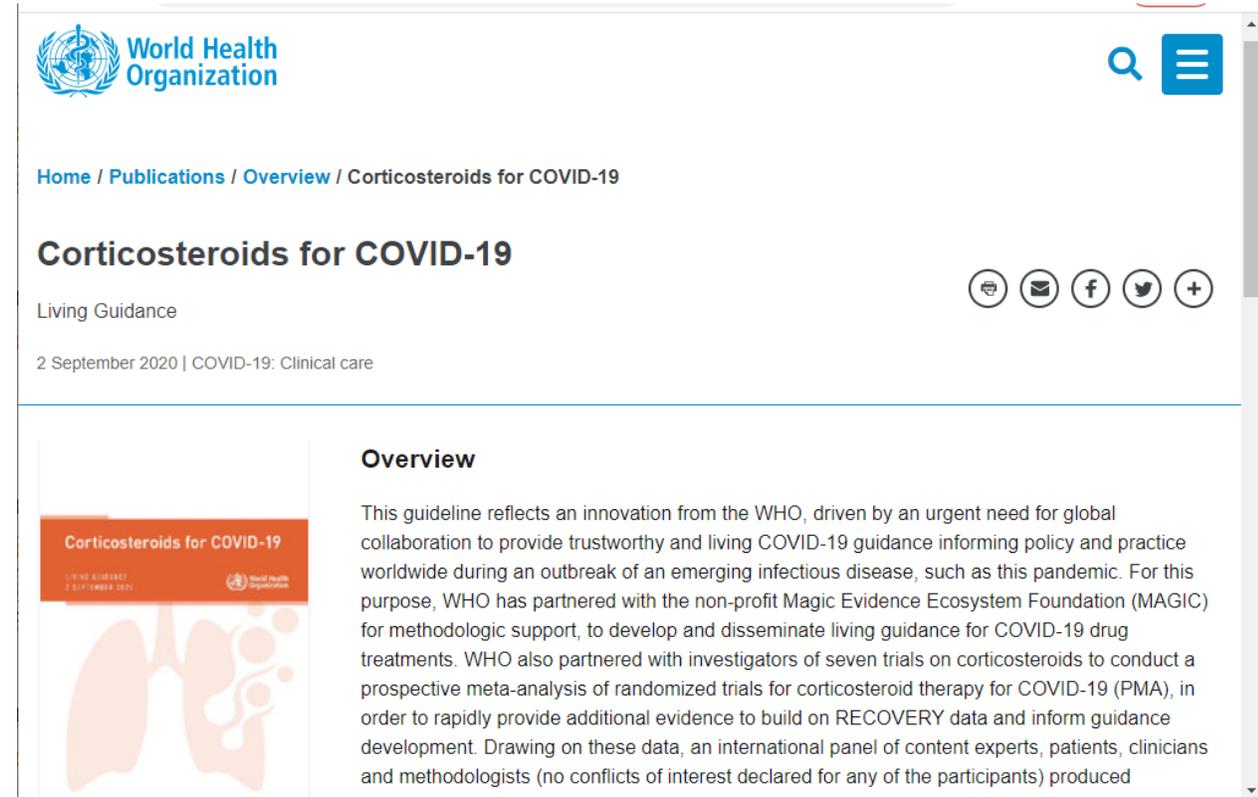
## Covid-19 Deaths Significantly Reduced by Use of Steroids, Analysis Says

Studies involving 1,700 patients showed consistent benefits from corticosteroid treatment, raising hopes that cheap drugs can help treat severe cases

<https://www.wsj.com/articles/covid-19-deaths-significantly-reduced-by-use-of-steroids-analysis-says-11599055201>

## September 2, 2020: Corticosteroids for COVID-19

<https://www.who.int/publications/i/item/WHO-2019-nCoV-Corticosteroids-2020.1>



The screenshot shows the WHO website page for 'Corticosteroids for COVID-19'. The page features the WHO logo and navigation links. The main title is 'Corticosteroids for COVID-19', with a subtitle 'Living Guidance'. The date is '2 September 2020 | COVID-19: Clinical care'. The 'Overview' section begins with the text: 'This guideline reflects an innovation from the WHO, driven by an urgent need for global collaboration to provide trustworthy and living COVID-19 guidance informing policy and practice worldwide during an outbreak of an emerging infectious disease, such as this pandemic. For this purpose, WHO has partnered with the non-profit Magic Evidence Ecosystem Foundation (MAGIC) for methodologic support, to develop and disseminate living guidance for COVID-19 drug treatments. WHO also partnered with investigators of seven trials on corticosteroids to conduct a prospective meta-analysis of randomized trials for corticosteroid therapy for COVID-19 (PMA), in order to rapidly provide additional evidence to build on RECOVERY data and inform guidance development. Drawing on these data, an international panel of content experts, patients, clinicians and methodologists (no conflicts of interest declared for any of the participants) produced...'

The screenshot shows a web browser window with the URL [libguides.princeton.edu/ChemSources](https://libguides.princeton.edu/ChemSources). The page header features the Princeton University Library logo and a search bar with the placeholder text "Search for library materials and website content". Below the header is a navigation menu with items: "Research Tools", "Libraries and Collections", "Library Services", "About the Library", and "Ask Us! Chat and more". The breadcrumb trail reads "Princeton University Library / LibGuides / Chemistry Sources / Home". The main heading is "Chemistry Sources", with a sub-heading "Chemistry Sources" and a search box labeled "Search this Guide". A left sidebar contains a list of links: "Home", "Remote Access for Fall 2020", "Chemistry Databases", "ChemRxiv: The Preprint Server for Chemistry", "PubChem", "Major Database: SciFinder", "Major Databases: REAXYS", and "Major Database: KnowItAll U spectra database". The main content area is titled "Chemical Information Sources" and contains a "Welcome to the Research Guide for Chemistry" section. The welcome text states: "This guide will assist you in conducting library research and in using the Princeton University Library resources and services. Use the tabs to start exploring the variety of tools and resources to assist you with your research. If you have any questions about doing basic or in-depth library research relating to chemistry, please contact me or [Schedule a Research Consultation](#)". Below this is a "Thank you, and enjoy the day!" message from "Emily", with a link to "Meet Our Specialists - Emily Wild". An "Ask Us" chat button is located in the bottom right corner of the content area.

Princeton University LIBRARY

Search for library materials and website content

Research Tools | Libraries and Collections | Library Services | About the Library | Ask Us! Chat and more

Princeton University Library / LibGuides / Chemistry Sources / Home

## Chemistry Sources

Chemistry Sources

Search this Guide Search

- Home
- Remote Access for Fall 2020
- Chemistry Databases
- ChemRxiv: The Preprint Server for Chemistry
- PubChem
- Major Database: SciFinder
- Major Databases: REAXYS
- Major Database: KnowItAll U spectra database

### Chemical Information Sources

#### Welcome to the Research Guide for Chemistry

This guide will assist you in conducting library research and in using the Princeton University Library resources and services. Use the tabs to start exploring the variety of tools and resources to assist you with your research. If you have any questions about doing basic or in-depth library research relating to chemistry, please contact me or [Schedule a Research Consultation](#)

Thank you, and enjoy the day!

Emily

[Meet Our Specialists - Emily Wild](#)

Ask Us



Search for library materials and website content



Research Tools ▾

Libraries and Collections ▾

Library Services ▾

About the Library ▾

Ask Us! Chat and more ▾

## Chemistry

### Core Resources

#### PubChem

PubChem is the world's largest collection of freely accessible chemical information. Search chemicals by name, molecular formula, structure, and other identifiers. Find chemical and physical properties, biological activities, safety and toxicity information, patents, literature citations and more.

#### SciFinder Web (Chemical Abstracts) 1907+

Comprehensive coverage of all aspects of chemistry. Combines several Chemical Abstracts Service (CAS) databases.

#### Reaxys 1772+

Detailed index covering organic and inorganic chemistry. Includes patents. Provides access to chemical reactions and physical, chemical and bioactivity data

#### Web of Science (ISI) Sciences (1900+), Social Sciences (1898+), Arts and Humanities (1975+), Conference Proceedings (1990+)

Multidisciplinary index to journal literature in the sciences, social sciences, and arts and humanities. Offers the option to find

### Subject Librarian(s)



Emily Wild

Chemistry, Geosciences, and Environmental Studies Librarian

✉ ewild@princeton.edu

Ask Us

**‘We Roar’: A COVID vaccine in 12-18 months? Don’t count on it**

<https://www.princeton.edu/news/2020/05/19/we-roar-covid-vaccine-12-18-months-dont-count-it>

**In the latest episode of the “[We Roar](#)” podcast, a vaccine expert describes what it will take to produce a coronavirus vaccine in less than two years — and why that timeline is already “miraculously fast.”**

Dr. Gordon Douglas, a Class of 1955 alumnus, has decades of experience looking at vaccines from all sides: as a practicing physician, as a professor in medical schools, as a medical investigator, as the president of Merck’s vaccine division, in his work with start-up companies developing new drugs and vaccines, and in his efforts to [distribute tuberculosis vaccines](#) to developing nations.

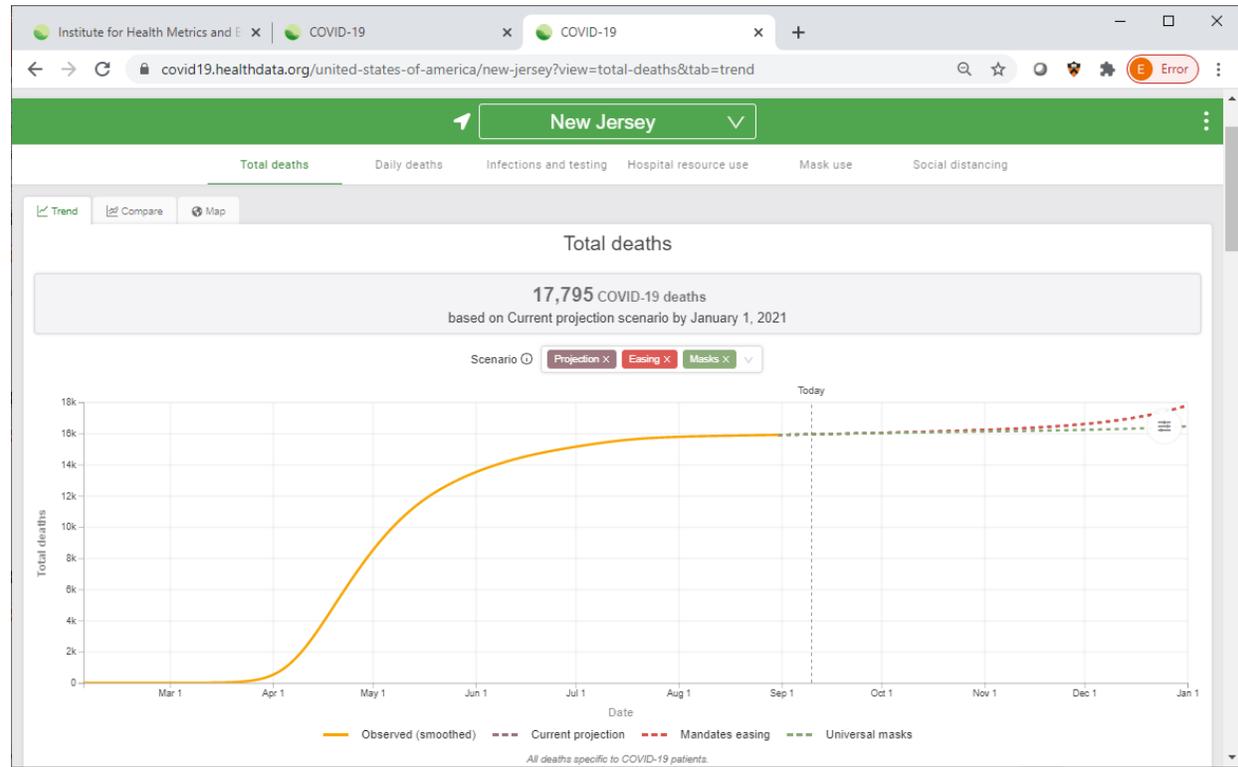
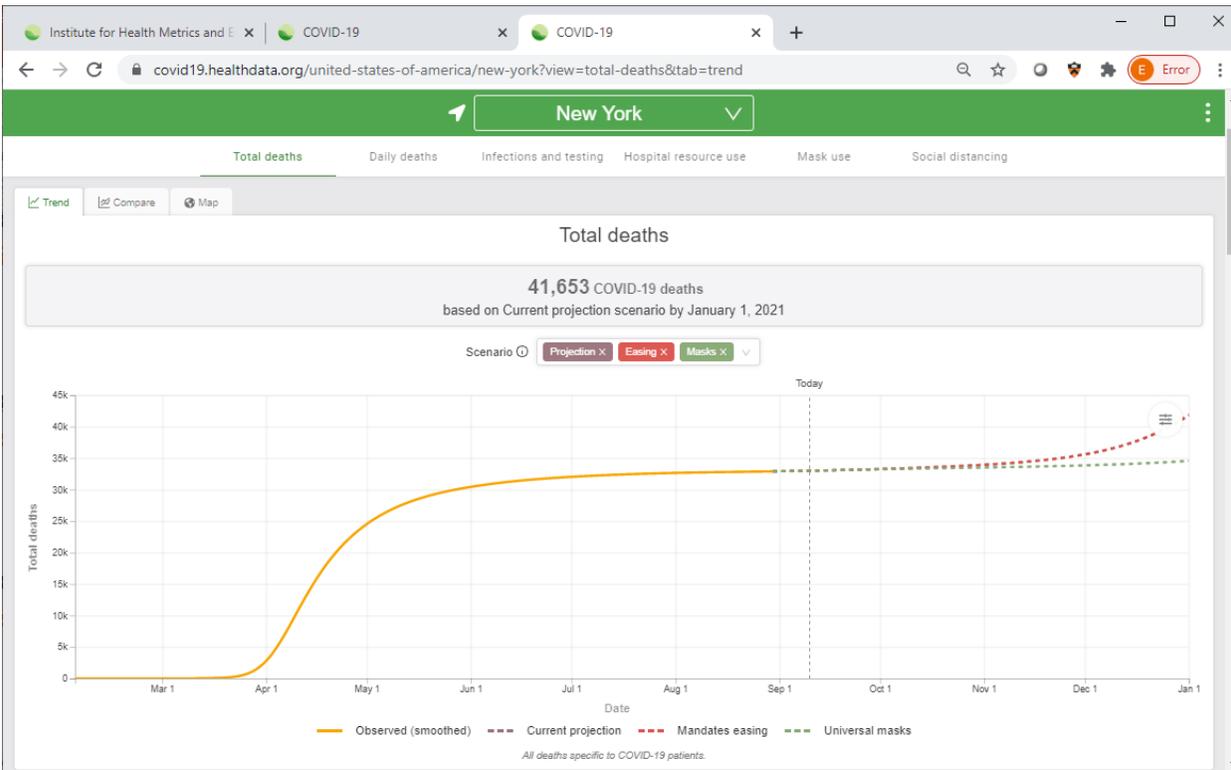
“Getting a new vaccine licensed is a huge accomplishment,” Douglas says in the [latest episode of the podcast](#). “It really is not done anywhere near as frequently as you think.”

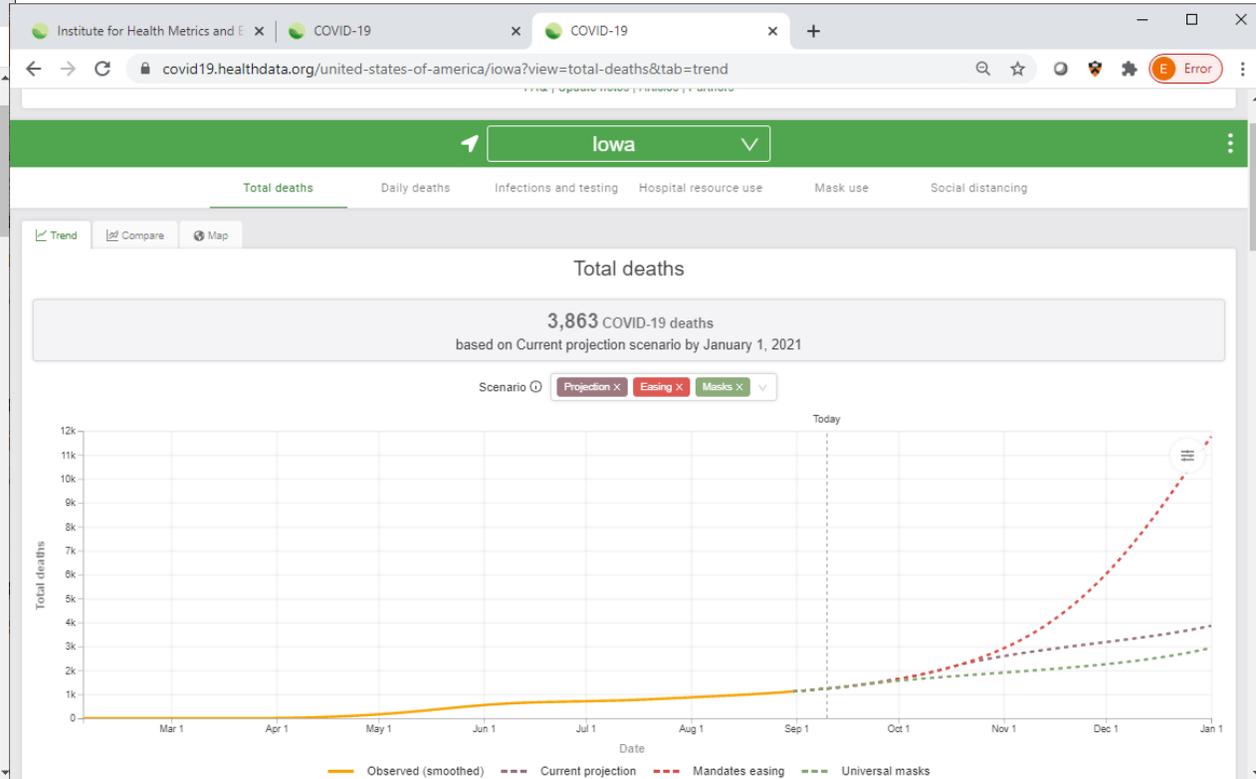
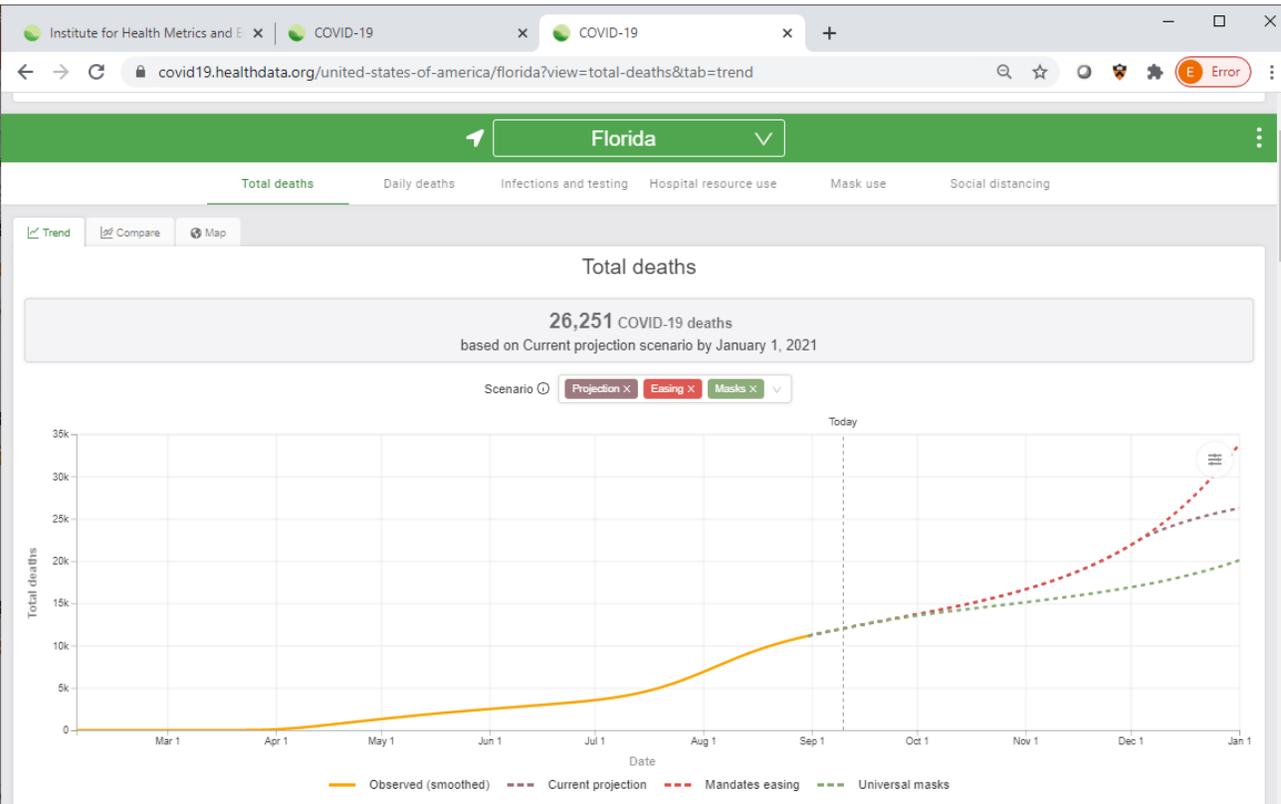
About 90% of candidate vaccines that make it to human trials will still fail to make it to the market, he says. Most vaccines now in regular use, like polio and chicken pox, took 10 to 15 years to develop, and no vaccine has ever been produced in less than four years.

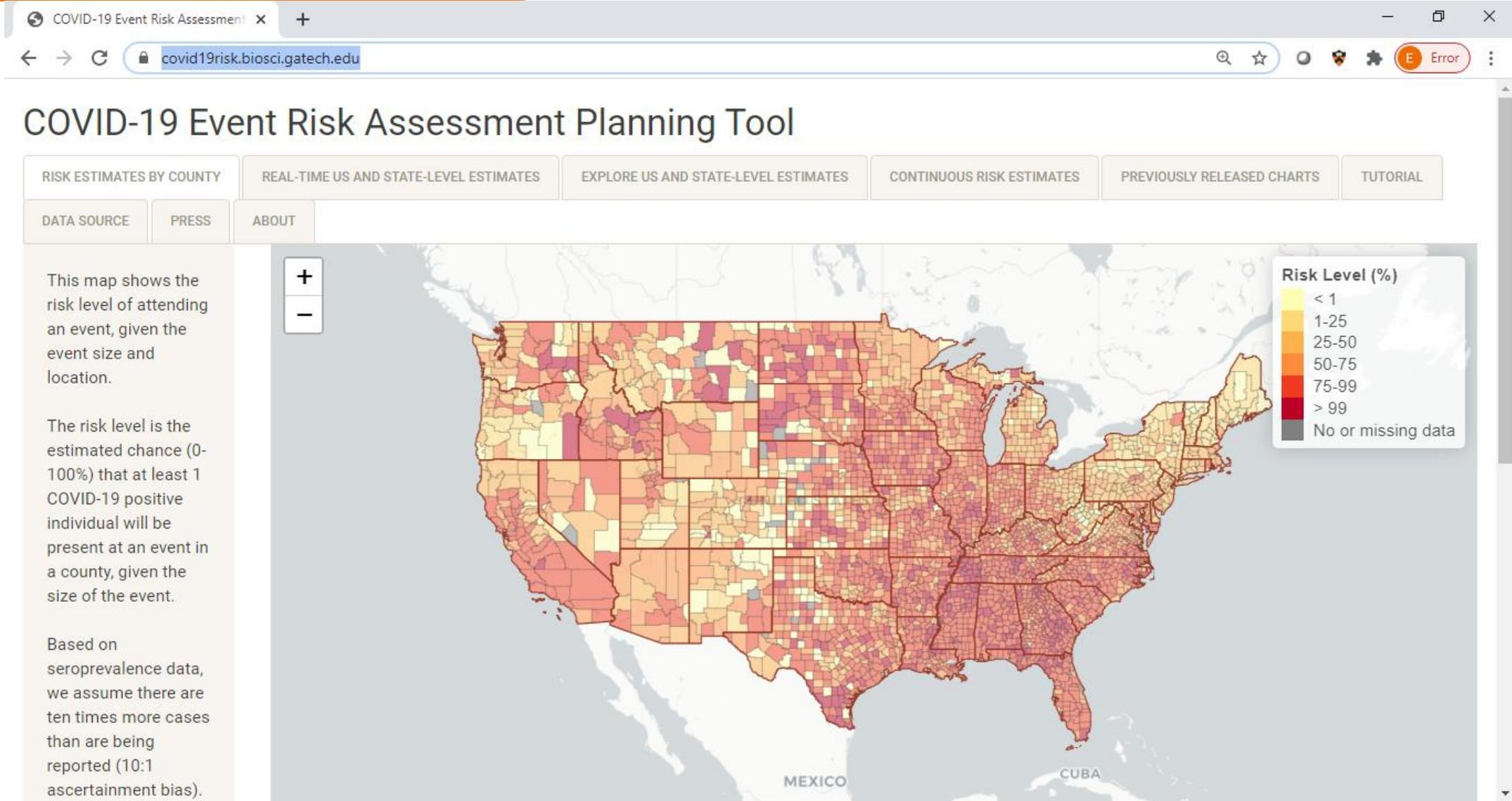
Former Merck official talks about potential COVID-19 vaccines

[https://centraljersey.com/2020/05/27/former-merck-official-talks-about-potential-covid-19-](https://centraljersey.com/2020/05/27/former-merck-official-talks-about-potential-covid-19-vaccines/)

[vaccines/](#)





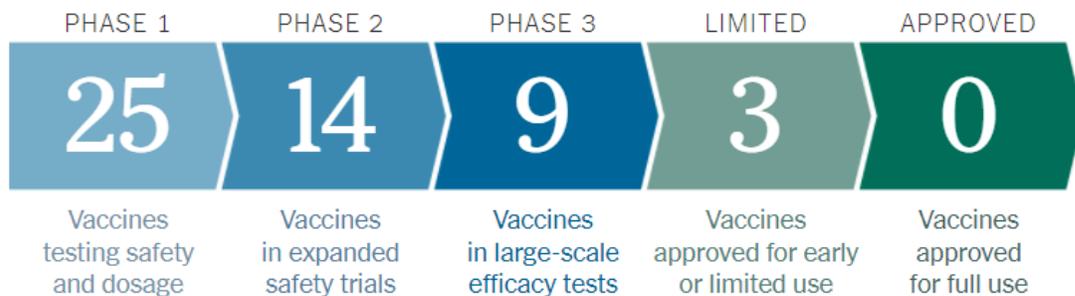


The New York Times

WORLD COUNTRIES | U.S.A. STATES TESTING

## Coronavirus Vaccine Tracker

By Jonathan Corum, Denise Grady, Sui-Lee Wee and Carl Zimmer Updated September 9, 2020



Vaccines typically require years of research and testing before reaching the clinic, but scientists are racing to produce a [safe and](#)

**New additions and recent updates:**

- The [University of Hong Kong](#) enters Phase 1. Sept. 9
- [AstraZeneca](#) halted its vaccine trials to investigate an unexplained illness. Sept. 8
- A vaccine by [Sanofi](#) moves to Phase 1. Aug. 31
- China approved a [Sinovac](#) vaccine for limited use. Aug. 31

**Moderna** develops vaccines based on messenger RNA (mRNA) to produce viral proteins in the body. They have yet to bring one to the market. In January, they began developing a vaccine for the coronavirus and since then the government has bankrolled Moderna's efforts, providing nearly \$1 billion. In partnership with **National Institutes of Health**, they found that the vaccine [protects monkeys](#) from the coronavirus. In March, the company [put the first Covid-19 vaccine into human trials](#), which yielded [promising results](#). The vaccine has progressed into Phase 3 testing, which [began](#) on July 27. The final trial is enrolling 30,000 healthy people at about 89 sites around the United States. On August 11, the government [awarded](#) the company an additional \$1.5 billion in exchange for 100 million doses if the vaccine proves safe and effective.

In July, Moderna [lost](#) a patent dispute over some of their vaccine technology. The following month, the company [stated](#) that it could not be certain it was the first to make the inventions claimed in their patents, including its coronavirus vaccine.

A [vaccine in development](#) by the British-Swedish company **AstraZeneca** and the **University of Oxford** is based on a chimpanzee adenovirus called ChAdOx1. A study on monkeys found that the vaccine [provided them protection](#). In May, the United States awarded the project [\\$1.2 billion](#) in support. In their Phase 1/2 trial, the vaccine developers [did not detect](#) any severe side effects. They found that the vaccine raised antibodies against the coronavirus as well as other immune defenses. The vaccine began Phase 2/3 trials in England and India, as well as Phase 3 trials in Brazil, South Africa, and the [United States](#).

In August the European Union reached an agreement for AstraZeneca to deliver [400 million doses](#) if the trials yield positive results. AstraZeneca has indicated they might be able to start delivering emergency vaccines as early as October, depending on the outcome of the studies. The company has said their total manufacturing capacity for the vaccine, if approved, stands at two billion doses. India's Serum Institute has already [produced millions of doses](#) to be used in trials.

On Sept. 8, AstraZeneca [halted global trials](#) of the vaccine to investigate one volunteer, who developed a form of inflammation called transverse myelitis.

Updated Sept. 9

The German company **BioNTech** entered into collaborations with **Pfizer**, based in New York, and the Chinese drug maker **Fosun Pharma** to develop an mRNA vaccine. In May they launched a Phase 1/2 trial on two versions of the vaccine. They [found](#) that both versions caused volunteers to produce antibodies against SARS-CoV-2, as well as immune cells called T cells that respond to the virus. They found that one version, called BNT162b2, produced significantly fewer side effects, such as fevers and fatigue, and so they chose it to move into Phase 2/3 trials. On July 27, the companies announced the [launch](#) of a Phase 2/3 trial with 30,000 volunteers in the United States and other countries including Argentina, Brazil, and Germany.

In that same month, the Trump administration [awarded](#) a \$1.9 billion contract for 100 million doses to be delivered by December and the option to acquire 500 million more doses. Meanwhile, Japan made a [deal](#) for 120 million doses, and the European Union [arranged](#) to purchase 200 million doses.

In September, the chief executive of Pfizer [said](#) they would know if the vaccine works as soon as October 2020. If approved, Pfizer has [said](#) they expect to manufacture over 1.3 billion doses of their vaccine worldwide by the end of 2021.

Updated Sept. 9

## April 2, 2020: CAS Releases Open Access Dataset of Antiviral Chemical Compounds to Aid COVID-19 Discovery and Analysis

<https://www.acs.org/content/acs/en/pressroom/newsreleases/2020/april/cas-releases-open-access-dataset-of-antiviral-chemical-compounds-to-aid-covid-19-discovery-and-analysis.html>

CAS, a division of the American Chemical Society specializing in scientific information solutions, is partnering with research and technology organizations worldwide to tackle the complex challenges presented by COVID-19. In support of calls to action from the White House Office of Science and Technology Policy and innovation leaders around the globe, CAS just released an [open access dataset](#) of chemical compounds with known or potential antiviral activity to support research, data mining and analytics applications.

The new CAS COVID-19 Antiviral Candidate Compounds Dataset contains nearly 50,000 chemical substances assembled from the CAS REGISTRY<sup>®</sup> that have antiviral activity reported in published literature or are structurally similar to known antivirals. Related metadata, such as CAS Registry Number<sup>®</sup>, physical properties and a connection table for each substance, are also provided. The dataset is the first chemical substance collection contributed to the Allen Institute for AI's COVID-19 Open Research Dataset "CORD-19" and can also be [downloaded directly](#) from CAS.

# ACS CAS Article

March 12, 2020 : the American Chemical Society (ACS) CAS Division published the following summary of relevant literature regarding COVID-19: Research and Development on Therapeutic Agents and Vaccines for COVID-19 and Related Human Coronavirus Diseases

<https://pubs.acs.org/doi/10.1021/acscentsci.0c00272#>

Research and Development on Therapeutic Agents and Vaccines for COVID-19 and Related Human Coronavirus Diseases

Since the outbreak of the novel coronavirus disease COVID-19, caused by the SARS-CoV-2 virus, this disease has spread rapidly around the globe. Considering the potential threat of a pandemic, scientists and physicians have been racing to understand this new virus and the pathophysiology of this disease to uncover possible treatment regimens and discover effective therapeutic agents and vaccines. To support the current research and development, CAS has produced a special report to provide an overview of published scientific information with an emphasis on patents in the CAS content collection. It highlights antiviral strategies involving small molecules and biologics targeting complex molecular interactions involved in coronavirus infection and replication. The drug-repurposing effort documented herein focuses primarily on agents known to be effective against other RNA viruses including SARS-CoV and MERS-CoV. The patent analysis of coronavirus-related biologics includes therapeutic antibodies, cytokines, and nucleic acid-based therapies targeting virus gene expression as well as various types of vaccines. More than 500 patents disclose methodologies of these four biologics with the potential for treating and preventing coronavirus infections, which may be applicable to COVID-19. The information included in this report provides a strong intellectual groundwork for the ongoing development of therapeutic agents and vaccines.

Cynthia Liu\*, Qiongqiong Zhou, Yingzhu Li, Linda V. Garner, Steve P. Watkins, Linda J. Carter, Jeffrey Smoot, Anne C. Gregg, Angela D. Daniels, Susan Jervey, and Dana Albani

Cite this: *ACS Cent. Sci.* 2020, 6, 3, 315–331  
 Publication Date: March 12, 2020  
<https://doi.org/10.1021/acscentsci.0c00272>  
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Article Views: 280578 | Altmetric: 1100 | Citations: 24

PDF (2 MB) | Supporting Info (1) | SUBJECTS: Infectious diseases, Inhibitors, Peptides and proteins, Pharmaceuticals, Receptors

Research and Development on Therapeutic Agents and Vaccines for COVID-19 and Related Human Coronavirus Diseases

Table 4. Existing Drugs with Therapeutic Potentials for COVID-19 (Drug Repurposing)

drug candidate	CAS RN	target
baricitinib(35)	1187594-09-7	JAK kinase
lopinavir(19)a	192725-17-0	viral protease
ritonavir(19,37)c	155213-67-5	viral protease
darunavir(33)	206361-99-1	viral protease
favipiravir (favilavir)(29,36)	259793-96-9	RdRp
remdesivir(19,29,32)a	1809249-37-3	RdRp
ribavirin(16,29–31)a	36791-04-5	RdRp
galidesivir(34)b	249503-25-1	RdRp
BCX-4430 (salt form of galidesivir)(34)b	222631-44-9	RdRp
Arbidol(22,33)a	131707-23-8	S protein/
chloroquine(29,32)	54-05-7	endosome
nitazoxanide(29)	55981-09-4	N/A

Figure 1: Distribution of COVID-19 cases as of 09 March 2020. The figure includes a bar chart showing the number of journal papers published per week from June 2019 to March 2020, and a horizontal bar chart showing the number of patents for various COVID-19 targets.

Recommended Articles:

- Considering the Effects of Microbiome and Diet on SARS-CoV-2 Infection: Nanotechnology Roles
- A Versatile Method of Ambient-Temperature Solvent Removal
- LogD Contributions of Substituents Commonly Used in Medicinal Chemistry
- Can N95 Respirators Be Reused after Disinfection? How Many Times?
- NMR Chemical Shifts of Trace Impurities: Industrially Preferred Solvents Used in Process and

**SARS-CoV-2 is the virus that causes COVID-19**

# SciFinder: References, ChemDraw



SciFinder Web (Chemical Abstrac x) | SciFinder - Reference Answer Set x | New Tab

scifinder.cas.org/scifinder/view/scifinder/scifinderExplore.jsf

CAS Solutions | SCIFINDER A CAS SOLUTION

Preferences | SciFinder Help | Sign Out

Welcome Emily Wild

Explore | Saved Searches | SciPlanner

Save | Print | Export

Research Topic "Remdesivir" > references (368)

REFERENCES | Get Substances | Get Reactions | Get Related Citations | Tools | Create Keep Me Posted Alert | Send to SciPlanner

Analyze | Refine | Categorize

Sort by: Accession Number

0 of 368 References Selected

Analyze by: Author Name

Cihlar Tomas	16
Feng Joy Y	15
Jordan Robert	12
Denison Mark R	11
Sims Amy C	11
Baric Ralph S	10
Hsueh Po Ren	10
Sheahan Timothy P	10
Clarke Michael O	8

1. **Andrographolide as a potential inhibitor of SARS-CoV-2 main protease: an in silico approach**  
Quick View | Other Sources  
By Enmozhi, Sukanth Kumar; Raja, Kavitha; Sebastine, Irudhayasamy; Joseph, Jerrine  
From Journal of Biomolecular Structure and Dynamics (2020), Ahead of Print. | Language: English, Database: CAPLUS

SARS-CoV-2 virus which caused the global pandemic the Coronavirus Disease- 2019 (COVID-2019) has infected about 1,203,959 patients and brought forth death rate about 64,788 among 206 countries as mentioned by WHO in the month of Apr. 2020. The clin. trials are underway for **Remdesivir**, an investigational anti-viral drug from Gilead Sciences. Antimalarial drugs such as Chloroquine and Hydroxychloroquine derivs. are being used in emergency cases; however, they are not suitable for patients with conditions like diabetes, hypertension and cardiac issues. The lack of availability of approved trea...

2. **SARS-CoV-2 RNA dependent RNA polymerase (RdRp) targeting: an in silico perspective**  
Quick View | Other Sources  
By Elfiky, Abdo A.  
From Journal of Biomolecular Structure and Dynamics (2020), Ahead of Print. | Language: English, Database: CAPLUS

New treatment against SARS-CoV-2 now is a must. Nowadays, the world encounters a huge health crisis by the COVID-19 viral infection. Nucleotide inhibitors gave a lot of promising results in terms of its efficacy against different viral infections. In this work, mol. modeling, docking, and dynamics simulations are used to build a model for the viral protein RNA polymerase (RdRp) and test its binding affinity to some clin. approved drugs and drug candidates. Mol. dynamics is used to equilibrate the system upon binding calcns. to ensure the successful reproduc...

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Research Topic "Remdesivir" > references (368) > get substances (236) > commercial sources (7852)

REFERENCES | SUBSTANCES: CHEMICAL STRUCTURE

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REFERENCES | SUBSTANCES: REACTION STRUCTURE

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Search Type: Allow variability only as specified | Substructure

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**SARS-CoV-2 is the virus that causes COVID-19**

# Pharmaceutical Substances

<https://library.princeton.edu/resource/41118>

## Remdesivir : C<sub>27</sub>H<sub>35</sub>N<sub>6</sub>O<sub>8</sub>P

**Thieme Pharmaceutical Substances**

Query Results About

**1 Results**

- Remdesivir

### Remdesivir

Synonyms: GS-5734; prodrug of GS-441524

ATC: -

Use: antiviral; RNA polymerase inhibitor against Ebola and Corona virus

Chemical name: (S)-2-Ethylbutyl 2-(((S)-(((2R,3S,4R,5R)-5-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-5-cyano-3,4-dihydroxytetrahydrofuran-2-yl)methoxy)phenoxy)phosphoryl)amino propanoate

Formula: C<sub>27</sub>H<sub>35</sub>N<sub>6</sub>O<sub>8</sub>P

MW: 602.59 g/mol

CAS-RN: 1809249-37-3

InChI Key: RWWYLEGWBNMMLJ-YSOARWBSDA-N

InChI: InChI=1S/C27H35N6O8P/c1-4-18(5-2)13-38-26(36)17(3)32-42(37,41-19-9-7-6-8-10-19)39-14-21-23(34)24(35)27(15-28,40-21)22-12-11-20-25(29)30-16-31-33(20)22/h6-12,16-18,21,23-24,34-35H,4-5,13-14H2,1-3H3,(H,32,37)(H2,29,30,31)/t17-,21+,23+,24+,27-,42-/m0/s1

#### Substance Classes

- 1,2,4-Triazines
- Pyrroles
- Phosphates
- Ribosides and Deoxyribosides
- Nitriles (Cyanides)

1. MgCl<sub>2</sub>, DIFEPA, MeCN, 50 °C  
2. 37% HCl, THF, rt

2-ethylbutyl ((S)-((S)-4-nitro-phenoxy)phenoxy)phosphoryl-L-alaninate (IX)

**ba) Synthesis of IX:**

1. OP(O)(Ph)<sub>2</sub>, TEA, CH<sub>2</sub>Cl<sub>2</sub>, -78 °C  
2. 4-nitrophenol, TEA, 0 °C  
3. Pr<sub>2</sub>O

**Substances Referenced in Synthesis Path**

CAS-RN	Formula	Chemical Name	CAS Index Name
89615-45-2	C <sub>26</sub> H <sub>28</sub> O <sub>5</sub>	(3R,4R,5R)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]oxolan-2-ol; (2,3,5-Tri-O-benzyl-α-D-ribofuranose)	
55094-52-5	C <sub>26</sub> H <sub>26</sub> O <sub>5</sub>	(3R,4R,5R)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]dihydrofuran-2(3H)-one	
C <sub>8</sub> H <sub>5</sub> BrN <sub>4</sub>		7-bromopyrrolo[2,1-f][1,2,4]triazin-4-amine	
C <sub>32</sub> H <sub>32</sub> N <sub>4</sub> O <sub>5</sub>		(3R,4R,5R)-2-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]tetrahydrofuran-2-ol	
C <sub>33</sub> H <sub>31</sub> N <sub>5</sub> O <sub>4</sub>		(2R,3R,4R,5R)-2-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]tetrahydrofuran-2-carbonitrile	
C <sub>12</sub> H <sub>13</sub> N <sub>5</sub> O <sub>4</sub>		(2R,3R,4S,5R)-2-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-3,4-dihydroxy-5-(hydroxymethyl)tetrahydrofuran-2-carbonitrile	
C <sub>15</sub> H <sub>23</sub> ClNO <sub>4</sub> P		(2S)-2-ethylbutyl 2-(chloro(phenoxy)phosphorylamino) propanoate	
C <sub>5</sub> H <sub>6</sub> Br <sub>2</sub> N <sub>2</sub> O <sub>2</sub>		1,3-dibromo-5,5-dimethyl-2,4-imidazolidinedione	
C <sub>6</sub> H <sub>5</sub> Cl <sub>2</sub> O <sub>2</sub> P		phenyl dichloro phosphate	
C <sub>9</sub> H <sub>20</sub> ClNO <sub>2</sub>		2-ethylbutyl L-alanine ester hydrochloride	
C <sub>8</sub> H <sub>5</sub> I <sub>2</sub> N <sub>4</sub>		7-iodopyrrolo[2,1-f][1,2,4]triazin-4-amine	
C <sub>15</sub> H <sub>17</sub> N <sub>5</sub> O <sub>4</sub>		(3aR,4R,6R,6aR)-4-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-6-(hydroxymethyl)-2,2-dimethyltetrahydrofuro[3,4-d][1,3]dioxole-4-carbonitrile	
C <sub>21</sub> H <sub>27</sub> N <sub>2</sub> O <sub>7</sub> P		2-ethylbutyl ((S)-((S)-4-nitro-phenoxy)(phenoxy)phosphoryl)-L-alaninate	
159326-68-8		pyrrolo[2,1-f][1,2,4]triazin-4-amine	

**Trade Names**

Country	Trade Name	Vendor	Annotation
USA			On 1 May 2020 FDA granted Gilead Sciences an Emergency Use Authorization of remdesivir to be distributed and used by licensed health care providers to treat hospitalized patients with severe COVID-19.

**SARS-CoV-2 is the virus that causes COVID-19**

# Google Patents

# Remdesivir : $C_{27}H_{35}N_6O_8P$

US20180346504A1 - Crystalline forms of (S)-2-ethylbutyl 2-(((S)-(((2R,3S,4R,5R)-5-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-5-cyano-3,4-dihydroxytetrahydrofuran-2-yl)methoxy)(phenoxy)phosphoryl)amino)propanoate

**Abstract**

The present invention relates to novel salts and crystalline forms of (S)-2-ethylbutyl 2-(((S)-(((2R,3S,4R,5R)-5-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-5-cyano-3,4-dihydroxytetrahydrofuran-2-yl)methoxy)(phenoxy)phosphoryl)amino)propanoate for use in treating viral infections. In some embodiments, the viral infection is caused by a virus selected from the group consisting of Arenaviridae, Coronaviridae, Filoviridae, Flaviviridae, and Paramyxoviridae.

**Images (30)**

**Classifications**

- C07H19/00 Compounds containing a hetero ring sharing one ring hetero atom with a saccharide radical; Nucleosides; Mononucleotides; Anhydro-derivatives thereof

[View 3 more classifications](#)

**US20180346504A1**  
United States

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**Inventor:** Katrien Brak, Ernest A. Carra, Lars V. Heumann, Nate Larson  
**Current Assignee:** Gilead Sciences Inc

**Worldwide applications**

2018 - [WO](#) [AU](#) [CN](#) [AR](#) [US](#) [EP](#) [KR](#) [CA](#) [TW](#)

**Application US15/964,597 events**

- 2017-05-01 • Priority to US201762492364P
- 2018-04-27 • Application filed by Gilead Sciences Inc
- 2018-04-27 • Priority to US15/964,597
- 2018-05-03 • Assigned to GILEAD SCIENCES, INC. ©
- 2018-12-06 • Publication of US20180346504A1

**Status** • Pending

CA3059777A1 - Crystalline forms of (S)-2-ethylbutyl 2-(((S)-(((2R,3S,4R,5R)-5-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-5-cyano-3,4-dihydroxytetrahydrofuran-2-yl)methoxy)(phenoxy)phosphoryl)amino)propanoate

**Abstract**

The present invention relates to novel salts and crystalline forms of (S)-2-ethylbutyl 2-(((S)-(((2R,3S,4R,5R)-5-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-5-cyano-3,4-dihydroxytetrahydrofuran-2-yl)methoxy)(phenoxy)phosphoryl)amino)propanoate (Formula I) for use in treating viral infections. In some embodiments, the viral infection is caused by a virus selected from the group consisting of Arenaviridae, Coronaviridae, Filoviridae, Flaviviridae, and Paramyxoviridae.

**Classifications**

- C07H19/00 Compounds containing a hetero ring sharing one ring hetero atom with a saccharide radical; Nucleosides; Mononucleotides; Anhydro-derivatives thereof

[View 3 more classifications](#)

**CA3059777A1**  
Canada

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**Other languages:** French

**Inventor:** Katrien Brak, Ernest A. Carra, Lars V. Heumann, Nate Larson  
**Current Assignee:** Gilead Sciences Inc

**Worldwide applications**

2018 - [WO](#) [AU](#) [CN](#) [AR](#) [US](#) [EP](#) [KR](#) [CA](#) [TW](#)

**Application CA3059777A events**

- 2017-05-01 • Priority to US201762492364P
- 2017-05-01 • Priority to US62/492,364
- 2018-04-27 • Application filed by Gilead Sciences Inc
- 2018-04-27 • Priority to PCT/US2018/029974
- 2018-11-08 • Publication of CA3059777A1

**Status** • Pending

<https://patents.google.com/patent/US20180346504A1/en?q=C27H35N6O8P&dq=C27H35N6O8P>

<https://patents.google.com/patent/CA3059777A1/en?q=C27H35N6O8P&dq=C27H35N6O8P>

*SARS-CoV-2 is the virus that causes COVID-19*

# BioRender Templates

## Remdesivir : $C_{27}H_{35}N_6O_8P$

The screenshot shows the BioRender Templates gallery interface. The top navigation bar includes 'Gallery', 'BioRender Templates', 'Contact Us', and 'Contest'. A search bar is present with the text 'Search BioRender templates'. The main content area displays a grid of template thumbnails, including 'Coronavirus Replication Cycle', 'COVID-19 Diagnostic Test', 'Fluorescent Dye-Based Real Time', 'Clinical Phase Vaccine', 'Common Components of', 'Receptor Recognition', 'COVID-19 Vaccine Candidate: Covid-', 'Bevacizumab: Potential', 'PD-1 Blocking Antibodies', 'Fluorescent Probe-Based Real', 'Remdesivir: Potential', 'Remdesivir Active Molecule', 'Remdesivir: Potential', 'SARS-CoV-2 Spike Protein S1-CTD', 'Schematic of Spike-Receptor', 'SARS-CoV-2 Spike Protein', 'Lopinavir: Potential', 'Principles of Herd Immunity and', 'COVID-19 Safety Information', and 'Sarilumab Antibody against'. A 'BioRender Graphical Abstracts Contest' banner is visible on the left side.

The screenshot shows the BioRender editor interface for a template titled 'Remdesivir Active Molecule Interaction with SARS-CoV-2 RdRp'. The top navigation bar includes 'Gallery', 'Remdesivir Active Molecule Interaction with SARS-CoV-2 RdRp', 'Enter contest', 'Preview', 'Export', and 'Share with...'. The main content area displays a diagram illustrating the potential drug candidate binding of RdRp (SARS-CoV-2). The diagram includes a chemical structure of Remdesivir (Prodrug) and its active molecule, GS-441524, and a 3D model of the RdRp SARS-CoV-2 protein structure (PDB ID: 6M71) showing the GS-441524 binding pocket. A genomic map of the RdRp gene is also shown, with ORF1a and ORF1b regions indicated. The editor interface includes a search bar, a sidebar with categories like 'Cell Types', 'Proteins', 'Nucleic Acids', 'Human Anatomy', 'Lab and Objects', 'Species', 'Membranes', 'Cell Structures', 'Epithelium', 'Lipids and Carbs', 'Chemistry', 'Graphs and Symbols', and 'Arrows and Shapes', and a 'REQUEST A CUSTOM ICON' button at the bottom.

*SARS-CoV-2 is the virus that causes COVID-19*

<https://app.biorender.com/biorender-templates/figures/5e99f5395fd61e0028682c01>

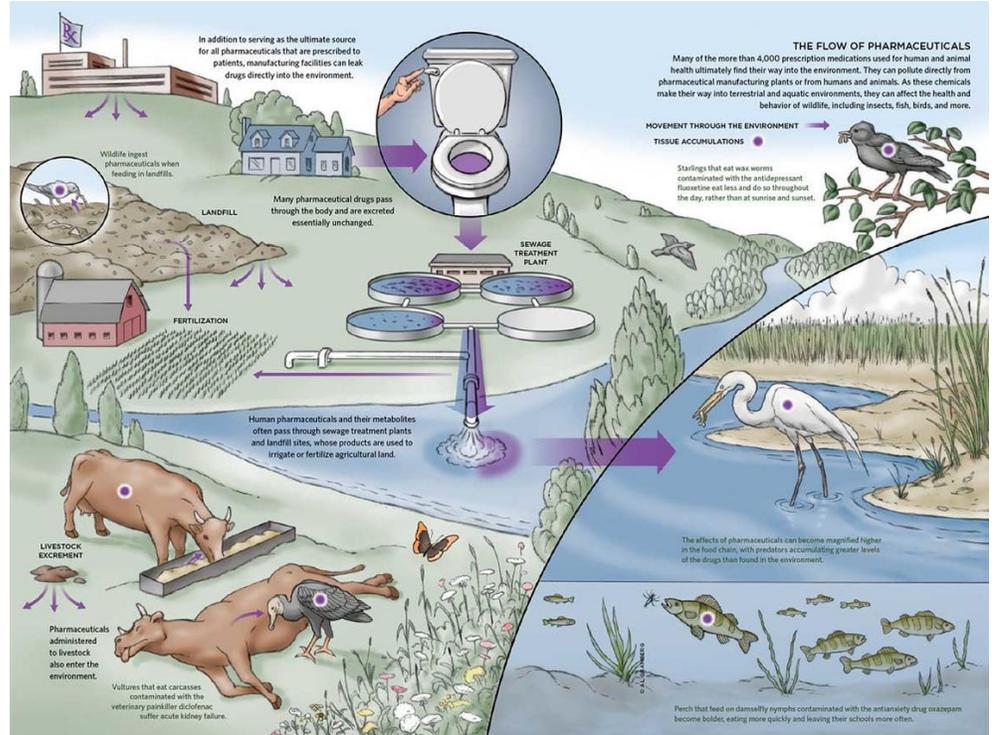
# Pharmaceuticals in the environment

The screenshot shows the USGS Water Science School website. The header includes the USGS logo and navigation links for Science, Products, News, Connect, and About. The main title is 'Pharmaceuticals in Water'. Below the title is a photograph of a scientist in a lab coat working in a laboratory. Navigation tabs for 'Overview', 'Related Science', and 'Multimedia' are visible. A 'Status - Completed' indicator and a 'Contacts' link are also present.

<https://www.usgs.gov/special-topic/water-science-school/science/pharmaceuticals-water>

Water Use : [https://www.usgs.gov/special-topic/water-science-school/science/water-use-information-topic?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/special-topic/water-science-school/science/water-use-information-topic?qt-science_center_objects=0#qt-science_center_objects)

Water Quality: <https://www.usgs.gov/water-resources/national-water-quality-program>



The Flow of Pharmaceuticals

# For Chemistry News

<https://www.cas.org/>

<https://pubchem.ncbi.nlm.nih.gov/>

<https://chemrxiv.org/>

<https://cen.acs.org/topics/pharmaceuticals.html>

The screenshot shows the C&EN website interface. At the top, there is a navigation bar with 'ACS', 'Publications', 'C&EN', and 'CAS'. Below this is a red header with the 'c&en' logo and 'CHEMICAL & ENGINEERING NEWS' text. Navigation links include 'TOPICS', 'MAGAZINE', 'COLLECTIONS', 'VIDEOS', and 'JOBS', along with a search icon. The main section is titled 'PHARMACEUTICALS' with a RSS icon. A sub-navigation bar lists various categories: 'All', 'Antibiotics', 'Biologics', 'Biosimilars', 'Drug Delivery', 'Drug Development', 'Drug Discovery', 'Gene', 'Neuroscience', 'Oncology', 'Pharmaceutical Chemicals', 'Process Chemistry', 'Rare Disease', and 'Vaccines'. The 'VACCINES' category is highlighted. Below this, there are three featured articles:

- VACCINES**  
**COVID-19 vaccine makers sign safety and efficacy pledge**  
Nine companies vow to wait for Phase III clinical trial data before seeking vaccine approvals
- PHARMACEUTICAL CHEMICALS**  
**Seqens adds pharmaceutical chemical capacity**
- SPONSORED CONTENT**  
**Potential for limitless growth**  
By Lanxess — As the natural

From ACRL Science & Technology Section Discussion List STS-L Listserv:  
<https://lists.ala.org/sympa/info/sts-l>

Please join the Memorial Sloan Kettering Cancer Center (MSKCC) Medical Library for our next [Advancing Authorship event: Preprints in the Time of COVID-19](#).

During the COVID-19 pandemic, research has accelerated at an unprecedented pace and it has become more critical than ever for scientists to rapidly share their research results. Increasingly, researchers are relying on preprints to quickly communicate and share findings.

In this session, we will explore the benefits and challenges of preprints. You'll hear from MSKCC researchers/clinicians who have published preprints on COVID-19, plus Dr. John Inglis (Cold Spring Laboratory) the founder of two popular preprint servers, [bioRxiv](#) and [medRxiv](#).

**Date:** Friday, September 25

**Time:** 12:30 PM – 2:00 PM EST

**Location:** [Zoom Webinar – REGISTER NOW](#)

**Thank you!**

**Questions?**



**Princeton University Library**  
<https://library.princeton.edu/>

**Department of Chemistry**  
<https://chemistry.princeton.edu/>

**Department of Geosciences**  
<https://geosciences.princeton.edu/>

**Princeton Environmental Institute (PEI)**  
<https://environment.princeton.edu/>



**Lewis Science Library designed by Frank Gehry**



<https://campusplan.princeton.edu/>