COVID-19 Science and Medicine Updates

Compiled by University of Maine faculty and students

Maine Updates – June 8, 2020
From Maine CDC:
https://www.maine.gov/dhhs/mecdc/infectious-disease/epi/airborne/coronavirus.shtml

Data updated June 8, 2020 at 12:15PM:
Total Cases: 2588
Confirmed cases: 2305
Probable cases: 283
Recovered: 1891
Hospitalizations: 301
Deaths: 99
** Data are also now available by Zip Code at the Maine CDC website.

Maine CDC, as with the U.S. CDC, is now listing test results in table-format, with antibody and PCR-based tests listed separately:

– View a Table of All Reported COVID-19 Tests in Maine

All Reported COVID-19 Tests in Maine			
Result	**Antibody**	**Molecular Testing**	**Total**
Positive	254	3,133	3,387
Negative	4,733	59,057	63,790
Indeterminate	8	105	113
Total	4,995	62,295	67,290

Results from Labs Reporting Electronically (Used for Percent Positivity Calculations)*			
Result	**Antibody**	**Molecular Testing**	**Total**
Positive	191	2,949	3,140
Negative	4,770	59,041	63,811
Indeterminate	8	104	112
Total	4,969	62,094	67,063
Percent Positive	3.84	4.75	4.68

*Not all labs report results to the Maine CDC electronically. Labs reporting manually report only the positve results and are therefore excluded for purposes of calculating the percent positivity rate.

Molecular testing includes PCR, isothermal, and NAAT methods.

Updated June 8, 2020 at 12:15 PM

Penobscot County Data from Maine CDC (as of June 8):

Cases: 101
Recovered: 94
Deaths: 2

Online Dashboard Links:

Desktop version:

https://arcg.is/1Knarr

Mobile version:

https://arcg.is/5qGGr

NEWS FROM MAINE:

Vast Expansion of COVID-19 testing in Maine

https://www.maine.gov/tools/whatsnew/index.php?topic=DHS+Press+Releases&id=2657874&v=dhhs_article_2020

- New testing capacity will come online in July and will quadruple state lab testing capacity as well as develop testing sites throughout Maine
- Builds on partnership with IDEXX Laboratories
- Ensures 90% of residents can get tested within 30min of their homes
- Individuals at elevated risk can get tested without an order from a healthcare provider

Mills Administration unveils "Keep Maine Healthy" Plan

https://www.maine.gov/governor/mills/news/mills-administration-unveils-keep-maine-healthy-plan-protect-maine-people-visitors-support

"The multilayered plan, called Keep Maine Healthy, aims to protect the health of Maine people and visitors while allowing the opportunity for people to visit Maine and support Maine small businesses during the summer months. The plan rests on three cornerstones: 1) having visitors certify that they have received a recent negative COVID-19 test to stay in lodging establishments, such as hotels, as an alternative to quarantine; 2) increasing symptom checks at places where visitors tend to go; and 3) supporting community promotion of COVID-19 prevention best practices and public health education."

OTHER COVID-19 NEWS:

Feces can carry live SARS-CoV-2 virus

https://wwwnc.cdc.gov/eid/article/26/8/20-0681_article

- Recent data demonstrated that SARS-CoV-2 virus can remain viable in feces, although this is a case study from one patient in China and more data should be collected to replicate this finding.
- These types of studies are important to distinguish PCR positive detection of viral RNA, which may come from inactivated or active virus.
- This study utilized multiple viral tests, including detecting viral loads and IgG antibodies against the virus spike protein, as well as distinguishing infectious virus in the feces.

- These findings have implications for fecal-oral transmission, including bathroom disinfection.

The World Health Organization rules that so-called "Immunity Passports" are a bad idea

https://www.nature.com/articles/d41586-020-01451-0

- So-called immunity passports would measure SARS-CoV-2 antibodies in a person and issue certificates that could lift restrictions on that person, with the idea that they have immunity against the virus.
- Concerns with this approach have included the fact that antibody presence does not indicate immunity to the virus per se, and the fact that even patients who are immune to re-infection can still carry and spread the virus.

" On 24 April, the World Health Organization (WHO) cautioned against issuing immunity passports because their accuracy could not be guaranteed. It stated that: "There is currently no evidence that people who have recovered from COVID-19 and have antibodies are protected from a second infection"(see go.nature.com/3cutjqz)."

Quick facts on UV Sterilization:

- UV light is outside the range that we can see
- UV light comes in three types: UV-A (closest to visible), UV-B, and UV-C (farthest away from visible). There is a lot of UV-A and UV-B in sunlight, but not much UV-C
- UV-C light has a **wavelength of 254** nanometers and carries a lot of energy. It can be used to kill pathogens like viruses and bacteria on surfaces, and can also kill the virus that causes COVID-19 if it is **shined for long enough**. However, it can also cause **skin burns and damage eyes**, so it is **important to be out of the room** or **wear proper eye and skin protection** when UV-C is used.
- UV-C functions by disrupting and damaging the proteins that make up the outer layer of the virus. It may also disrupt the virus's genetic code (RNA) and make it harder for it to reproduce
- UV-A and UV-B are not as damaging to skin and eyes, but also do not effectively kill the virus.
- The amount of time UV-C light needs to be shined on a surface depends on the power of the light source and the distance to the surface
- UV light will not work if it is not directly touching the surface, so if there is a shadow over part of a surface that part will be less likely to be disinfected. For this reason, hospitals use multiple lights in different locations to sterilize rooms. They also usually only use it on hard surfaces, such as walls, floors, and surgical tables.
- **NOTE:** NEVER use UV on or inside your body; this can cause serious damage to cells and tissues and UV is a known cancer risk

Mask wearing: Myths and Controversies

- **Myth 1: wearing a cloth mask for long periods causes hypoxia (lack of proper oxygen supply)**

- **Fact:** oxygen supply is normal with cloth masks. But be sure your mask fits well, snugly over your mouth and nose, and does allow you to breathe. Multiple layers of tightly woven cotton, with or without a filter between, is recommended versus other materials that may not be breathable. Many professions wear masks all day without risk of lack of oxygen

https://www.news8000.com/masks-not-causing-hypoxia/

Great overview of Mask use, with graphics, from Scientific American: https://www.scientificamerican.com/article/how-to-use-masks-during-the-coronavirus-pandemic/

- **Myth 2: Mask wearing does not reduce risk of transmission**
  - **Fact:** cloth masks reduce release of droplets and aerosols that can carry virus particles into shared air (see graphic below). If 80% of the population wears cloth masks, SARS-CoV-2 transmission will be greatly reduced.

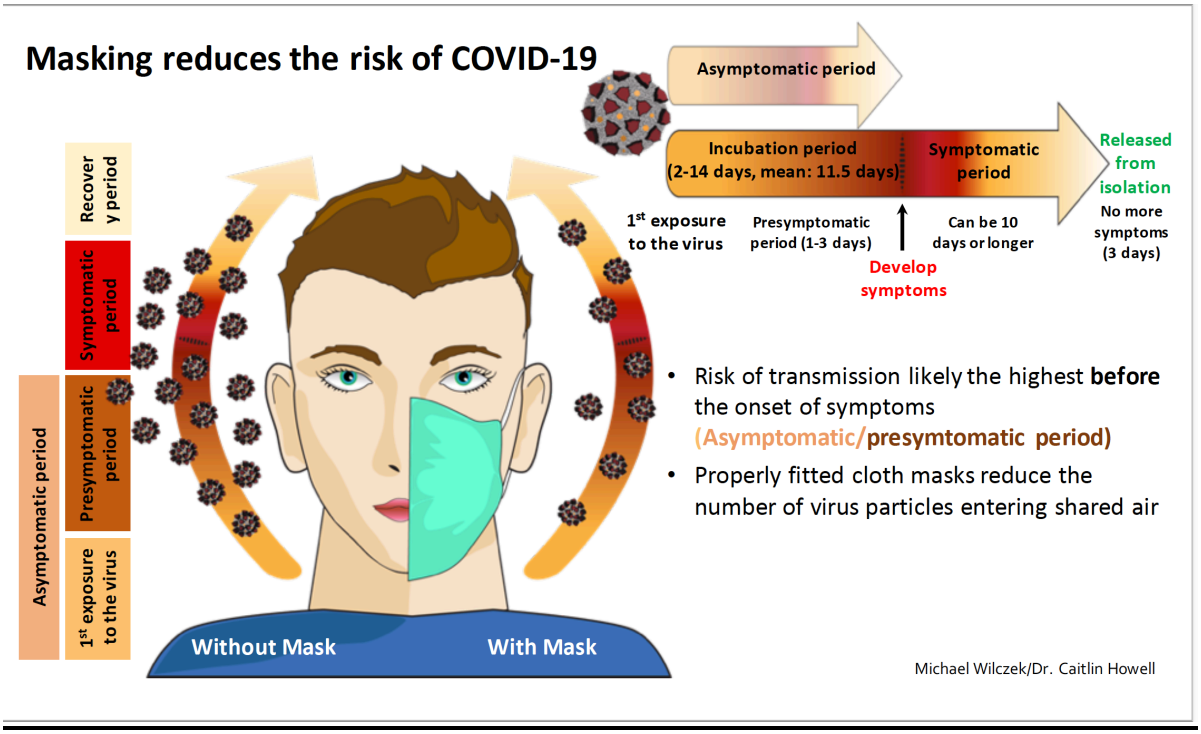
A recently published meta-analysis (comparing data sets from multiple smaller studies) about SARS-CoV-2 transmission indicates mask wearing results in a large reduction in risk of transmission. Eye protection was also implicated as reducing transmission risk, since viral particles can also infect via the eyes, and not just the mouth and nose which are covered by masks. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31142-9/fulltext

Mask wearing mainly prevents release of droplets and aerosols by the person wearing the mask. It is not as effective at keeping you from being infected by virus particles in the air. An N95 respirator would be needed for that. Since respirators are in short supply, cloth mask wearing should be coupled with other precautions such as physical distancing. https://science.sciencemag.org/content/early/2020/06/02/science.abc6197.1.full

- **Myth 3: N95 masks and other masks with one-way valves prevent virus release from the wearer**
  - **Fact:** N95 masks are respirators that block 95% of small particles from being breathed in. Respirator usage requires the wearer to undergo a fit test to ensure they fit and function properly on the wearer. In addition, they are considered true personal protective equipment (PPE) that is disposable. Since they are in short supply right now, they should be reserved for healthcare workers.
  - Because of the way the one-way valve works on many N95 respirators, as well as in some cloth masks that have added a valve, unfiltered air is released when you breath out. Therefore, they are not effective at blocking release of viral particles from the person wearing the mask. One-way valves are added to make it easier for the wearer to breathe.
  - N95 masks may be able to be disinfected and re-used, but this is an active area of investigation.

https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-mask/art-20485449

- **Myth 4: Masks only protect you from people who are actively sick and show symptoms**
    - **Fact:** About 40-45% of SARS-CoV-2 cases are asymptomatic https://www.acpjournals.org/doi/10.7326/M20-3012
    - People who show no symptoms are still contagious and can spread the virus through droplets and aerosols.
    - People may be contagious but show no symptoms in the following situations:
        - They are presymptomatic (symptoms haven't started yet; such as during the incubation period of 2-14 days for this virus)
        - They are truly asymptomatic cases and will never develop symptoms during their infection
        - They will become symptomatic but their symptoms may not be typical (such as fever, shortness of breath) and may include less common symptoms such as loss of smell and taste, or intestinal distress (see the full CDC list of symptoms here: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html
- **Myth 5: Mask wearing will prevent you from being re-infected with the virus, even if you already had COVID-19**
    - **Fact:** recent data indicate that people who already had COVID-19 cannot be reinfected with the virus. This is because data had been collected from PCR tests that detect the virus's RNA genetic material, but these tests did not measure the shedding of infectious virus particles. Newer data indicate that samples from patients that appeared to be "re-infected" did NOT have infectious virus. https://www.sciencenews.org/article/coronavirus-covid19-reinfection-immune-response



COVID-19: Health Risks and Health Complications

Known Risks for COVID-19 hospitalization and severe illness:

- Official CDC list[1]
- Age (NYU Langone study of over 5000 COVID-19+ patients[2]):
  - Over 45 - greater risk of hospitalization
  - Over 65 – greater risk for critical illness
- Obesity, Diabetes, Heart Conditions
  - Age 18-49: obesity is most significant underlying condition for COVID hospitalizations
  - Patients under 60 with BMI over 35 are 2x likely to go to ICU
  - Maine has highest rates of these conditions in NE
- Chronic lung disease, severe asthma
- Immunocompromised
- Kidney disease, liver disease
- Males have higher risk (NYU Langone, other studies)
- Hispanic (NYU data), Black patients (national trends) at higher risk
- About 90% of COVID-19 hospital admissions involve co-morbidities https://www.medscape.com/viewarticle/928531

1) https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-higher-risk.html
2) Petrilli et al. 2020 BMJ

Neurological symptoms and health complications:

- Neurological symptoms:
  - Anosmia (loss of smell), headache, dizziness, confusion, impaired movement, seizures, and strokes
  - In a Wuhan, China study: 36% of COVID patients had neurological symptoms
  - In a French study: 84% of COVID patients had neurological symptoms
- Those with cerebrovascular disease have worse respiratory symptoms
- Inflammatory cytokine storm with COVID-19 reported to lead to encephalopathy and encephalitis (medical case studies)
- Unclear what long-lasting neurological effects will be; studies are ongoing

1) Garg et al. (2020) Morbidity and Mortality Weekly Report – Centers for Disease Control and Prevention, April 17, 2020; 69(15); 458-464.
2) Lighter et al. (2020) Obesity in patients younger than 60 years is a risk factor for Covid-19 hospital admission. (accepted manuscript in press, Oxford University Press)
3) Mao et al. (2020) Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. JAMA April 10, 2020 pre-print.
4) Helms et al. (2020) Neurologic features in severe SARS-CoV-2 infection. Correspondence: New England Journal of Medicine, April 15 2020.
5) De Felice et al. (2020) Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the central nervous system. Trends in Neurosciences, pre-print.
6) Morfopoulou et al. (2016) Human coronavirus OC43 associated with fatal encephalitis. Correspondence – New England Journal of Medicine, Aug 4, 2016. 375:5.
7) Li et al. (2020) The neuroinvasive potential of SARS-CoV2 may play a role in the respiratory failure of COVID-19 patients. Journal of Medical Virology. 92; 552-555.
8) Brizzi et al. (2014) Peripheral nervous system manifestations of infectious diseases. The neurohospitalist. 4(4); 230-240.
9) Koyuncu et al. (2013) Viral infections in the nervous system. Cell Host Microbe; 13(4); 379-393.

10) Poyiadji et al. (2020) COVID-19-associated acute hemmorhagic necrotizing encephalopathy: CT and MRI features. Radiology. (preprint)
11) Ye et al. (2020) Encephalitis as a clinical manifestation of COVID-19. Brain Behavior and Immunity (Preprint)

Effects on other organs:

- Lungs
  - Walls of alveoli break down
  - Oxygen uptake diminished
  - Long-term damage may occur (fibrosis)
- Heart and Blood vessels
  - Infection of cells lining blood vessels
  - Can promote blood clots, heart attacks, cardiac inflammation
  - Increase in strokes, including for younger patients[2]
- Liver damage
- Kidney damage
- Intestinal damage
- The cellular targets of the virus are beginning to become clear, using data from the Human Cell Atlas and screening for expression of ACE2 and TMPRSS2 that interact with SARS-CoV-2, cells like the mucus producing goblet cells in the nasal passages and enterocytes in the gut are now known targets of the virus.

  https://directorsblog.nih.gov/2020/05/05/the-prime-cellular-targets-for-the-novel-coronavirus/

1) Wadman et al. (2020) Science 368: 356-360
2) https://www.medrxiv.org/content/10.1101/2020.05.03.20077206v2

Worth a Read:
The following articles in lay publications do a good job of explaining the science:

Thousands Who Got COVID-19 in March Are Still Sick - The Atlantic
https://www.theatlantic.com/health/archive/2020/06/covid-19-coronavirus-longterm-symptoms-months/612679/

What the COVID-19 Pandemic Means for Black Americans
https://blogs.scientificamerican.com/voices/what-the-covid-19-pandemic-means-for-black-americans/

RESOURCES AND RECOMMENDED READINGS:

Clinical and Administrative Guidance on COVID-19 shared by UW Hospitals:
As an early hot-spot in the US, Washington has been providing leadership and guidance around handling clinical cases of COVID-19. Documents are shared at this site, and constantly updated:
https://covid-19.uwmedicine.org/Pages/default.aspx

UMaine's Fogler Library COVID-19 Lib Guide:
https://libguides.library.umaine.edu/coronavirus/maine

Calculate your Pandemic Footprint, based on your behaviors:
https://www.pandemic-footprint.com/

NIH is Enrolling for a New Study to Quantify Undetected Cases of Coronavirus
Blood samples from healthy volunteers are needed, learn more here:
https://www.niaid.nih.gov/news-events/nih-begins-study-quantify-undetected-cases-coronavirus-infection

Maine Small Business Resources during COVID
http://www.mainestreamfinance.org/covid-19-updates/small-business-updates-and-resources-during-covid-19-outbreak/

COVID-19 Literature Searches MLA Net (Medical Library Association)
https://www.mlanet.org/page/covid-19-literature-searching

CDC Research Guide
https://www.cdc.gov/library/researchguides/2019novelcoronavirus/databasesjournals.html

LitCOVID:
https://www.ncbi.nlm.nih.gov/research/coronavirus/

Nature – Pick of the papers (COVID)
https://www.nature.com/articles/d41586-020-00502-w

Mayo Clinic
https://news.mayocliniclabs.com/covid19/

Norwegian evidence map may be one of the world's most systematic overviews of research on COVID-19

https://sciencenorway.no/epidemic-virus/norwegian-evidence-map-may-be-one-of-the-worlds-most-systematic-overviews-of-research-on-covid-19/1676520

COVID-19 Diagnostic Criteria
https://www.idsociety.org/practice-guideline/covid-19-guideline-diagnostics/

BioME Panel of Maine Experts on COVID-19 (May 28, 2020) – video:
https://biomaine.org/events/webinar-on-demand-the-science-of-covid-19/

REPUTABLE ONLINE RESOURCES WITH COVID-19 DATA:

IHME Health Data and Projections:
https://covid19.healthdata.org/united-states-of-america
https://covid19.healthdata.org/united-states-of-america/maine

- *Now including more data for Maine!*

Johns Hopkins
https://coronavirus.jhu.edu/map.html

Comparison of COVID testing results, false positive and false negative rates across platforms:
https://covidtestingproject.org/

COVID-19 Projections Using Machine Learning. Taking a data-driven approach rooted in epidemiology to forecast infections, deaths, and recovery timelines of the COVID-19 / coronavirus epidemic in the US and around the world
https://covid19-projections.com/about/

COVID-19 Simulator
https://www.covid19sim.org/

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