SARS-COV-2 virus: COVID-19 disease

- Enveloped +RNA virus named for solar corona-like appearance of their virions
- Second most prevalent cause of the common cold
- Replicate at lower temperatures, thus predilection for upper respiratory tract
- The corona helps the enveloped virus survive the GI tract
- Control of transmission is difficult
COVID 19 Updates

Cumulative number of people tested for the coronavirus in California

27,654 people tested | +17,943 in the past week

3,169 positives
In CA
11%

SOURCE: The COVID Tracking Project
Tests are reported by the California Department of Health and are approximate.
COVID 19 Updates

3,169 positives
In CA
67 Dead

33,030 positives
In NY
366 Dead

Coronavirus tests per million people

- California
- United States
- New York
New confirmed cases in California, by day

Cases in the Bay Area  Cases outside the Bay Area

SOURCES: U.S. Centers for Disease Control and Prevention, California Department of Public Health and county public health departments, Chronicle reporting
<table>
<thead>
<tr>
<th>County</th>
<th>Total cases</th>
<th>Deaths</th>
<th>New cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alameda County</td>
<td>135</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Contra Costa County</td>
<td>108</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Marin County</td>
<td>60</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Napa County</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>San Francisco County</td>
<td>178</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>San Mateo County</td>
<td>165</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Santa Clara County</td>
<td>459</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Solano County</td>
<td>31</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sonoma County</td>
<td>37</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

SOURCES: U.S. Centers for Disease Control and Prevention, the California Department of Public Health and county public health departments, exclusive Chronicle reporting.
SARS-CoV-2: Do we know how long a person is contagious (whether symptomatic or asymptomatic)?

People are most contagious one week before they have symptoms and during the time they have symptoms.

medRxiv preprint doi: https://doi.org/10.1101/2020.03.05.20030502
SARS-CoV-2:

Asymptomatic transmission of SARS-CoV-2

Rothe et al., N Engl J Med 2020; 382:970-971
Is it possible that people had earlier versions of the virus already (since it’s been out there awhile and mutates) and have some immunity built up from that?

- RNA viruses mutate continuously
- S and L strain identified in Wuhan, China
- Researchers in Brazil analyzed whole genome of SARS-CoV-2, one resembled CoV-2 from UK and the other Germany
- If mutations are not beneficial to the virus, they are typically eliminated through natural selection
SARS-CoV-2 Testing

SARS-CoV-2 antibody test:

Serological enzyme-linked immunosorbent assays (ELISA) developed using recombinant antigens derived from the spike protein of SARS-CoV-2.

The assay allows for screening and identification of COVID19 seroconverters using human plasma/serum as early as 3 days post symptom on set. Importantly, the assay does not require handling of infectious virus, can be adjusted to detect different antibody types and is amendable to scaling.

medRxiv preprint doi: https://doi.org/10.1101/2020.03.17.20037713
COVID-19 NIH Funding

This package provides **NIBIB $60,000,000** as part of the emergency funding. Further, Congress has provided the following special funding to other specific NIH Institutes and Centers, each amount specifically to prevent, prepare for and respond to the coronavirus, domestically and internationally. It is important to note that these funds remain available until September 30, 2024, an unusual multiyear provision.

National Institute of Allergy and Infectious Diseases (NIAID) - $706,000,000
(Aleast 156,000,000 of this is for facility needs for vaccine research)
National Heart Lung Blood Institute (NHLBI) - $103,400,000
National Institute of Biomedical Imaging and Bioengineering (NIBIB) - $60,000,000
National Center for Advancing Translational Sciences (NCATS) - $36,000,000
National Library of Medicine (NLM) - $10,000,000
Office of the Director/Common Fund - $30,000,000

Link to the entire package:
[https://www.politico.com/f/?id=00000171-149c-da0d-a17b-fedf132f0000](https://www.politico.com/f/?id=00000171-149c-da0d-a17b-fedf132f0000)
Imaging COVID-19
CT Features of COVID-19

- Ground glass + consolidation
  - occasionally “cazy paving”
- patchy, rounded/nodular
- peripheral
- basal predominance
- Organizing pneumonia
  - Reverse halo / atoll sign
  - Perilobular distribution
COVID-19 disease

42 y/o women, she was discharged 2 days after the final scan

Lancet Infect Dis 2020; 20: 425–34
COVID-19 disease

77 y/o patient, he died 10 days after the final scan

Lancet Infect Dis 2020; 20: 425–34
## PCR Detection of SARS-CoV-2
1070 Specimens from 205 Patients (5-67 yrs)

### Table. Detection Results of Clinical Specimens by Real-Time Reverse Transcriptase–Polymerase Chain Reaction

<table>
<thead>
<tr>
<th>Specimens and values</th>
<th>Bronchoalveolar lavage fluid (n = 15)</th>
<th>Fibrobronchoscope brush biopsy (n = 13)</th>
<th>Sputum (n = 104)</th>
<th>Nasal swabs (n = 8)</th>
<th>Pharyngeal swabs (n = 396)</th>
<th>Feces (n = 153)</th>
<th>Blood (n = 307)</th>
<th>Urine (n = 72)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive test result, No. (%)</td>
<td>14 (93)</td>
<td>6 (46)</td>
<td>75 (72)</td>
<td>5 (63)</td>
<td>125 (32)</td>
<td>44 (29)</td>
<td>3 (1)</td>
<td>0</td>
</tr>
<tr>
<td>Cycle threshold, mean (SD)</td>
<td>31.1 (3.0)</td>
<td>33.8 (3.9)</td>
<td>31.1 (5.2)</td>
<td>24.3 (8.5)</td>
<td>32.1 (4.2)</td>
<td>31.4 (5.1)</td>
<td>34.6 (0.7)</td>
<td>ND</td>
</tr>
<tr>
<td>Range</td>
<td>26.4–36.2</td>
<td>26.9–36.8</td>
<td>18.4–38.8</td>
<td>16.9–38.4</td>
<td>20.8–38.6</td>
<td>22.3–38.4</td>
<td>34.1–35.4</td>
<td></td>
</tr>
<tr>
<td>95% CI</td>
<td>28.9–33.2</td>
<td>29.8–37.9</td>
<td>29.3–33.0</td>
<td>13.7–35.0</td>
<td>31.2–33.1</td>
<td>29.4–33.5</td>
<td>0.0–36.4</td>
<td></td>
</tr>
</tbody>
</table>

Wang et al., *JAMA*. Published online March 11, 2020. doi:10.1001/jama.2020.3786
Safety

How long should mail, or groceries, or delivery boxes, remain untouched to be safe from contacting virus on their surfaces?

https://www.medrxiv.org/content/10.1101/2020.03.09.20033217v2.full.pdf
Van Doremalen et al, doi: https://doi.org/10.1101/2020.03.09.20033217