COVID-19 Scientific Advisory Board
Legislature Presentation
May 21, 2020

- President UMaine & UMM Joan Ferrini-Mundy, Ph.D., Chair
- Vaccines/Antivirals - Melissa Maginnis, Ph.D., UMaine
- Diagnostic Testing - Kristy Townsend, Ph.D., UMaine
- Serology Testing/Immunity - Rob Wheeler, Ph.D., UMaine
- Epidemiology and Contact Tracing - Sara Huston, Ph.D., USM
- Transmission in the Environment/Surfaces - Caitlin Howell, Ph.D., UMaine
### Vaccines

**Vaccines in development**

**Leading candidates in clinical development**

<table>
<thead>
<tr>
<th>#</th>
<th>Vaccine Name</th>
<th>Clinical Trial Status</th>
<th>Manufacturing</th>
<th>Company Guidance for Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ChAdOx1 nCov-19 (Viral Vector)</td>
<td>Phase 1 - complete • Phase 2 - March • Phase 3 – May/summer (US)</td>
<td>Partnered with AstraZeneca for global development and distribution BARDA ($1b) funding to support</td>
<td>400 million doses starting in October, and capacity secured for 1 billion doses 2020-21</td>
</tr>
<tr>
<td>2</td>
<td>mRNA-1273 (RNA Vaccine)</td>
<td>Phase 1 - complete • Phase 2 - approved May 6 • Phase 3 - July</td>
<td>Partnered with Lonza, 10-year agreement BARDA ($483m) funding to support</td>
<td>Partnership with Lonza enables worldwide vaccine distribution of 1 billion doses/year.</td>
</tr>
<tr>
<td>3</td>
<td>INO-4800 (DNA Vaccine)</td>
<td>Phase 1 - April • Phase 2 - summer • Phase 3 - fall</td>
<td>Partnered with Richter-Helm Biologics</td>
<td>Indicates end of year availability</td>
</tr>
<tr>
<td>4</td>
<td>BNT162 program (RNA Vaccine)</td>
<td>Phase 1 - April • Phase 2 - April • Phase 3 - TBD</td>
<td>Partnered with Pfizer</td>
<td>Emergency use or accelerated approval starting in the fall</td>
</tr>
</tbody>
</table>

**Antivirals**

**Drugs in development**

**Leading candidates**

<table>
<thead>
<tr>
<th>#</th>
<th>Drug Name</th>
<th>Clinical Trial Status</th>
<th>Manufacturing</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remdesivir (Nucleotide Inhibitor)</td>
<td>Phase 1-3 – ongoing (5 trials) May 1: FDA issued emergency use authorization for patients with severe disease</td>
<td>Building global consortium of manufacturers Aim to treat &gt;1 million patients by the end of 2020</td>
<td>Providing 1.5 million free doses to patients</td>
</tr>
<tr>
<td>2</td>
<td>Convalescent plasma (anti-CoV Antibodies)</td>
<td>Clinical trials • Expanded access • Emergency IND approval</td>
<td>Hospital based FDA-registered donations</td>
<td>Relies on donations from recovered patients</td>
</tr>
</tbody>
</table>
Primary Transmission Route: Aerosolized Droplets Containing Virus

- Virus can remain stable for up to 3 hours in air, up to 3 days on surfaces
- 25-80% infected individuals from non-healthcare settings show no symptoms
- Highest transmissibility likely occurs 2-3 days before symptoms show
- Increased population density increases probability of presence of virus. Thus, physical distancing and social distancing are key.
- Transmission appears to be increased with activities that require heavy or deep breathing (exercise/singing).

However: Barriers, masks, and other engineered solutions slow the spread if used correctly with high compliance and in conjunction with distancing.

Caitlin Howell
COVID-19 risk: Total virus exposure = \# of virus particles \times \text{time}

- Risk of transmission likely the highest before the onset of symptoms (Asymptomatic/presymptomatic period)
- \# of virus particles: The more people in an area, the higher the chance of virus being present, and in greater amounts
- Time: The longer people remain together, the higher the chance of
- Properly fitted cloth masks reduce the number of virus particles entering shared air

Asymptomatic period
Incubation period (2-14 days, mean: 11.5 days)
Symptomatic period
Develop symptoms
Released from isolation
Can be 10 days or longer
No more symptoms (3 days)
Rapid, high-throughput diagnostic testing for the entire community

Contact tracing of COVID-19+ (contacts within <6ft for >30 min are quarantined)

Isolation of COVID-19+ patients in infirmaries until healthy to return

**14-day Quarantine:** keeps individuals from transmitting disease during the known period of incubation (2-14 days, 5 days median) for SARS-CoV-2

* Based on procedures that have been successful in “flattening the curve” around the globe

Kristy Townsend
Testing for SARS-CoV-2 Infection: An important part of the arsenal to prevent spread of COVID-19

Period of positive diagnostic test
(measures viral RNA by PCR or similar methods)

- Active cases are detected, starting about 1wk before symptoms
- Workflow is well-validated, good sensitivity and specificity
- Can be cost-effective (high-throughput costs more, may have more false results)
- Positive tests are isolated until recovery
- After about 3wks since symptomatic, lose PCR detection (below threshold for limit of detection)

Period of antibody detection by serology tests

- Detects antibodies from previous infection (IgM & IgG detectable from 2-23d after symptomatic; highest around wk 3)
- Recent data indicate nearly 100% of cases develop antibodies (within 19d of symptom onset)
- Antibody+ patients could donate convalescent serum for treatment of active cases
- Unclear if antibody presence indicates immunity (research ongoing)

- SARS-CoV-2 Infection
- Incubation Period:
  - viral replication, shedding (contagious)
  - Pre-symptomatic
- Latency period

Timeline since initial infection

- 3 days
- 14+ days
- Variable days depending on disease progression, complications

RECOVERY

Kristy Townsend
Rob Wheeler
Preventing Spread: Isolate Cases, Quarantine Contacts

Source: A Coordinated, National Approach to Scaling Public Health Capacity for Contact Tracing and Disease Investigation, Association of State & Territorial Health Officers; and Resolve to Save Lives
Movement of virus-containing droplets in the environment

- Speaking can generate aerosols\(^1\)
- Masks are effective when used correctly and compliance is high\(^2,3\)
- Good ventilation is critical; recirculation contributes to spread\(^4\)

Role of surfaces in person-to-person transfer of virus

- Virus can land on surfaces and be re-aerosolized\(^4\)
- Virus traces found on shoes as well as handles, chairs, etc.\(^4\)
- Regular disinfection is effective\(^4\)

Other potential routes of infection and opportunities for detection

- Infectious virus found recently found in feces\(^5\), viral traces in toilet areas\(^4\)
- Wastewater monitoring can assist in early identification of outbreaks\(^6\)
COVID-19 Scientific Advisory Board

Contact Information:

- Caitlin Howell: caitlin.howell@maine.edu
- Sara Huston: sara.huston@maine.edu
- Melissa Maginnis: melissa.maginnis@maine.edu
- Kristy Townsend: kristy.townsend@maine.edu
- Robert Wheeler: robert.wheeler1@maine.edu