Human metapneumovirus (hMPV) and para-influenza virus 3 (PIV3) vaccine (mRNA-1653)

Last program update: October 29, 2020

<table>
<thead>
<tr>
<th>Modality</th>
<th>ID #</th>
<th>Program</th>
<th>Preclinical development</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Commercial</th>
<th>Moderna rights</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRNA-1273</td>
<td></td>
<td>COVID-19 vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mRNA-1647</td>
<td></td>
<td>Cytomegalovirus (CMV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mRNA-1653</td>
<td></td>
<td>hMPV/PIV3 vaccine</td>
<td>Phase 1 (healthy volunteers)</td>
<td>Phase 1b (Age de-escalation) Seropositives</td>
<td></td>
<td></td>
<td>Worldwide</td>
<td></td>
</tr>
<tr>
<td>mRNA-1893</td>
<td></td>
<td>Zika vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide BARDA funded</td>
</tr>
<tr>
<td>mRNA-1345</td>
<td></td>
<td>Pediatric respiratory syncytial virus (RSV) vaccine</td>
<td>Future respiratory combo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
<tr>
<td>mRNA-1189</td>
<td></td>
<td>Epstein-Barr virus (EBV) vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
<tr>
<td>mRNA-1851</td>
<td></td>
<td>Influenza H7N9 vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide Advancing subject to funding</td>
</tr>
</tbody>
</table>

Prophylactic vaccines
Human metapneumovirus (hMPV) and parainfluenza virus type 3 (PIV3) represent a high unmet need in young children

- hMPV and PIV3 are RNA viruses that are important causes of respiratory tract infections, particularly in children
- Increasing rates of diagnosis and association with hospitalization for respiratory illness
- **Disease burden:** Major cause of hospitalization due to respiratory infection
  - Symptoms range from mild upper respiratory tract infection to life threatening severe bronchiolitis and pneumonia
  - Both viruses cause clinically indistinguishable disease
- **Target population:** Infants
  - Most hMPV or PIV3-associated hospitalizations in children occur under 2 years old
  - Hospitalization rates in children < 5 years old in the U.S.:
    - hMPV: 1.2 per 1,000
    - PIV3: 0.5 per 1,000
- **Unmet need:** No approved hMPV or PIV3 vaccine
  - Other companies' previous attempts focused only on hMPV or PIV alone (no known attempts at a combination vaccine)
**hMPV/PIV3 vaccine (mRNA-1653)**

*Combines mRNAs encoding antigens from two different viruses*
hMPV/PIV3 (mRNA-1653) Phase 1b trial

*First mRNA vaccine to be evaluated in children*

**Key objective**
- To evaluate the safety and immunogenicity of mRNA-1652 when administered to adults and to children 12-36 months of age with serologic evidence of prior exposure

**Primary endpoint**
- Safety

**Secondary endpoint**
- Neutralizing antibodies against hMPV and PIV3

**Trial progress**
- Adult cohort is completed; First 10 pediatric participants dosed in trial before COVID-19 related disruptions
- Resumed dosing pediatric participants (12-36 months of age) in Phase 1b age de-escalation study following COVID-19 disruptions

**Abbreviations**
- SMC = Safety Monitoring Committee
hMPV/PIV3 vaccine (mRNA-1653)

Preclinical data – combo vaccine generates neutralizing titers against each virus

Species: Mouse

hMPV neutralizing titers with hMPV/PIV3 mRNA vaccine

PIV3 neutralizing titers with hMPV/PIV3 mRNA vaccine

Pre-clinical studies of hMPV and PIV3 combination vaccine demonstrated ability to generate robust neutralizing antibody titers. In separate experiments in NHP (not shown) vaccination conferred protection against hMPV or PIV3 viral challenge.
hMPV/PIV3 vaccine (mRNA-1653)

Preclinical data – combo vaccine generates neutralizing titers against each virus

Key Objectives

• Evaluate safety and immunogenicity through 12 months after the second vaccination
• Select optimal dose and vaccination schedule for further clinical development

Dosing schedule: Day 1 and month 1

Dose-escalation Phase A (N=20) Sequential enrollment
Randomization 4:1 for mRNA-1653: placebo, Five subjects per dose cohort

- mRNA-1653 25µg or placebo
- mRNA-1653 75µg or placebo
- mRNA-1653 150µg or placebo
- mRNA-1653 300µg or placebo

All subjects received two doses

Dose-selection Phase A (N=104) Parallel enrollment
Randomization of 1:1:1:1, 26 subjects per dose cohort

- mRNA-1653 75µg
- mRNA-1653 150µg
- mRNA-1653 300µg
- placebo

Safety monitoring committee

Within each mRNA-1653 dose level group, subjects randomized 1:1 to receive one or two doses
hMPV/PIV3 vaccine (mRNA-1653)
Phase 1 in healthy adults; Interim results, through 1 month

Safety and tolerability

- mRNA-1653 was found to be generally well tolerated at all dose levels
- No serious adverse events (SAEs), adverse events of special interest, or adverse events leading to withdrawal were reported
- Injection site pain was the most commonly reported solicited adverse event and grade 3 adverse event

### Unsolicited Adverse Events, Through 28 Days After Each Vaccination Exposed Set

<table>
<thead>
<tr>
<th>Dose Level (µg)</th>
<th>25</th>
<th>75</th>
<th>150</th>
<th>300</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>4</td>
<td>13</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>≥1 event</td>
<td>3 (75.0)</td>
<td>3 (23.1)</td>
<td>5 (29.4)</td>
<td>4 (30.8)</td>
<td>5 (29.4)</td>
</tr>
<tr>
<td>≥1 related event</td>
<td>0</td>
<td>0</td>
<td>1 (5.9)</td>
<td>1 (7.7)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>≥1 Grade 3+ event</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (7.7)</td>
</tr>
<tr>
<td>≥1 related Grade 3+ event</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (7.7)</td>
</tr>
<tr>
<td>≥1 SAE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>≥1 medically-attended event</td>
<td>0</td>
<td>1 (7.7)</td>
<td>1 (5.9)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>≥1 AESI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>≥1 AE leading to withdrawal</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Reported as: number of subjects reporting event (% of subjects reporting event)
N = number of subjects enrolled in the specified treatment group; SAE = serious adverse event; AESI = adverse events of special interest
**hMPV/PIV3 vaccine (mRNA-1653)**

*Phase 1 in healthy adults; Interim results, through 1 month*

- mRNA-1653 tended to induce a greater boost in neutralizing antibody in subjects with lower baseline titers.
- 1 month after a single vaccination, hMPV and PIV3 neutralization titers were ~6x and ~3x baseline, respectively.

### Relationship Between Baseline Titer and Response to First mRNA-1653 Vaccination (Day 28 / Day 1 Titer Ratio)

<table>
<thead>
<tr>
<th></th>
<th>Total mRNA N=90</th>
<th>Placebo N=28</th>
</tr>
</thead>
<tbody>
<tr>
<td>hMPV-A</td>
<td>6.04</td>
<td>1.00</td>
</tr>
<tr>
<td>hMPV-B</td>
<td>6.33</td>
<td>1.04</td>
</tr>
<tr>
<td>PIV3</td>
<td>3.24</td>
<td>1.03</td>
</tr>
</tbody>
</table>
hMPV/PIV3 vaccine (mRNA-1653)

Phase 1 in healthy adults; Interim results, through 7 months

Immunogenicity

- Single vaccination boosted serum neutralization titers against hMPV and PIV3 at all dose levels tested
- Second vaccination did not further boost antibody titers, suggesting a single vaccination was sufficient to achieve a plateau in neutralizing antibodies in this pre-exposed population
- Second interim data show antibody titers remained above baseline at all dose levels at 7 months after vaccination
hMPV/PIV3 vaccine (mRNA-1653)
Phase 1 in healthy adults; Summary interim results, through 7 months

**Safety and tolerability**
- mRNA-1653 was found to be generally well tolerated at all dose levels
- No serious adverse events (SAEs), adverse events of special interest, or adverse events leading to withdrawal were reported
- Injection site pain was the most commonly reported solicited adverse event and grade 3 adverse event

**Immunogenicity**
- Single vaccination boosted serum neutralization titers against hMPV and PIV3 at all dose levels testedmRNA-1653 was found to be generally well tolerated at all dose levels
- Neutralizing antibodies against hMPV and PIV3 present at baseline in all subjects, consistent with prior exposure to both viruses
- 1 month after a single vaccination, hMPV and PIV3 neutralization titers ~6x and ~3x baseline, respectively
- Second vaccination did not further boost antibody titers, suggesting a single vaccination was sufficient to achieve a plateau in neutralizing antibodies in this pre-exposed population
- Second interim data show antibody titers remained above baseline at all dose levels at 7 months after vaccination
This presentation contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, as amended including, but not limited to, statements concerning potential development candidate applications, development candidate activities, preclinical and clinical studies, regulatory submissions and approvals, risk management and estimates and forward-looking projections with respect to Moderna or its anticipated future performance or events. In some cases, forward-looking statements can be identified by terminology such as “may,” “should,” “expects,” “intends,” “plans,” “aims,” “anticipates,” “believes,” “estimates,” “predicts,” “potential,” “continue,” or the negative of these terms or other comparable terminology, although not all forward-looking statements contain these words. The forward-looking statements in this presentation are neither promises nor guarantees, and you should not place undue reliance on these forward-looking statements because they involve known and unknown risks, uncertainties and other factors, many of which are beyond Moderna’s control and which could cause actual results to differ materially from those expressed or implied by these forward-looking statements. These risks, uncertainties and other factors include, among others: preclinical and clinical development is lengthy and uncertain, especially for a new category of medicines such as mRNA, and therefore Moderna’s preclinical programs or development candidates may be delayed, terminated, or may never advance to or in the clinic; no mRNA drug has been approved in this new potential category of medicines, and may never be approved; mRNA drug development has substantial clinical development and regulatory risks due to the novel and unprecedented nature of this new category of medicines; and those described in Moderna’s most recent Annual Report on Form 10-K filed with the U.S. Securities and Exchange Commission (SEC) and in subsequent filings made by Moderna with SEC, which are available on the SEC’s website at www.sec.gov. Except as required by law, Moderna disclaims any intention or responsibility for updating or revising any forward-looking statements in this presentation in the event of new information, future developments or otherwise. These forward-looking statements are based on Moderna’s current expectations and speak only as of the date hereof.