Business Update and Second Quarter 2019 Financial Results
August 7, 2019
Forward-looking statements

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mRNA as a potential new class of medicines

1. Large product opportunity
2. Higher probability of technical success
3. Accelerated research and development timelines
4. Greater capital efficiency over time vs. recombinant technology
Risk management is essential to building a new class of medicines.
Moderna Priorities for 2019-2020

*We focus on our portfolio of potential mRNA medicines, not “lead assets”*

1. **Execute on the development pipeline**
   - 20 programs in development
   - Focus on demonstrating human proof of concept

2. **New development candidates in existing modalities**

3. **New development candidates in new modalities**
Modernā’s development pipeline

- 7 Prophylactic vaccine programs
- 2 Cancer vaccine programs
- 3 Intratumoral immunology programs
- 1 Localized regenerative therapies program
- 3 Systemic secreted therapies programs
- 4 Systemic intracellular therapies programs
- New announcements since 1Q 2019 update

Positive Phase 1 Data*

- PCV
- VEGF-A
- OX40L
- RSV (1777) vaccine
- hMPV+PIV3 vaccine
- Chikungunya vaccine
- H7 vaccine
- H10 vaccine

Pre-Clinical Development | Open IND | Phase 1 | Phase 2 planning | Phase 2
---|---|---|---|---
GSD1a | PKU | PA | Fabry | Relaxin
MMA | CMV vaccine | RSV (1777) vaccine | OX40L vaccine | OX40L ovarian
PCV | VEGF-A

*Data in some cases are interim; positive data means the data warrant continued advancement within a trial or for further development.
Modernas development pipeline

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**Positive Phase 1 Data***

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<th>PCV</th>
<th>VEGF-A</th>
<th>OX40L</th>
<th>RSV (1172) vaccine</th>
<th>hMPV+PIV3 vaccine</th>
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<th>H7 vaccine</th>
<th>H10 vaccine</th>
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</thead>
</table>

**New announcements since 1Q 2019 update**

- RSV (1172) vaccine
- hMPV+PIV3 vaccine
- Chikungunya vaccine
- H7 vaccine
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New announcements since 1Q 2019 update

Pre-Clinical Development
- GSD1a
- PKU
- PA
- Fabry
- Relaxin

Open IND
- MMA

Phase 1
- KRAS Vaccine
- IL12
- RSV (1172) vaccine
- Zika vaccine
- hMPV+PIV3 vaccine
- Chikungunya antibody
- OX40L+IL23+IL36γ (Triplet)
- OX40L solid tumors
- PCV
- CMV vaccine
- RSV (1777) vaccine
- Chikungunya vaccine

Phase 2 planning
- OX40L ovarian

Phase 2
- PCV
- VEGF-A
- H7 vaccine
- H10 vaccine

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Phase 1 Data*
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# Moderna in August 2019

## Programs in Development

<table>
<thead>
<tr>
<th><strong>Immuno-Oncology</strong></th>
<th><strong>Rare Disease</strong></th>
<th><strong>Vaccines for major unmet needs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• PCV in Ph 2</td>
<td>• MMA – Ph 1 actively recruiting</td>
<td>• CMV in Ph 1, fully enrolled</td>
</tr>
<tr>
<td>• OX40L preparing for Ph 2 cohort</td>
<td>• PA, PKU, Fabry &amp; GSD1a in GLP Tox</td>
<td>• RSV in Ph 1</td>
</tr>
<tr>
<td>• Triplet in Ph 1</td>
<td>• First secreted systemic therapeutic in Ph 1</td>
<td>• hMPV+PIV3 – positive interim Ph 1 data</td>
</tr>
<tr>
<td>• KRAS &amp; IL12 in Ph 1</td>
<td></td>
<td>• Zika in Ph 1</td>
</tr>
</tbody>
</table>

## Foundations

- **>1,000** Healthy volunteers and patients enrolled
- **>800** employees
- **200,000 sq. ft.** GMP site operational in Norwood, MA

## Leading Biopharma Partners

- Merck
- AstraZeneca
- Vertex

## Financials

- **$1.44 bn** of cash, cash equivalents, and investments as of June 30, 2019 (unaudited)
Progress by modality

- Prophylactic vaccines
- Cancer vaccines
- Intratumoral immuno-oncology
- Localized regenerative therapeutics
- Systemic secreted therapeutics
- Systemic intracellular therapeutics
Progress by modality

- Prophylactic vaccines
- Cancer vaccines
- Intratumoral immuno-oncology
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- Systemic intracellular therapeutics
# Prophylactic Vaccines

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<th>Phase 3 and commercial</th>
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<tr>
<td>mRNA-1172/ Merck V172</td>
<td>RSV vaccine</td>
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<tr>
<td>mRNA-1647</td>
<td>CMV vaccine</td>
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<tr>
<td>mRNA-1653</td>
<td>hMPV+PIV3 vaccine</td>
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<tr>
<td>mRNA-1893</td>
<td>Zika vaccine</td>
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<tr>
<td>mRNA-1851</td>
<td>Influenza H7N9 vaccine</td>
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<tr>
<td>mRNA-1440</td>
<td>Influenza H10N8 vaccine</td>
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<tr>
<td>mRNA-1388</td>
<td>Chikungunya vaccine</td>
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<td>Worldwide</td>
</tr>
</tbody>
</table>

**Prophylactic vaccines – Commercial programs**

**Prophylactic vaccines – Global health programs**
Prophylactic vaccines

Five positive phase 1 readouts

Clinical summary

• Safety: > 1,000 healthy volunteers enrolled in 9 phase 1 vaccine trials, at dose levels up to 400µg
  – Emerging safety and tolerability profile consistent with that of marketed adjuvanted vaccines

• Progress:
  – CMV (mRNA-1647): Phase 1 fully enrolled, with top dose of 300µg
  – RSV (mRNA-1172/Merck V172): First subject dosed in phase 1
  – Zika (mRNA-1893): First subject dosed in phase 1
  – hMPV+PIV3 (mRNA-1653): Phase 1 second interim data show antibody titers remained above baseline at all dose levels at month 7. Full data to be presented at a future medical meeting
    • Preparing to start phase 1b study in seropositive toddlers following recent meeting with FDA
  – Chikungunya vaccine (mRNA-1388): Phase 1 data – 100% seroresponse for subjects at the 100µg dose level at 1 month and 92.9% at 6 months post vaccination
  – H7 influenza (mRNA-1851): Phase 1 data: 96% of subjects at 25µg achieved HAI titer > 1:40
  – H10 influenza (mRNA-1440): Phase 1 data: 100% of subjects at 100µg achieved HAI titer > 1:40
    • Publication in Vaccine showing mRNA-1851 and mRNA-1440 against H7N9 and H10N8 influenza viruses, respectively, were immunogenic and well tolerated
Prophylactic vaccines

mRNA-1647 for CMV: Phase 1 trial fully enrolled; with top dose of 300μg

Congenital cytomegalovirus (CMV) overview

• Human CMV is a common human pathogen and member of the herpes virus family and is the leading cause of birth defects

• Disease burden: Birth defects in 20% of infected babies – permanent neurodevelopment disabilities
  — approximately one third of infants with severe congenital disease die in first year; significant long-term burden on survivors, caregivers, and health systems
  — 0.65% of US newborns infected annually (~25,000 US newborns)

• Initial target population: Women of childbearing potential
• Unmet need: No approved CMV vaccine

mRNA-1647

• Six mRNA sequences in total: five code for the pentamer, 1 codes for gB

Preclinical:

• mRNA-1647 demonstrated pentamer and gB can produce potent and durable antibody titers against the antigens in pre-clinical species

Clinical:

• Phase 1 trial is fully enrolled, no further cohorts after 300 μg dose cohort
Progress by modality

- Prophylactic vaccines
- Cancer vaccines
- Intratumoral immuno-oncology
- Localized regenerative therapeutics
- Systemic secreted therapeutics
- Systemic intracellular therapeutics
## Cancer Vaccines

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<td>mRNA-4157</td>
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<td>Personalized cancer vaccine (PCV)</td>
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<td>50-50 global profit sharing with Merck</td>
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<td>50-50 global profit sharing with Merck</td>
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<td>KRAS vaccine <em>CRC, NSCLC, pancreatic cancer</em></td>
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<tr>
<td>Merck V941</td>
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Note: NCI-4650 differs from mRNA-4157 in its neoantigen selection process
PCV (mRNA-4157)

*Phase 2 initiated; First patient consented*

- Randomized phase 2, PCV + pembrolizumab vs. pembrolizumab alone in resected melanoma at high risk of recurrence

**Key Objectives**
- Assess whether postoperative adjuvant therapy with mRNA-4157 and pembrolizumab improves recurrence free survival compared to pembrolizumab only in patients with complete resection of cutaneous melanoma at high risk of recurrence
- Primary endpoint: recurrence free survival at 12 months
Personalized cancer vaccine (mRNA-4157)

*Phase 1 design*

**Key Objectives**

- **Part A** — To assess the safety and tolerability of mRNA-4157 monotherapy in subjects with resected solid tumors, including an apheresis cohort
- **Parts B, C and D** — To assess the safety, tolerability, and recommended phase 2 dose of mRNA-4157 administered in combination with pembrolizumab
- **Part D** — To assess the immunogenicity of mRNA-4157 with pembrolizumab from apheresis samples

**Part A: Dose escalation (N = approx. 18)**

- mRNA-4157 0.04 mg
- mRNA-4157 0.13 mg
- mRNA-4157 0.39 mg
- mRNA-4157 1 mg

**Part B: Dose escalation (N = approx. 18)**

- mRNA-4157 0.04 mg
- mRNA-4157 0.13 mg
- mRNA-4157 0.39 mg
- mRNA-4157 1 mg

**Part B: PD1i-refractory (N = 17)**

**Part C: PD1/PDL1i naïve (N = 34)**

- MSS-CRC (N = 17)
- HPV-neg HNSCC (N = 17)

**Part D: Adjuvant melanoma (N = 10)**
Personalized Cancer Vaccines

mRNA-4157: Phase 1 data

Clinical & regulatory update

- Continuing to enroll patients in phase 1 safety, tolerability and immunogenicity trial monotherapy and in combination with pembrolizumab
- Part C&D: Continuing to enroll patients
- Interim safety, tolerability immunogenicity data presented at ASCO 2019
- First patients consented for phase 2 Randomized Controlled Trial

Select clinical data

**Safety**: mRNA-4157 is well tolerated at all dose levels studied with no DLTs reported. No mRNA-4157 related grade 3/4 AE or SAE was reported. The most common grade 2 adverse events were fatigue, soreness at the injection site, colitis and myalgias.

**Activity**: Neoantigen specific CD8 T-cell responses were detected in 10 out of 18 class I neoantigens in patient 40033, the first patient dosed at 1 mg who underwent apheresis. 100% of positive CD8 T-cell responses post vaccination were to neoantigens with a high predicted binding affinity of <500 nm.

**Early clinical**: Clinical responses have been seen in 6 out of 20 patients treated with mRNA-4157/pembrolizumab combination. Of these 6 patients, 2 responses have been seen in patients previously treated with PD-(L)1 inhibitor and 1 patient achieved CR prior to vaccination.

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1 Data cutoff as of May 10, 2019
KRAS Vaccine

**mRNA-5671/Merck V941:**

**KRAS Overview:**

- KRAS is a key regulator of cell proliferation and survival; mutations cause dysregulated cell proliferation
- One of the most frequently mutated oncogenes in human cancers; mutation is present in >20% of human cancers
- Mutations found principally in pancreatic, lung and colorectal cancers
- Recognition of mutated KRAS epitopes by T-cells can lead to cancer cell regression as proven by adoptive T-cell transfer

**mRNA-5671/Merck V941:**

- Codes for the four most prevalent KRAS mutations G12D, G12V, G13D, and G12C covering 80-90% of KRAS mutations

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1 T-Cell Transfer Therapy Targeting Mutant KRAS in Cancer, NEJM, Eric Tran, Ph.D., et al.
KRAS vaccine (mRNA-5671)/Merck V941
First Patient dosed in Phase 1 trial

Phase 1 study overview

— A Phase 1, Open-Label, Multicenter Study to Assess the Safety and Tolerability of mRNA-5671/Merck V941 as a Monotherapy and in Combination With Pembrolizumab in Participants With KRAS Mutant Advanced or Metastatic Non-Small Cell Lung Cancer, Colorectal Cancer or Pancreatic Adenocarcinoma

— Selecting for HLA subtypes (HLA-A*1101 and/or HLA-C*0802) most likely to respond
Progress by modality

- Prophylactic vaccines
- Cancer vaccines
- Intratumoral immuno-oncology
- Localized regenerative therapeutics
- Systemic secreted therapeutics
- Systemic intracellular therapeutics
## Intratumoral Immuno-Oncology

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<tbody>
<tr>
<td>mRNA-2416</td>
<td></td>
<td>OX40L Solid tumors/lymphoma Advanced ovarian Cancer</td>
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<td>Worldwide</td>
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<tr>
<td>mRNA-2752</td>
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<td>OX40L+IL23+IL36γ (Triplet) Solid tumors/lymphoma</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
<tr>
<td>MEDI1191</td>
<td></td>
<td>IL12 Solid tumors</td>
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<td></td>
<td></td>
<td></td>
<td>50-50 U.S. profit sharing; AZ to pay royalties on ex-U.S. sales</td>
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</tbody>
</table>

- **Slide 24**
OX40L

mRNA-2416: Phase 1 ongoing at highest dose level, Phase 2 cohort is being prepared

OX40L Overview:
• OX40L is a potent co-stimulator, which promotes T-cell proliferation and enhanced survival in the presence of antigen

mRNA-2416:
• mRNA-2416 encodes for OX40L, which is a membrane protein that we believe cannot be manufactured by recombinant technologies

Clinical:
• Phase 1/2, open-label, multicenter, dose escalation and efficacy study of mRNA 2416 for intratumoral injection to patients with advanced malignancies
• Interim analysis SITC 2018: mRNA-2416 is tolerable at all dose levels studied with no DLTs reported and the majority of AE’s being grade 1 or 2
• A clear increase in OX40L protein expression from mRNA-2416 was observed in both tumor and stromal regions in three out of the five post-treatment biopsies collected from injected tumors
• Dosing at highest levels (8mg) continues in phase 1
• Phase 2 cohort in patients with ovarian cancer, including in combination with durvalumab is being prepared
OX40L (mRNA-2416)

Phase 1/2 design

Key Objectives

• Evaluate safety and tolerability of mRNA-2416 administered intratumorally
• Define the maximum tolerated dose and recommended dose for expansion
• Other endpoints include PK analyses as well as assessment of biomarkers of immunological response in tumor

Arm A: mRNA-2416 alone

Dose escalation (N=45)

- mRNA-2416 1 mg (N=3-6)
- mRNA-2416 2 mg (N=3-6)
- mRNA-2416 4 mg (N=3-6)
- mRNA-2416 8 mg (N=3-6)
- mRNA-2416 8 mg (N=3-6) (confirmation in visceral lesions)

MTD/RDE

Phase 2 cohort

Dose expansion (N=30)
Ovarian carcinoma

Biopsy cohort enrichment

- Group A: Abscopal distal tumor (N=3 per dose)
- Group B: Primary tumor cycle 1 (N=3 per dose)
- Group C: Primary tumor cycle 2 (N=3 per dose)

Arm B: mRNA-2416 + durvalumab

Dose escalation (N=12)

- mRNA-2416 4 mg (N=3-6)
- mRNA-2416 8 mg (N=3-6)
- mRNA-2416 8 mg (N=3-6) (confirmation in visceral lesions)

MTD/RDE

Phase 2 cohort

Dose expansion (N=45)
Ovarian carcinoma
OX40L+IL23+IL36γ

mRNA-2752: Phase 1 ongoing; First patient dosed in combination durvalumab

OX40L+IL23+IL36γ (Triplet) Overview:
- OX40L powerful co-stimulatory protein that enhances T-cell expansion, function and memory formation
- IL23 and IL36γ have established roles in mediating immune responses

mRNA-2752:
- mRNA-2752 encodes for OX40L which is a membrane protein and secreted pro-inflammatory cytokines IL-23 and IL-36γ

Clinical:
- Phase 1, open-label, multicenter, dose escalation and efficacy study of mRNA 2752 for intratumoral injection alone and in combination with immune checkpoint blockade
- Phase 1 ongoing
- First patient dosed with combination of mRNA-2752 and durvalumab
OX40L+IL23+IL36γ (Triplet) (mRNA-2752)

**Phase 1 design**

### Key Objectives

- Evaluate safety and tolerability of mRNA-2752 administered alone and in combination with checkpoint inhibitors
- Define MTD and recommended dose for expansion for mRNA-2752 alone and in combination with durvalumab
- Intended to assess:
  - Anti-tumor activity
  - Protein expression in tumors
  - Pharmacokinetics

**Arm A: mRNA-2752 alone**

- Dose escalation (N=20)
  - Accessible solid tumors and lymphomas
  - mRNA-2752 0.25 mg
  - mRNA-2752 0.5 mg
  - mRNA-2752 1 mg
  - mRNA-2752 2 mg
  - mRNA-2752 4 mg

**MTD/RDE**

- Dose confirmation (N=3)
  - Visceral solid tumors and lymphomas

**Arm B: mRNA-2752 + durvalumab**

- Dose escalation (N=20)
  - Accessible solid tumors and lymphomas
  - mRNA-2752 0.25 mg + CPI
  - mRNA-2752 0.5 mg + CPI
  - mRNA-2752 1 mg + CPI
  - mRNA-2752 2 mg + CPI
  - mRNA-2752 4 mg + CPI

**MTD/RDE**

- Dose confirmation (N=3)
  - Visceral solid tumors and lymphomas

**Dose expansion**

- Triple-negative breast cancer (N=12)
- Head and neck squamous cell carcinoma (N=12)
- Non-Hodgkin lymphoma (N=12)

First patient dosed in combination arm
**IL12**

**MEDI1191: First patient dosed in phase 1**

**IL12 Overview:**
- IL12 is a potent immune modulator associated with type 1 immune response and production of interferon gamma

**MEDI1191:**
- Encodes for IL12, a secreted cytokine that acts locally in the tumor microenvironment (TME)

**Clinical:**
- Phase 1, open-label, multicenter, dose escalation and expansion study of MEDI1191 administered intratumorally as monotherapy and in combination with durvalumab in subjects with advanced solid tumors
- Key objectives to evaluate safety and tolerability in monotherapy and combination arms and objective response rate in patients within expansion arms
- First patient dosed with IL12 monotherapy in phase 1 trial
Progress by modality

- Prophylactic vaccines
- Cancer vaccines
- Intratumoral immuno-oncology
- Localized regenerative therapeutics
- Systemic secreted therapeutics
- Systemic intracellular therapeutics
## Localized Regenerative Therapeutics

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<tbody>
<tr>
<td>Localized regenerative therapeutics</td>
<td>AZD8601</td>
<td>VEGF-A Myocardial ischemia</td>
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<td>AZ to pay milestones and royalties</td>
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</table>
**VEGF-A**

**AZD8601: Phase 2a ongoing; additional trial sites open**

**VEGF-A:**
- VEGF-A is a potent angiogenic factor that promotes the growth of blood vessels
- Preclinical data suggest that expression of VEGF-A in the ischemic heart could increase blood flow and partially restore cardiac function

**AZD8601:**
- Encodes for VEGF-A in saline solution

**Clinical:**
- Phase 1a study demonstrated AZD8601 is well tolerated. Common AEs were mild. Phase 1a results show dose dependent production of VEGF-A
- Phase 1b data show a single dose of intradermal VEGF-A (AZD8601) restored baseline skin blood flow in diabetic patients
- Phase 2a study to evaluate safety in a CABG population is on going
- Additional clinical trial site open in Germany. Sites now open in Finland, Netherlands and Germany

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O$^{18}$-PET imaging is used to create tailored injection maps in patients
Progress by modality

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## Systemic secreted therapeutics

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<tr>
<td>mRNA-1944</td>
<td></td>
<td>Antibody against Chikungunya virus</td>
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<td>AZD7970</td>
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<td>Relaxin <em>Heart failure</em></td>
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<td>50-50 U.S. profit sharing; AZ to pay royalties on ex-U.S. sales</td>
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<td>mRNA-3630</td>
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<td>α-GAL <em>Fabry disease</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
</tbody>
</table>

*Note: Preclinical, Phase 1, Phase 2, Phase 3 and commercial, and Moderna rights details are placeholders for actual data.*
Antibody against Chikungunya virus

**mRNA-1944: 6 of 8 subjects dosed in 3rd cohort of Ph 1 trial**

### Antibody against Chikungunya virus Overview:
- Circulating antibody to confer passive immunity

### mRNA-1944:
- Encodes for antibodies against Chikungunya virus consisting of heavy and light chains

### Preclinical data:
- **Safety**: (mRNA-1944) – Top dose tested in NHPs was NOAEL (no observed adverse event level)
- **Activity**: Dose-dependent expression of mRNA-1944 in NHPs

### Clinical:
- Phase 1, Randomized, placebo controlled single ascending dose study in healthy volunteers evaluating safety and tolerability
- Objectives: to determine pharmacokinetics of up to four dose levels on mRNA-1944, to determine if antibodies produced neutralize the virus and to determine pharmacodynamics of Chikungunya virus IgG levels
- Initial 6 subjects (6 of 8 subjects) dosed in 3rd cohort of phase 1 trial

---

1 As of July 30, 2019
Antibody against Chikungunya virus (mRNA-1944)
6 of 8 subjects dosed in 3rd cohort of Phase 1 trial¹

- Randomized, placebo-controlled, single ascending dose study in healthy adults

**Key Objectives**
- Evaluate safety and tolerability of escalating doses of mRNA-1944 administered via intravenous infusion
- Determine pharmacokinetics of up to four dose levels (0.1, 0.3, 0.6, 1.0 mg/kg)
- Determine if the antibodies produced are sufficiently active to neutralize viral infection in assays
- Determine the pharmacodynamics of anti-Chikungunya virus IgG levels

¹As of July 30, 2019
Our Modality Strategy

Increasing biology risk

CMV vaccine

Flu vaccines (H7, H10)

OX40L

OX40L+ IL23+IL36γ (Triplet)

VEGF-A (no LNP)

Localized regenerative therapeutics

Intratumoral immunology

OX40L

Cancer vaccines

Prophylactic vaccines

Locally advanced regenerative therapeutics

Systemic secreted therapeutics

Systemic intracellular therapeutics

CMV vaccine

Flu vaccines (H7, H10)

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OX40L+ IL23+IL36γ (Triplet)

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Localized regenerative therapeutics

Intratumoral immunology

OX40L
Progress by modality

- Prophylactic vaccines
- Cancer vaccines
- Intratumoral immuno-oncology
- Localized regenerative therapeutics
- Systemic secreted therapeutics
- Systemic intracellular therapeutics
## Systemic intracellular therapeutics

<table>
<thead>
<tr>
<th>Modality</th>
<th>ID#</th>
<th>Program Indication</th>
<th>Preclinical development</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3 and commercial</th>
<th>Moderna rights</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRNA-3704</td>
<td>MUT</td>
<td>Methylmalonic acidemia, MMA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
<tr>
<td>mRNA-3927</td>
<td>PCCA+PCCB</td>
<td>Propionic acidemia, PA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
<tr>
<td>mRNA-3283</td>
<td>PAH</td>
<td>Phenylketonuria, PKU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
<tr>
<td>mRNA-3745</td>
<td>G6Pase</td>
<td>Glycogen storage disease type 1a, GSD1a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worldwide</td>
</tr>
</tbody>
</table>
Methylmalonic acidemia (MMA)
Propionic acidemia (PA)

MMA/ PA Overview:
• MMA and PA are inborn errors of protein metabolism caused by MUT enzyme deficiency and PCC enzyme deficiency, respectively
• Similar biology and disease pathology
• Rare diseases: prevalence for each disease in the US:
  – MMA: ~500-2000 patients
  – PA: ~325-2000 patients
• Identified by newborn screening
• Current care regimens include strict dietary restriction, oral and IV medications as supportive care and liver transplant

Organic acidemias
Multiple candidates targeting the same metabolic pathway
MMA (mRNA-3704): Phase 1/2 trial sites actively recruiting

PA (mRNA-3927): Preparing IND filing

MMA (mRNA-3704):
- Encodes for MUT enzyme, an intracellular protein that acts in the mitochondria of liver cells
- Same proprietary lipid nanoparticle formulation as antibody against Chikungunya virus (mRNA-1944)
- FDA orphan drug designation, FDA rare pediatric disease designation, FDA Fast Track designation, EMA orphan drug designation

PA (mRNA-3927):
- Encodes for PCCA and PCCB subunits that form the active PPC enzyme, an intracellular protein that acts in the mitochondria in liver cells
- Same proprietary lipid nanoparticle formulation as antibody against Chikungunya virus (mRNA-1944)
- FDA orphan drug designation, FDA rare pediatric disease designation, EMA orphan drug designation

Preclinical data
- Safety: MMA (mRNA-3704) – Top dose tested in NHPs was NOAEL (no observed adverse event level)
- Activity: MMA – 100% rescue in severe MMA mouse model

Clinical & regulatory update
- MMA and PA Natural History Study (MaP): 71 patients enrolled (35 MMA, 36 PA)¹
- MMA (mRNA-3704) – Phase 1/2 trial sites for interventional study open

¹ As of July 15, 2019
### Moderna’s development pipeline

**Modality**
- **Prophylactic vaccines**
  - mRNA-1172: Respiratory syncytial virus (RSV) vaccine
    - Preclinical development
    - Phase 1 (adults): Positive interim data; starting phase1b toddler study
  - mRNA-1777: Respiratory syncytial virus (RSV) vaccine
    - Preclinical development
    - Phase 1 fully enrolled
  - mRNA-1647: Cytomegalovirus (CMV) vaccine
    - Phase 1
  - mRNA-1653: Human metapneumovirus and parainfluenza virus 3 (hMPV+PIV3) vaccine
    - Phase 1b (pediatrics)
  - mRNA-1440: Influenza H10N8 vaccine
    - Phase 1 (adults)
    - Merck to pay milestones and royalties
  - mRNA-1851: Influenza H7N9 vaccine
    - Phase 1
    - Worldwide Advancing subject to funding
  - mRNA-1893: Zika vaccine
    - First patient dosed
    - Worldwide BARDA funded
  - mRNA-1388: Chikungunya vaccine
    - Advancing subject to funding

- **Cancer vaccines**
  - mRNA-4157: Personalized cancer vaccine (PCV)
    - Phase 2
    - Interim phase 1 data presented ASCO ’19
    - 50-50 global profit sharing with Merck
  - NCI-4650: Personalized cancer vaccine (PCV)
    - Phase 2 started
    - 50-50 global profit sharing with Merck
  - mRNA-5671: KRAS vaccine
    - First patient dosed in phase 1
    - 50-50 global profit sharing with Merck

- **Intratumoral immuno-oncology**
  - mRNA-2416: OX40L
    - Dosing in combination with durvalumab
    - Ovarian
    - Phase 2 cohort actively recruiting
  - mRNA-2752: OX40L+IL23+IL36 γ (Triplet)
    - Solid tumors
    - Worldwide
  - MEDI1191: IL12
    - Solid tumors
    - First patient dosed in phase 1
    - Worldwide

- **Localized regenerative therapeutics**
  - AZD8601: VEGF-A
    - Myocardial ischemia
    - AZ to pay milestones and royalties

- **Systemic secreted therapeutics**
  - mRNA-1944: Antibody against Chikungunya virus
    - 6/8 subjects in 3rd cohort enrolled
    - Worldwide DARPA funded
  - AZD7970: Relaxin
    - Heart failure
    - 50-50 U.S. profit sharing; AZ to pay royalties on ex-U.S. sales
  - mRNA-3630: α-GAL
    - Fabry disease
    - Worldwide

- **Systemic intracellular therapeutics**
  - mRNA-3704: MUT
    - Methylmalonic Acidemia (MMA)
    - Phase 1/2 trial sites open, Fast Track Designation
    - Worldwide
  - mRNA-3927: PCCA+PCCB
    - Propionic Acidemia (PA)
    - Worldwide
  - mRNA-3283: PAH
    - Phenylketonuria (PKU)
    - Worldwide
  - mRNA-3745: G6Pase
    - Glycogen Storage Disease Type 1a (GSD1a)
    - DC nomination
    - Worldwide

**Announcements since IPO**
- Phase 1b enrollment started
- Phase 1 fully enrolled
- First patient dosed in phase 1
- Phase 1 (adults) positive interim data; starting phase1b toddler study
- First patient dosed in phase 1
- Interim phase 1 data presented ASCO ’19
- Phase 2 started
- Worldwide
- 50-50 global profit sharing with Merck
- 50-50 U.S. profit sharing; AZ to pay royalties on ex-U.S. sales
- Worldwide DARPA funded
## Second Quarter 2019 Financial Results (Unaudited)

### Balance Sheets

<table>
<thead>
<tr>
<th></th>
<th>June 30, 2019</th>
<th>December 31, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash, cash equivalents and investments</td>
<td>$ 1.44 billion</td>
<td>$ 1.69 billion</td>
</tr>
</tbody>
</table>

### Statements of Cash Flows

<table>
<thead>
<tr>
<th></th>
<th>6 months ended June 30, 2019</th>
<th>6 months ended June 30, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net cash used in operating activities</td>
<td>$ 256 mm</td>
<td>$ 160 mm</td>
</tr>
<tr>
<td>Cash used for purchases of property and equipment</td>
<td>$ 18 mm</td>
<td>$ 66 mm</td>
</tr>
</tbody>
</table>

### Statements of Operations

<table>
<thead>
<tr>
<th></th>
<th>3 months ended June 30, 2019</th>
<th>3 months ended June 30, 2018</th>
<th>6 months ended June 30, 2019</th>
<th>6 months ended June 30, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenue</td>
<td>$ 13 mm</td>
<td>$ 29 mm</td>
<td>$ 29 mm</td>
<td>$ 58 mm</td>
</tr>
<tr>
<td>Research and development expenses</td>
<td>$ 128 mm</td>
<td>$ 104 mm</td>
<td>$ 259 mm</td>
<td>$ 195 mm</td>
</tr>
<tr>
<td>General and administrative expenses</td>
<td>$ 29 mm</td>
<td>$ 21 mm</td>
<td>$ 56 mm</td>
<td>$ 38 mm</td>
</tr>
<tr>
<td>Total operating expenses</td>
<td>$ 157 mm</td>
<td>$ 126 mm</td>
<td>$ 315 mm</td>
<td>$ 232 mm</td>
</tr>
<tr>
<td>Net loss</td>
<td>$ (135) mm</td>
<td>$ (91) mm</td>
<td>$ (268) mm</td>
<td>$ (163) mm</td>
</tr>
</tbody>
</table>

### Notes:

1. Excludes restricted cash of $12 mm for both June 30, 2019 and December 31, 2018.
2. Includes $22 mm and $25 mm in the first quarter of 2019 and 2018, respectively, of in-licensing payments to Cellscript, LLC and its affiliate, mRNA RiboTherapeutics, Inc. to sublicense certain patent rights. After the first quarter of 2019, we have no further in-licensing payment obligations under the Cellscript-MRT Agreements.
3. Includes $11 mm in 2019 and $61 mm in 2018 related to our Norwood manufacturing facility.

**2019 expected cash position:**

*Moderna reiterates its expectation for cash, cash equivalents and investments at December 31, 2019 to be in the range of $1.15 billion to $1.20 billion.*
Moderna Priorities for 2019-2020

We focus on our portfolio of potential mRNA medicines, not “lead assets”

1. Execute on the development pipeline
   - 20 programs in development
   - Focus on demonstrating human proof of concept

2. New development candidates in existing modalities

3. New development candidates in new modalities
Moderna 2Q19 Highlights

• Phase 2 Personalized Cancer Vaccine (mRNA-4157) study initiated, with first patient consented

• Phase 1 CMV vaccine (mRNA-1647) study fully enrolled

• Four new phase 1 trials have begun, two in immuno-oncology and two in infectious diseases

• Vertex Pharmaceuticals extended the companies’ CF research collaboration
## Anticipated clinical next steps

| Prophylactic vaccines | • CMV – Phase 1 safety and immunogenicity data; Phase 2 start  
|                       | • hMPV+PIV3 – Phase 1b seropositive toddler study start  
|                       | • RSV – Phase 1 safety and immunogenicity data  
|                       | • Zika – Phase 1 safety and immunogenicity data  
| Cancer vaccines       | • PCV – Additional Ph1 data and Phase 2 clinical data  
|                       | • KRAS – Phase 1 data  
| Intratumoral  
immuno-oncology     | • OX40L – Initiation of dosing of phase 2 cohort in advanced ovarian carcinoma  
|                       | • OX40L+IL23+IL36γ (Triplet) – Completion of dose escalation monotherapy and combination cohorts  
|                       | • IL12 – Phase 1 data  
| Localized  
regenerative  
therapeutics | • VEGF – Phase 2a data  
| Systemic  
secreted  
therapeutics | • Antibody against Chikungunya virus – Phase 1 safety and serum antibody levels  
|                       | • Fabry – IND filing  
|                       | • Relaxin – IND filing (AstraZeneca)  
| Systemic  
intracellular  
therapeutics | • MMA – Safety and proof of concept biomarker Phase 1/2 data  
|                       | • PA – IND filing  
|                       | • PKU – IND filing  
|                       | • GSD1a – IND filing  

mRNA as a potential new class of medicines

1. Large product opportunity
2. Higher probability of technical success
3. Accelerated research and development timelines
4. Greater capital efficiency over time vs. recombinant technology
mRNA as a potential new class of medicines

1. Large product opportunity

<table>
<thead>
<tr>
<th>Indication</th>
<th>Development Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMV</td>
<td>mRNA-1647</td>
</tr>
<tr>
<td>RSV</td>
<td>mRNA-1172/1777</td>
</tr>
<tr>
<td>hMPV/PIV3</td>
<td>mRNA-1653</td>
</tr>
<tr>
<td>Zika</td>
<td>mRNA-1893</td>
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<td>PCV</td>
<td>mRNA-4157</td>
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<tr>
<td>KRAS</td>
<td>mRNA-5671</td>
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<tr>
<td>OX40L</td>
<td>mRNA-2416</td>
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<tr>
<td>Triplet</td>
<td>mRNA-2752</td>
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<tr>
<td>IL12</td>
<td>MEDI1191</td>
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<td>MMA</td>
<td>mRNA-3704</td>
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<td>PA</td>
<td>mRNA-3927</td>
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<tr>
<td>GSD1A</td>
<td>mRNA-3745</td>
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<tr>
<td>Fabry</td>
<td>mRNA-3630</td>
</tr>
<tr>
<td>PKU</td>
<td>mRNA-3283</td>
</tr>
<tr>
<td>VEGF-A</td>
<td>AZD8601</td>
</tr>
</tbody>
</table>
mRNA as a potential new class of medicines

1. Large product opportunity
2. Higher probability of technical success
3. Accelerated research and development

19 INDs/CTAs opened
8 positive phase 1 readouts to date *
16 development candidates in clinical trials Since December 2015

*Data in some cases are interim; positive data means the data warrant continued advancement within a trial or for further development
Our Mission
To deliver on the promise of mRNA science to create a new generation of transformative medicines for patients.
Please Join us for R&D Day

Thursday, September 12, 2019
JW Marriott Essex House
160 Central Park South
Grand Salon
New York, NY 10019

7:30am – 8:30am
Breakfast and Registration

8:30am – 12:30pm
Presentations

Lunch to Follow

RSVP by Thursday, August 29
Daniella Funaro
daniella.funaro@sternir.com
212.362.1200