Forward-Looking Statements

This presentation includes statements that are, or may be deemed, “forward-looking statements,” within the meaning of Section 27A of the Securities Act of 1933, as amended. All statements, other than statements of historical facts, included in this presentation regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans and objectives of management are forward-looking statements. In some cases, you can identify forward-looking statements by terms such as “may,” “might,” “will,” “objective,” “intend,” “should,” “could,” “can,” “would,” “expect,” “believe,” “anticipate,” “project,” “target,” “design,” “estimate,” “predict,” “opportunity,” “proposition,” “strategy,” “potential,” “plan” or the negative of these terms and similar expressions intended to identify forward-looking statements.

You should not place undue reliance on these forward-looking statements. Forward-looking statements include, but are not limited to, statements about: the timing and success of preclinical studies and clinical trials; the ability to obtain and maintain regulatory approval of our product candidates; the scope, progress, expansion and costs of developing and commercializing our product candidates; our expectations regarding the amount and timing of our expenses and revenue; the sufficiency of our cash resources; plans for the use of our cash resources and needs for additional financing; our ability to adequately manufacture our product candidates; our ability to obtain and maintain intellectual property protection for our product candidates; our expectations regarding competition; the size and growth of the potential markets for our product candidates and the ability to serve those markets; the rate and degree of market acceptance of any of our product candidates; our anticipated growth strategies; the anticipated trends and challenges in our business and the market in which we operate; our ability to establish and maintain development partnerships; our ability to attract or retain key personnel; our expectations regarding federal, state and foreign regulatory requirements; regulatory developments in the United States and foreign countries and other factors that are described in the “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” sections of our Annual Report on Form 10-K for the year ended December 31, 2018 and our quarterly report on Form 10-Q for the quarter ended September 30, 2019, each of which has been filed with the Securities and Exchange Commission (SEC) and is available on the SEC’s website at www.sec.gov.

In addition, the forward-looking statements included in this presentation represent Inovio’s views as of the date hereof. Inovio anticipates that subsequent events and developments may cause its views to change. However, while Inovio may elect to update these forward-looking statements at some point in the future, the company specifically disclaims any obligation to do so, except as may be required by law. These forward-looking statements should not be relied upon as representing Inovio’s views as of any date subsequent to the date of this presentation.

Third-party industry and market information included herein has been obtained from sources believed to be reliable, but the accuracy or completeness of such information has not been independently verified by, and should not be construed as a representation by, Inovio. The information contained in this presentation is accurate only as of the date hereof. “Inovio” and the Inovio logo are trademarks and service marks of Inovio. All other trademarks, service marks, trade names, logos and brand names identified in this presentation are the property of their respective owners.
Powering a New Decade of DNA Medicines

Precisely Designed Plasmids Delivered Through Proprietary Smart Device

Safe and Robust Immune Responses in More Than 2,000 Patients

In Vivo Immune Responses for “Off-the-Shelf” Speed, Efficiency

Extensive Patent Portfolio Protecting Technology Platform

FIRST DNA Medicine in Phase 3 Clinical Trials (VGX-3100) for Precancerous Cervical Dysplasia

FIRST to Show Clearance of High-Risk HPV 16/18 in Phase 2b Trial (VGX-3100)

FIRST to Show Complete Response in Phase 1 w/2 PD-1s for Head and Neck Cancer (MEDI0457)

FIRST dMAb® in Phase 1 for Zika (INO-A002)
Founding Vision

- Create precisely designed plasmids that target antigens to address urgent medical needs
- Develop proprietary device to deliver plasmid safely in vivo directly into the cell to produce robust immune response
- Build scientific, medical, and commercial team and outstanding partnerships to drive value

Near-Term Execution

- Rapidly bring to market precisely designed DNA medicines to treat, cure, and protect people from diseases associated with HPV, cancer, and infectious diseases
- Maximize value of lead candidates worldwide

Long-Term Strategy

- Create new market in safe, effective DNA medicines
- Aggressively seek partners to ensure DNA medicines reach patients in need
- Be capital efficient
  - $93.8M cash/investments as of last reported earnings (9/30/19)
Vision Built on INOVIO Proprietary Technology

OPTIMIZED PLASMID DESIGN AND DELIVERY TECHNOLOGY

PRECISELY DESIGNED PLASMIDS (SynCon®)

PROPRIETARY SMART DEVICE (CELLECTRA®)

IN VIVO
INOVIO Technology – Powering Potent Antigen Specific Immune Responses

INOVIO DNA medicines power a patient’s immune system to generate functional antibodies and killer T cells in vivo to fight cancer and infectious disease.

1. Identify diverse strains/variants of a target virus or cancer
2. Assess gene sequence of selected antigen(s) from chosen strains/variants of the virus or cancer
3. Create optimal Consensus Sequence for the selected antigen
4. Insert SynCon sequence for each selected antigen into a separate precisely designed plasmid
5. Manufacture DNA medicine and deliver into muscle or skin using CELLECTRA® proprietary smart device
6. Protective antibodies and killer T cells produced by immune system against diverse strains of a virus or cancer
CELECTRA® 5PSP – INOVIO’s First Commercial Smart Device

CELECTRA® 5PSP

- World’s first commercial smart device for DNA Medicine – CE Marking in Europe
- Proprietary smart device currently used in Phase 3 trials
- Simplified interaction and automated injection using prefilled cartridge
- Disposable single use array which includes used drug cartridge
- Touch screen interface, automated sensors and trigger start
- Records data file for post-treatment review
- Data files can be downloaded from system and uploaded to web-based interface
- Several rounds of Usability Testing that refined development
INOVIO’s Technology Advantages

Clinical Efficacy
• Demonstrated clinical efficacy in Phase 2b study
• Lead candidate VGX-3100 in Phase 3 for cervical dysplasia

Safety
• Favorable safety profile tested in over 2,000 patients in over 6,000 administrations
• Carries no potential toxicity from viral vectors

Versatility and Boosting
• Targets virtually any antigenic sequence; combining multi-antigens into single vial
• Initiated first-in-human study of optimized dMAb®
• No anti-vector response – allows for effective boosting

Rapid and Scalable Manufacturing
• “Off-the-shelf” product; no cold-chain storage issues (room temp storage >1 yr.)
• Rapid development from concept to human in 7 months (Zika vaccine)
• Relatively inexpensive to manufacture; produce large quantities
Limitations of Other Approaches

Viral Vectors – Receptor/cell target based mediated entry
- Systemic delivery/local injection
- Preexisting or induced immunity is an issue
- Biologic variability of take
- Immune bias tuned by vector
- Hard to re-administer/tissue tropism limits and positives

RNA – LNP/nanoparticle delivery dependent
- Systemic delivery, localized expression (liver>lung or spleen)
- Process for manufacture and release work in progress
- Formulations + RNA follow tissue targeting of the particles/cold chain required, include focus on IV route
- DLT observed, low CTL induced, inflammatory
- High cost of goods
### INOVIO DNA Medicines Pipeline

<table>
<thead>
<tr>
<th>Product</th>
<th>Indication</th>
<th>Antigen</th>
<th>Preclinical</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Partner/Collaborator/Funder</th>
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<td>Product</td>
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HPV-Related Programs
HPV-Associated Diseases Market Overview

HPV-associated conditions per year in US:

- **80M Americans currently infected with HPV**
- **14M new infections annually**
- **~7M high-risk HPV infections (HPV 16/18)**

- **Cervical:** 1.1M to 1.7M
- **Cervical:** ~195,000
- **Vulvar:** >25,000
- **Anal:** >14,000
- **Cervical:** 12,000
- **HPV-associated H&N:** 18,000
- **Anal:** ~6,500
- **Vulvar:** ~4,000

Sources:
Published VGX-3100 Phase 2b Study Achieves All Primary and Secondary Endpoints

Phase 2b Endpoints (n=167)

**Primary:** Regression to CIN1 or Normal 49.5%  P=0.017

**Secondary:** Regression to Normal AND Virological Clearance 40.2%  P=0.003

IHC Staining: HPV

Week 0

Week 36

T Cell Responses Measured in Blood

VGX-3100 Specific T Cells

*Statistically significant; bars are 95% CI

Treatment at wks 0, 4, & 12

Increased and persistent presence of CD8+ cells (24 weeks post-last dose)

CD8+ T Cell Infiltration

Regression of CIN3 & HPV to normal

Pre

Post

IHC Staining: CD8+ T Cell Infiltration

IHC Staining: HPV

Trimble et al. Lancet 2015
VGX-3100 Phase 3 Program: HPV-Associated Cervical HSIL/Precancerous Dysplasia

**TRIAL: VGX-3100**
- Targets HPV 16/18 subtypes; E6/E7 oncogenes
- Treats high-grade squamous intraepithelial lesions (HSIL)

**Phase 3 consists of 2 studies in parallel:**

**REVEAL1 (primary) n=198 – Enrollment Closed**
Study follow-up through week 88 (as in P2b)
Topline efficacy data expected by 4Q 2020

**REVEAL2 (confirmatory) n=198 – Now Enrolling**
Study follow-up through week 40

**FIRST** treatment for HPV infection of the cervix
**FIRST** non-invasive treatment for cervical pre-cancer
**Primary endpoint:**
Regression of HSIL (CIN2/3) AND clearance of HPV 16/18 in the cervix

2:1 Randomized (2:1), double-blind, placebo-controlled

Dosing: month 0, 1, 3 (as in P2b)

mo.9 Primary endpoint measured at month 9 (as in P2b)
In 2Q 2019, INOVIO entered into collaboration with QIAGEN to co-develop a liquid biopsy-based pretreatment commercial test kit to guide patient selection for VGX-3100:

• Aimed to produce an accurate test that would increase absolute efficacy of VGX-3100 among HPV-infected women who have progressed to Cervical HSIL (pre-cancer)

• Commercialization of a CDx test concurrently with VGX-3100 could enhance market adoption of this first-in-class DNA medicine
Recurrent Respiratory Papillomatosis (RRP) caused by HPV 6 and 11

- Rare, orphan disease with ~15,000 total active cases within the U.S., where virtually all of those require surgical procedures
  - ~6,000 new cases per yr. in the U.S.
  - HPV-associated disease; caused by HPV 6 and 11
  - Growths can lead to life-threatening airway obstructions
  - SoC is lifelong surgery (repeated/multiple times a yr)
    - Currently, disease is incurable and can only be treated by surgery to remove tumors, which temporarily restores the airway
  - RRP may occur in adults as well as in children who are thought to have contracted the virus during childbirth

Areas affected by Recurrent Respiratory Papillomatosis (RRP)

INO-3106 Pilot Study in RRP

**TRIAL: INO-3106** (for HPV 6-caused RRP)

- **Phase 1 pilot, single-site, clinical study**
- **Enrolled 2 adult patients with RRP, HPV 6+**
- **4 doses of vaccine, 3 weeks apart on Day 0, Weeks 3, 6, 9**
- **CELERECTRA-delivered INO-3106 (only for HPV 6) plasmid encoded antigens**

Two RRP patients had prior surgeries every 6 months

After receiving 4 doses, 1 patient has gone >915 days without surgery, and the second went 584 days without surgery

Planning potential registrational study of INO-3107 (for both HPV 6 and 11) by 1H 2020

Published in Vaccines (MDPI); entitled “Immune Therapy Targeting E6/E7 Oncogenes of Human Papillomavirus Type 6 (HPV-6) Reduces or Eliminates the Need for Surgical Intervention in the Treatment of HPV-6-Associated Recurrent Respiratory Papillomatosis”; January 23, 2020.
MEDI0457 for HPV-Related Cancers in Partnership with AstraZeneca

- **MEDI0457** (formerly INO-3112) = VGX-3100 + INO-9012 (IL-12 plasmid)

- In 2015, **AstraZeneca acquired exclusive rights to MEDI0457**
  - $27.5M upfront
  - ~$250M in potential development and commercial milestones
  - Double-digit tiered royalties on MEDI0457 sales

- **AstraZeneca is evaluating MEDI0457 in combination with its PD-L1 checkpoint inhibitor, durvalumab, in HPV-associated cancers**
MEDI0457 Potential to Treat Head and Neck Cancer Demonstrated in Phase 1 Trial

Cohort 1
HPV 16/18+ HNSCC undergoing definitive surgery (n=5)
Immunotherapy is administered before and after surgery

Cohort 2
HPV 16/18+ HNSCC undergoing definitive/adj chemoradiation (n=20)
Immunotherapy is administered 2 months after completion of chemoradiation

Primary: Safety and tolerability of DNA based immunotherapy
Secondary: Cellular and humoral immune responses
Exploratory: Anti-tumor response and progression free survival

Study Treatment: MEDI0457
MEDI0457: 6 mg of VGX-3100 + 1 mg of INO-9012
In Cohort 1, if time allows, up to 2 treatments can be administrated prior to surgery, but total 4 treatments are scheduled

Follow up for 6 months post last dose

Surgery
> 4 months
Robust antigen-specific CD8+ killer T cell responses observed in 20/22 – 90.1% – of patients (both tumor tissue and peripheral blood)

Aggarwal et al Clinical Cancer Research 2018
MEDI0457 Phase 1 Study Demonstrates Complete Response

Phase 1 study of MEDI0457 (VGX-3100+IL-12) in 22 HPV+ H&N cancer patients

- Robust antigen-specific CD8+ killer T cell responses observed in 20/22 – 90.1% – of patients (both tumor tissue and peripheral blood)
- 4 progressed over several year period exhibiting recurrence with metastatic disease; treated with PD-1
- 2/4 (50%) show complete response to PD-1 therapy and remained tumor free for 2+ years
- 50% CR rate compares well in metastatic HPV+ H&N:
  - 4% CR rate (8/192) by KEYTRUDA alone
  - 3% CR rate (6/240) by OPDIVO alone
- AstraZeneca conducting Phase 2 studies combining MEDI0457 and durvalumab (PD-L1 inhibitor)

(Top image) CT neck with IV contrast demonstrating partial response pre- and 6 weeks post-nivolumab.
(Bottom image) PET scan images pre- and 6 weeks post-nivolumab.

Published in Clinical Cancer Research (CCR) 2018
**TRIAL: MEDI0457 (VGX-3100 + IL-12)**

Phase 1b/2a open label study for metastatic HPV+ HNSCC with persistent or recurrent disease after chemotherapy treatment

Combination with AstraZeneca’s PD-L1 checkpoint inhibitor (durvalumab)

**Primary Endpoints:**
- Safety, tolerability

**Secondary Endpoints:**
- Immunogenicity, ORR, PFS, Disease CR, OS

Completed enrollment of 35 subjects in August 2019

**Planned Dosing Schedule:**
- **durvalumab:** Weeks 4, 8 and 12 and then every 4 weeks until disease progression, unacceptable toxicity or withdrawal of consent
- **MEDI0457:** Weeks 1, 3, 7 and 12 and then every 8 weeks until disease progression, unacceptable toxicity or withdrawal of consent

**TUMOR CORE BIOPSY AT SCREEN & WEEK 10**
HPV-Related Clinical Program Overview

Cervical Pre-Cancer (VGX-3100)
- Phase 2b PoC trial for cervical dysplasia demonstrated a **complete response in 43 out of 107** patients in regression of high-grade cervical lesions and elimination of HPV infection

Head & Neck Cancer (MEDI0457)
- Phase 1 trial for HNSCC, **2 out of 4** patients treated with MEDI0457 and 2 different PD-1 checkpoint inhibitors experienced a **long-term complete response for >2 years**
- MEDI0457 is licensed by AstraZeneca and currently in a Phase 1b/2a study in combination with durvalumab (PD-L1 checkpoint inhibitor)

RRP (INO-3107)
- Pilot study for Recurrent Respiratory Papillomatosis (RRP) demonstrated a clinical benefit in **2 out of 2** patients by delaying surgery due to lack of tumor recurrence
- A Phase 1/2 clinical trial for treating RRP with INO-3107, which includes both HPV 6 and HPV 11 antigens, is planned
Immuno-Oncology Programs
(Non-HPV Associated)
INO-5401 for Newly Diagnosed GBM in Phase 1/2 Study in Collaboration with Regeneron

**TRIAL:** **INO-5401** (encoding tumor-associated antigens: hTERT, WT1, PSMA)

**Phase 1b/2 open label study for newly diagnosed glioblastoma (GBM)**

**Combination with Regeneron's PD-1 checkpoint inhibitor** (Libtayo®)

**Primary Endpoints:** Safety, tolerability

**Secondary Endpoints:** Immunological impact, PFS and OS

**Cohort A:**
- MGMT-Unmethylated: 32 patients

**Cohort B:**
- MGMT-Methylated: 20 patients

**Screening WK 3**
**WK 6**
**WK 9**
**WK 12**
**WK 15**
**WK 18**

**INO-5401 + INO-9012 will continue every 9 weeks until disease progression**

**Resection**
**RT within 42 days of resection**

**RT + TMZ 3 WEEKS**
**TMZ 6 CYCLES TOTAL**

**Cemiplimab** every 3 weeks until disease progression
INO-5401 Interim Results: Promising 6-Month Progression-Free Survival Data, 12- and 18-Month Overall Survival Data in 2020

- SITC late-breaking abstract presented November 6-10\textsuperscript{th} 2019
  - MGMT-Unmethylated PFS6 – (24/32) 75%
  - MGMT-Methylated PFS6 – (16/20) 80%
  - Supportive safety, tolerability, and immunogenicity data
  - Acceptable safety profile consistent with that of Libtayo and INOVIO’s platform technology
  - Majority of patients tested had a T cell immune response to one or more tumor-associated antigens encoded by INO-5401
  - The combination of INO-5401 + INO-9012 with cemiplimab, given with RT and TMZ, is promising
  - Overall survival results (OS12, OS18) will be available in 2020

This data supports the potential of INOVIO’s immunotherapies utilizing tumor-associated antigens to generate new treatment options for difficult-to-treat cancers

Several patients have experienced pseudo-progression, with progression by RANO criteria and radiographic evidence of progression on MRI, without evidence of tumor on repeat biopsy
INO-5151 Phase 2 Prostate Cancer Combination Study

**TRIAL:** **INO-5151** (encoding tumor-associated antigens: **PSA, PSMA**)

Phase 2 study (PORTER) for metastatic castration-resistant prostate cancer

Three cohort, 45-patient platform study, INO-5401 in Cohort C

**Cohort C – 15 patients**

INO-5401 (DNA immunotherapy)

CDX-301 (FLT3 ligand) from Celldex Therapeutics

Nivolumab (anti-PD-1) from Bristol-Myers Squibb

**PICI/CRI** will fund & execute the clinical study
Infectious Disease Programs
(Non-HPV Associated)
## Positive Clinical Data and Partnering Opportunities

<table>
<thead>
<tr>
<th>Product</th>
<th>Indication</th>
<th>Data Reported (to date)</th>
<th>Partner/s</th>
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</table>
| PENNVAX-GP  | HIV        | • Phase 1: **93% (71 of 76)** evaluable vaccinated participants showed a CD4+ or CD8+ cellular immune response to at least one of the vaccine antigens  
• **94% (62 of 66)** demonstrated an env specific antibody response                                                                 | NIH NIAID | Interim results from P1/2 HIV trial study 2020 (UCSF; Deeks)                                                                                                                                       |
| INO-4201    | Ebola      | • Phase 1: High levels of binding antibodies measured (ELISA) in **95% (170 of 179)** evaluated subjects  
• **Published: The Journal of Infectious Diseases, March 2019**                                                                                     | DARPA     | Seeking additional grant funding for Phase 2 development                                                                                                                                             |
| INO-4700    | MERS       | • Phase 1: High levels of binding antibodies measured (ELISA) in **92% (57 of 62)** evaluated subjects  
• **98% (61 of 62)** generated an antibody and/or T cell response against MERS  
• **Published: The Lancet Infectious Diseases, July 2019**                                                                                     | CEPI      | Publish Ph1 data/initiate CEPI funded P2 trial in 2020                                                                                                                                             |
| INO-4600    | Zika       | • Phase 1: High levels of binding antibodies measured (ELISA) in **100% (39 of 39)** evaluated subjects  
• **Published: New England Journal of Medicine, October 2017**                                                                                   | GEIE      | Report on Puerto Rico study 2020                                                                                                           |
| (GLS-5300)  |            |                                                                                                                                                                                                                      |           |                                                                                                                                                                                                             |
| (GLS-5700)  |            |                                                                                                                                                                                                                      |           |                                                                                                                                                                                                             |
Management & Financials
Experienced Executive Team and Board of Directors

J. Joseph Kim, Ph.D.  
President & CEO

- Decades of biotech/ pharma management
- Merck: hepatitis A and B vaccines manufacturing; HIV vaccine (Ad5) R&D

Peter Kies  
CFO

- Ernst & Young
- Experience with growth companies

Jacqueline Shea, Ph.D.  
COO

- Former CEO/COO of Aeras
- Held management positions at Emergent BioSolutions and Microscience Ltd.

Laurent Humeau, Ph.D.  
CSO

- Extensive R&D leadership exp. in vaccine, cell and gene therapy developments in private biotech and mid-cap companies
- Led Translational Research, Human Therapeutics Division for Intrexon

Board of Directors

Simon X. Benito, Chairman of the Board, Former SVP, Merck Vaccine Division
Angel Cabrera, Ph.D., President, George Mason University
J. Joseph Kim, Ph.D., President & CEO, INOVIO Pharmaceuticals
Ann. C. Miller, M.D., Former Head of Sanofi Oncology Global Marketing
Jay Shepard, Former President & CEO, Aravive
David B. Weiner, Ph.D., Executive VP, Director, Vaccine Center, The Wistar Institute
Wendy L. Yarno, Ph.D., Former Executive VP and Chief Marketing Officer, Merck
Lota S. Zoth, Former CFO, MedImmune
Strong Balance Sheet to Support Critical Milestones

$93.8M
Cash and short-term investments

99.0M
Common stock shares outstanding

As of September 30, 2019

Milestones

VGX-3100
- 1Q20: Report interim data from Phase 2 VIN/AIN clinical trial
- 4Q20: REVEAL 1 Phase 3 top-line efficacy & safety data

MEDI0457
- 2020: Phase 2 completion of MEDI0457 study in HNSCC

INO-3107
- 1H20: Initiate Phase 1/2 trial for the development of INO-3107 (HPV6 and 11)

INO-5401
- Nov 2019: Report PFS6 data from Phase 1/2 GBM clinical trial
- 2Q20: OS12 data from Phase 1/2 GBM clinical trial (INO-5401 plus Libtayo®)
- 4Q20: OS18 data from Phase 1/2 GBM clinical trial (INO-5401 plus Libtayo®)

Platform Development
- 2020: Advance INO-4700 against MERS into a Phase 2 field study in Middle East & Africa (CEPI-funded)
- 2020: Interim Phase 1 results from first-in-human trial of dMAb candidate INO-A002 (for preventing or treating Zika virus infection)
Validated Proprietary Technology

• Platform has demonstrated **Phase 2b clinical efficacy** of lead asset VGX-3100
• Well-protected with over 1,000 issued and pending patents
• **Over 2,000 patients safety data** and demonstration of high levels of T cell and antibody immune responses
• **Over $170M in non-dilutive funding** since 2009
• **Partnerships** with major pharma and organizations:

12-Month Pipeline Catalysts

• **Phase 3 for lead asset VGX-3100** treating high-grade cervical dysplasia – Efficacy data from REVEAL 1 in 4Q20
• **New target** (INO-3107) registrational study initiated by 1H 2020 for treating RRP (orphan/rare disease)
• **Phase 2 checkpoint-combination programs** in glioblastoma and HPV-associated cancers – INO-5401 GBM OS12 and OS18 data in 2020 – MEDI0457 HNSCC data in 2H20
Appendix
INOVIO DNA Medicines Will Meet Urgent Health Needs Worldwide

**HPV-Related Diseases**

- Nearly 80M Americans are currently infected with HPV; ~14M become infected each year
- ~35k Americans get an HPV-attributable cancer per year, including head and neck and cervical, anal, penile and vulvar cancers
- ~23% of Americans age 18-59 have genital infections with ≥1 high-risk HPV genotype (e.g., HPV 16, HPV 18), which can lead to cervical, anal, head and neck, and other cancers; no current medicine to destroy/clear the virus
  - ~4% of Americans age 18-69 have oral infection with ≥1 high-risk HPV genotype
- Other HPV genotypes (6/11) can cause debilitating conditions such as Recurrent Respiratory Papillomatosis (RRP), rare and potentially fatal in children and adults; only current treatment is multiple, lifelong surgeries
And INOVIO Has Mobilized to Rapidly Address Global Health Needs for Emerging Coronavirus

INOVIO’s China Coronavirus Inroads to Date:

• INOVIO made a coronavirus vaccine within hours of seeing the viral sequence

• Already in preclinical testing

• Signed collaboration with China biotech

• Will begin clinical studies in the U.S. and China early summer

The New York Times

Researchers Are Racing to Make a Coronavirus Vaccine. Will It Help?

Scientists in Australia and at least three companies — Johnson & Johnson, Moderna Therapeutics and Inovio Pharmaceuticals — are also working on vaccine candidates to stop the spread of the disease, which has infected about 8,000 people and killed more than 120.

“Everybody is trying to move as quickly as possible,” said Jacqueline Shea, the chief operating officer at Inovio.

Inovio received a grant of up to $9 million to develop a coronavirus vaccine from the Coalition for Epidemic Preparedness Innovations, a group whose aim is to speed vaccines to market. Moderna, which is working with Dr. Graham’s team at the N.I.H., received a similar grant, as did researchers at the University of Queensland in Australia.

Historically, vaccines have been one of the greatest public health tools to prevent disease. But even as new technology, advancements in genomics and improved global coordination have allowed researchers to move at unprecedented speed, vaccine development remains an expensive and risky process. It takes months and even years because the vaccines must undergo extensive testing in animals and humans. In the best case, it takes at least a year — and most likely longer — for any vaccine to become available to the public.

The Washington Post

Coronavirus vaccine research is moving at record speed

...At Inovio, a biotech company headquartered outside Philadelphia, a team began working on designing a vaccine hours after the sequence appeared, Shea said...

The Wall Street Journal

Drugmakers Rush to Develop Vaccines Against China Virus

First tests of the research could occur within a few months, but approval would take longer
Cancer (non-HPV associated)

- >11,000 people in U.S. get glioblastoma (GBM, rare and most aggressive form of brain cancer) each year; 23,000 people in U.S. have GBM

Infectious Diseases (non-HPV associated)

- HIV
- Ebola
- MERS
- Zika
- Lassa Fever
- China Coronavirus

INOVIO DNA Medicines Will Meet Urgent Health Needs Worldwide (continued)
INOVIO’s Technology Delivering Precisely Designed Plasmids with Proprietary Smart Devices

INOVIO’s DNA medicine powers a patient’s immune system to generate functional antibodies and killer T cells

- Syringe inserted into selected muscle or skin tissue injects the DNA vaccine.
- Controlled, millisecond electrical pulses are applied to the needle electrodes, which then form an electric field.
- The electrical field creates temporary openings in the cell membrane, allowing significantly greater amounts of the DNA vaccine to enter cells.
- In the lymph node, the interaction of antigen-presenting cells and other immune cells results in antibodies that can prevent future infections or killer T-cells that can clear already-infected cells.
- Antigen-presenting cells engulf the antigens and carry them to lymph nodes.
- The cell membrane reseals and the trapped DNA causes the cell to produce the antigen coded by the DNA.
Innovation in the Delivery of SynCon® DNA Medicine

**CELECTRA®-5PSP**
- Intramuscular
- 13, 19, 25mm electrodes
- In clinical use

**CELECTRA®-3P**
- Intradermal – minimally invasive
- 3mm electrodes
- In clinical use

**Surface EP (SEP)**
- **Surface**
- Noninvasive
- 4x4 electrode array
- Specifically targets epidermis
- In late-stage preclinical development
Precise Design + Intracellular Delivery = Improved Immune Responses

Display of GFP (green fluorescent protein) gene expression after CELLECTRA® delivery into rabbit muscle

Muscle + GFP

GFP

With EP

No EP
CTLA4 or PD1 + DNA Vaccine Improves Tumor Control & Survival in Challenge Model

Checkpoint Inhibitor Therapies Combined with INOVIO DNA Medicine

• Potential to improve response rates, without adding toxicity

• Tumor infiltration of antigen-specific, functional CD8+ T cells may prime patients for treatment with checkpoint inhibitors and increase response rates

• Combination studies initiated
  - MEDI0457 with AstraZeneca PDL-1
  - INO-5401 with Regeneron PD-1
  - INO-5151 with BMS PD-1 + Celldex FTL3L (PICI Study)

Paper published in Molecular Therapy 2017
MEDI0457 (HPV16/18) Induces Robust Anti-Tumor Immunity in Head and Neck Cancer

Phase 1 study of MEDI0457 (INO-3112) 22 HPV+ HNSCC Patients

Strong invasion by CD8 T cells into tumors following immunization with MEDI0457 in HPV associated HNSCCa.

Induction of T cells: Quantitative non-cultured ELISpots

Induction of Antibodies: Endpoint titers to HPV18 E7

Most participants respond immunologically to the vaccine

Aggarwal et al Clinical Cancer Research 2018
**GBM (Newly-diagnosed) Phase 1/2 Study**

**Trial Treatment (NCT03491683)**
- **INO-5401** (3 mg of each WT1, PSMA and hTERT plasmids) combined with 1 mg INO-9012, (total 10 mg of DNA) IM injection followed by EP given every 3 weeks for 4 doses, then every 9 weeks; and
- **Cemiplimab (LIBTAYO®)** (350 mg/dose IV every 3 weeks)

**Chemoradiation Treatment**
- **Radiotherapy** (RT), given in a hypofractionated schedule (40 Gy over 3 weeks) for all patients post surgery
- **Temozolomide** (TMZ) concurrent with RT for all patients, and then following RT for 6 cycles in methylated patients only
GBM-001 Progression-Free Survival at Six Months (PFS6)

**Confirmed PD (RANO)** = confirmation by consecutive PD scan ≥4 weeks from original PD event, or progressed according to biopsy surgery. Subjects who terminated for any reason prior to 6 months other than PD included as confirmed progressive events, including two (2) subjects in Cohort B who came off-study at week three (3), and declined long-term follow-up. Note: subjects with time to events longer than 6 months included; subjects have different time on study durations.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>N Subjects</th>
<th>N Event-free Subjects</th>
<th>PFS6 (%)</th>
<th>95% CI Lower Bound</th>
<th>95% CI Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort A (MGMT Unmethylated)</td>
<td>32</td>
<td>24</td>
<td>75</td>
<td>56.6</td>
<td>88.5</td>
</tr>
<tr>
<td>Cohort B (MGMT Methylated)</td>
<td>20</td>
<td>16</td>
<td>80</td>
<td>56.3</td>
<td>94.3</td>
</tr>
<tr>
<td>Both Cohorts Combined</td>
<td>52</td>
<td>40</td>
<td>77</td>
<td>63.2</td>
<td>87.5</td>
</tr>
</tbody>
</table>
Ebola – 15 months to clinic: 95% response rate post dose 2 (publication submitted)

MERS – 9 months to clinic: 95% responses post dose 2, 98% overall response rate

Zika – 6.5 months to clinic (including animal preclinical work): 100% response rate-passive transfer protection (Tebas et al NEJM 2017)

Can be shortened to weeks
Executive Team

J. Joseph Kim, Ph.D., President & CEO
- Decades of biotechnology/pharma management
- Merck: hepatitis A and B vaccines manufacturing; HIV vaccine (Ad5) R&D

Peter Kies, CFO
- Ernst & Young
- Experience with growth companies

Jacqueline Shea, Ph.D., COO
- Former CEO of Aeras, the leading not-for-profit organization dedicated to developing new tuberculosis vaccines
- Held management positions at Emergent BioSolutions and Microscience Ltd.

Laurent Humeau, Ph.D., CSO
- Extensive R&D leadership experience in vaccine, cell and gene therapy developments in private biotech and mid-cap companies
- Led Translational Research, Human Therapeutics Division for Intrexon
Board of Directors

Simon X. Benito
Chairman, BOD
• Former Senior Vice President, Merck Vaccine Division

Angel Cabrera, Ph.D.
• President, Georgia Tech

J. Joseph Kim, Ph.D.
• President & CEO, INOVIO

Ann C. Miller, M.D.
• Former Head of Sanofi Oncology Global Marketing

Jay Shepard
• Former President & CEO, Aravive; Former Executive Partner, Sofinnova Ventures

David B. Weiner, Ph.D.
• Executive VP, The Wistar Institute; Director, Vaccine Center

Wendy Yarno
• Former Chief Marketing Officer, Merck

Lota Zoth, CPA
• Former CFO, MedImmune
Scientific Advisory Board

David B. Weiner, Ph.D., Chairman
• “Father of DNA vaccines”
• Executive VP, The Wistar Institute; Director, Vaccine Center

Anthony W. Ford-Hutchinson, Ph.D.
• Former SVP, Vaccines R&D, Merck
• Oversaw development: Singulair®, Januvia®, Gardasil®, Zostavax®, Proquad® and Rotateq®

Stanley A. Plotkin, M.D.
• Developed rubella and rabies vaccines
• Oversaw Sanofi flu vaccine
• Emeritus Professor, Wistar Institute & University of Pennsylvania

Rafi Ahmed, Ph.D.
• Professor, Department of Microbiology and Immunology, Emory University School of Medicine
INOVIO Fully Integrated Capabilities Poised for Rapid Production

Philadelphia Corporate and Operations Site
- Corporate, Clinical, Regulatory, Compliance, Biostatistics, and Data Management functions
- ~80 FTE

San Diego Research Center
- Molecular biology, cell biology, and clinical immune monitoring
- Research-grade DNA manufacture capabilities
- 6,000 sf dedicated BSL-2 research lab (wet lab and cell culture)
- 5,000 sf cGLP labs to process, store, and analyze human clinical trial samples
- Well established QA capability
- ~40 FTE

San Diego Device Engineering and Manufacturing Facility
- Electroporation delivery device and consumable design, engineering, and manufacturing
- Delivery device testing and distribution
- 53,000 sf facility opened in July 2017
- ISO 13485 and MDD certified by TÜV America in San Diego
- ~70 FTE