Powering a New Decade of DNA Medicines

October 2020

Nasdaq:INO

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, 2019 and Form 10-Q for the quarter ended June 30, 2020, which have been filed with the Securities and Exchange Commission (SEC) and are 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.

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Powering a New Decade of DNA Medicines

Precisely Designed Plasmids Delivered Through Proprietary Smart Device

***In Vivo* Immune Responses for "Off-the-Shelf" Speed, Efficiency**

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

Extensive Patent Portfolio Protecting Technology Platform

DNA VACCINES

- FIRST & ONLY COVID-19 Vaccine to Show Long-Term Protection Against Live Virus in NHPs 13-Weeks Post-Vaccination (INO-4800)
- FIRST Vaccine to Generate Immune Response Against COVID-19 Variant D614G (INO-4800)
- FIRST Vaccine in Phase 2 for Middle East Respiratory Syndrome (INO-4700)
- FIRST dMAb™ Plasmid in Phase 1 for Zika (INO-A002)

DNA IMMUNOTHERAPIES

- FIRST to Show Clearance of High-Risk HPV 16/18 in Phase 2b Trial (VGX-3100)
- FIRST DNA Medicine in Phase 3 Clinical Trials (VGX-3100 for Precancerous Cervical Dysplasia)
- FIRST to Show Complete Response in Phase 1 w/2 PD-1s for Head and Neck Cancer (MEDI0457)
- FIRST DNA Medicine to Show Potential for Efficacy in GBM (INO-5401)

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INOVIO Vision to Build the Leading DNA Medicine Company

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 potentially treat and prevent 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**
- **Strong financial position**
  - $371.7M cash/investments as of last reported earnings (6/30/20)

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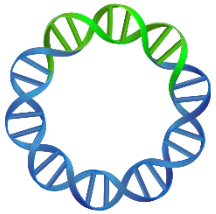
Vision Built on INOVIO Proprietary Technology

OPTIMIZED PLASMID DESIGN AND DELIVERY TECHNOLOGY

PRECISELY DESIGNED PLASMIDS
(SynCon®)



PROPRIETARY SMART DEVICE
(CELLECTRA®)

IN VIVO

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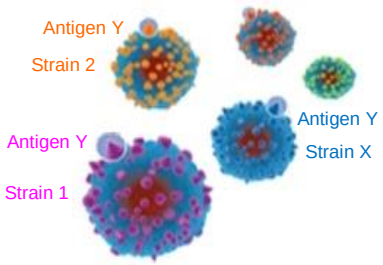
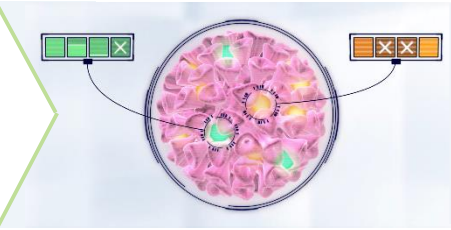
INOVIO Technology – Powering Potent Antigen Specific Immune Responses

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

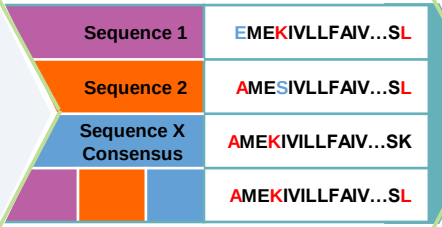
1. Identify diverse strains/variants of a target virus or cancer



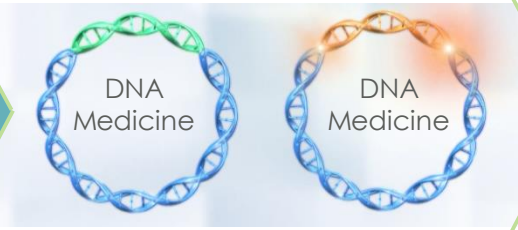
2. Assess gene sequence of selected antigen(s) from chosen strains/variants of the virus or cancer



3. Create optimal Consensus Sequence for the selected antigen

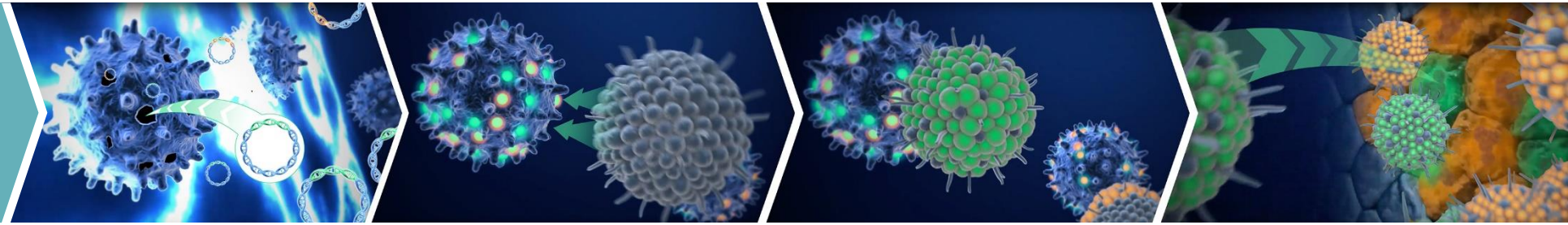


4. Insert SynCon sequence for each selected antigen into a separate precisely designed plasmid



5. Manufacture DNA medicine and deliver into muscle (IM) or skin (ID) using CELLECTRA® proprietary smart device

6. Protective antibodies and killer T cells produced by immune system against diverse strains of a virus or cancer



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INOVIO's Technology Advantages

Clinical Efficacy

- **Demonstrated clinical efficacy in Phase 2b study**
- **Lead candidate VGX-3100 in Phase 3 for precancerous cervical dysplasia**

Safety

- **Favorable safety profile tested in over 2,000 patients and over 7,000 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™ plasmid
- **No anti-vector response** – allows for effective boosting

Rapid and Scalable Manufacturing

- "Off-the-shelf" product; **no frozen storage issues** (room temp storage >1 yr.)
- Rapid development from concept to human in <3 months (COVID-19 vaccine)
- Relatively inexpensive to manufacture; produce large quantities

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INOVIO DNA Medicines Pipeline

PRODUCT	INDICATION	ANTIGEN	PRECLINICAL	PHASE 1	PHASE 2	PHASE 3	PARTNER/COLLABORATOR/FUNDER
HPV-TARGETED							
VGX-3100	Precancerous Cervical Dysplasia (HSIL)	HPV 16 E6, E7/ HPV 18 E6, E7					Apollobio (China; INOVIO maintains global rights)
	Precancerous Vulvar Dysplasia (HSIL)						
	Precancerous Anal Dysplasia (HSIL)						
INO-3107	Recurrent Respiratory Papillomatosis (RRP)	HPV 6 E6, E7/ HPV 11 E6, E7					
MEDI0457	Head & Neck Cancer	HPV 16 E6, E7/ HPV 18 E6, E7					AstraZeneca
	Cervical, Anal, Penile, Vulvar Cancers						
IMMUNO-ONCOLOGY (NON HPV-ASSOCIATED)							
INO-5401	Glioblastoma Multiforme (GBM)	WT1, PSMA, hTERT					REGENERON
INO-5151	Prostate Cancer	PSA, PSMA					Cancer Research Institute; Parker Institute for Cancer Immunotherapy

INTERNALLY FUNDED EXTERNALLY FUNDED

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INOVIO DNA Medicines Pipeline (Continued)

PRODUCT	INDICATION	ANTIGEN	PRECLINICAL	PHASE 1	PHASE 2	PHASE 3	PARTNER/COLLABORATOR/FUNDER
INFECTIOUS DISEASES (NON HPV-ASSOCIATED)							
PENNVAX-GP	HIV	Gag, pol, env					NIH NIAID; HIV VACCINE TRIALS NETWORK
INO-4201	Ebola	Glycoprotein					DARPA
INO-4700 (GLS-5300)	MERS	Spike					GEMINI; CEPI
INO-4600 (GLS-5700)	Zika	Glycoprotein					GEMINI
INO-4500	Lassa Fever	Glycoprotein					CEPI
INO-4800	COVID-19 (Coronavirus)	Spike					CEPI; BILL & MELINDA GATES foundation
dMAb™ (DNA-ENCODED MONOCLONAL ANTIBODIES)							
INO-A002	Zika	Glycoprotein					BILL & MELINDA GATES foundation

INTERNALLY FUNDED EXTERNALLY FUNDED

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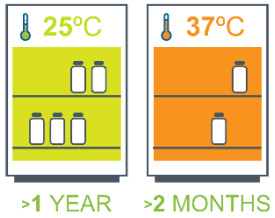
Infectious Disease Programs

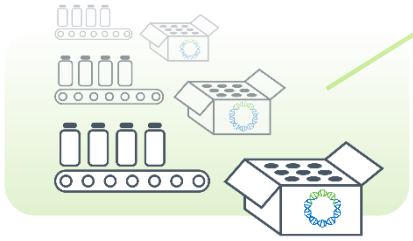
Key Characteristics of INOVIO's DNA Vaccine Platform

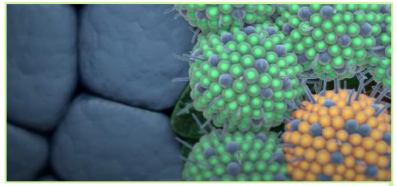
Refrigerated (2-8°C) Storage >5 years

Room Temp (25°C) Storage >1 year; 37°C >2 months



Rapid & Scalable Manufacture

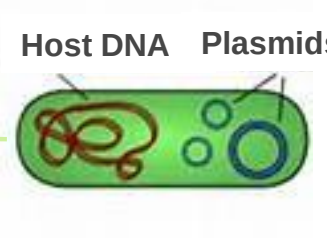




Robust Immune Responses
(Neutralizing anti-bodies/ B cells and Killer T cells)

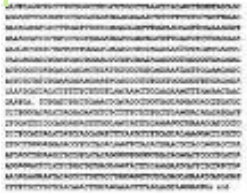
Multi-antigen Immunotherapy/ Protection in Single Vial

CELLECTRA®



Non-replicating, Non-integrating

SynCon® Rapid Design



No Anti-Vector Response
(effective boosting)

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Infectious Disease Platform: Positive Clinical Data and Partnering Opportunities

Product	Indication	Data Reported (to date)	Partner/s	Next Milestone
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 HIV VACCINE TRIALS NETWORK	Interim results from Phase 1/2 HIV trial study 2020 (UCSF; Deeks)
INO-4201	**Ebola**	• Phase 1: High levels of binding antibodies measured (ELISA) in **95% (170 of 179)** of evaluated subjects • ***Published: The Journal of Infectious Diseases, March 2019***	DARPA	Seeking additional grant funding for Phase 2 development
INO-4700 (GLS-5300)	**MERS**	• Phase 1: High levels of binding and neutralizing antibodies in >**90% of subjects** • **98%** generated an antibody and/or T cell response against MERS • ***Published: The Lancet Infectious Diseases, July 2019*** • ***Presented: ASGCT, May 2020***	GENE 진원생명과학(주) GeneOne Life Science CEPI	Initiate Phase 2 clinical trial in Middle East
INO-4600 (GLS-5700)	**Zika**	• Phase 1: High levels of binding antibodies measured (ELISA) in **100% (39 of 39)** of evaluated subjects • ***Published: New England Journal of Medicine, October 2017***	GENE 진원생명과학(주) GeneOne Life Science	Report on Puerto Rico study 2020

INOVIO's COVID-19 DNA Vaccine INO-4800 Development Timeline

DECEMBER 2019

INOVIO coronavirus experts learn about a novel coronavirus (SARS-CoV-2) that caused an outbreak of respiratory disease in Wuhan, China, now referred to as COVID-19

JANUARY 10/11, 2020

Chinese researchers share the genetic sequence of the novel coronavirus on 1/10

INOVIO designs DNA vaccine INO-4800 in three hours after receiving the genetic sequence late in the evening on 1/10 using its proprietary DNA medicines platform technology

INO-4800 was designed just after midnight on 1/11 to precisely match the DNA sequence of the virus

JANUARY 10 - JANUARY 23, 2020

INOVIO coronavirus experts race to manufacture INO-4800 and begin preclinical testing and clinical trial design

JANUARY 23, 2020

INOVIO receives a grant of up to $9 million from the Coalition for Epidemic Preparedness Innovations (CEPI) to fund ongoing preclinical and initial clinical development of INO-4800

CEPI

MARCH 2020

Ongoing preclinical studies, including challenge studies; human clinical trial designs finalized; 3,000 human trial doses prepared for clinical trials in the U.S., China, and South Korea; large-scale manufacturing plans developed

MARCH 12, 2020

INOVIO announces $5 million grant from the Bill & Melinda Gates Foundation to continue advancing the development of INO-4800, specifically to accelerate the testing and scale up of INOVIO's proprietary smart device CELLECTRA® 3PSP

BILL & MELINDA GATES foundation

MARCH 26, 2020

INOVIO announces the Department of Defense (DoD) awarded Ology Bioservices an $11.9 million contract to work with INOVIO on DNA technology transfer to rapidly manufacture INO-4800 for the DoD for upcoming clinical trials

APRIL 6 - APRIL 23, 2020

INOVIO announces initiation of Phase 1 human clinical trial in the U.S. following authorization by the U.S. Food and Drug Administration of its Investigational New Drug (IND) application

U.S. study fully enrolls 40 healthy volunteers; study sites are the University of Pennsylvania and a clinic in Kansas City, MO

MAY 20, 2020

Preclinical data (in mice and guinea pigs) published in peer-reviewed journal Nature Communications

nature COMMUNICATIONS

JUNE/JULY 2020

Phase 1 trial expanded with 80 additional participants (older adults, low-dose arm)

INOVIO receives $71 million from DoD to scale up manufacture of CELLECTRA 3PSP and procurement of CELLECTRA® 2000 (6/23)

INOVIO announces positive interim Phase 1 data for INO-4800 (6/30); durable antibody and T cell responses in NHPs challenged with SARS-CoV-2 (7/30)

Phase 1/2 trials begin in South Korea, China

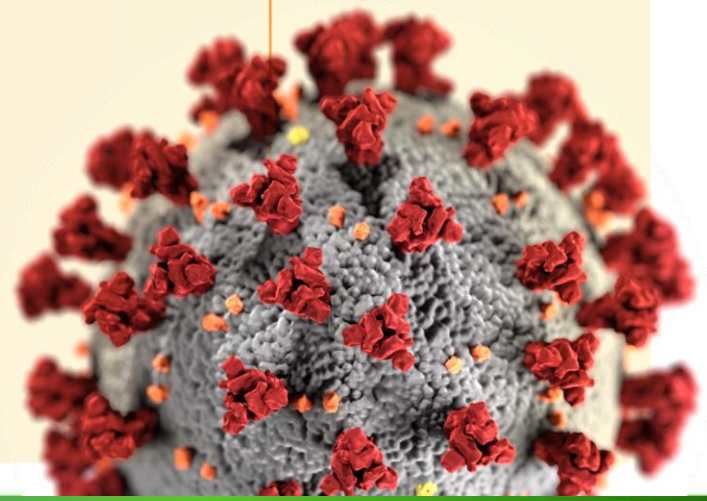
4Q 2020

Phase 2/3 trials expected to begin*

ONGOING

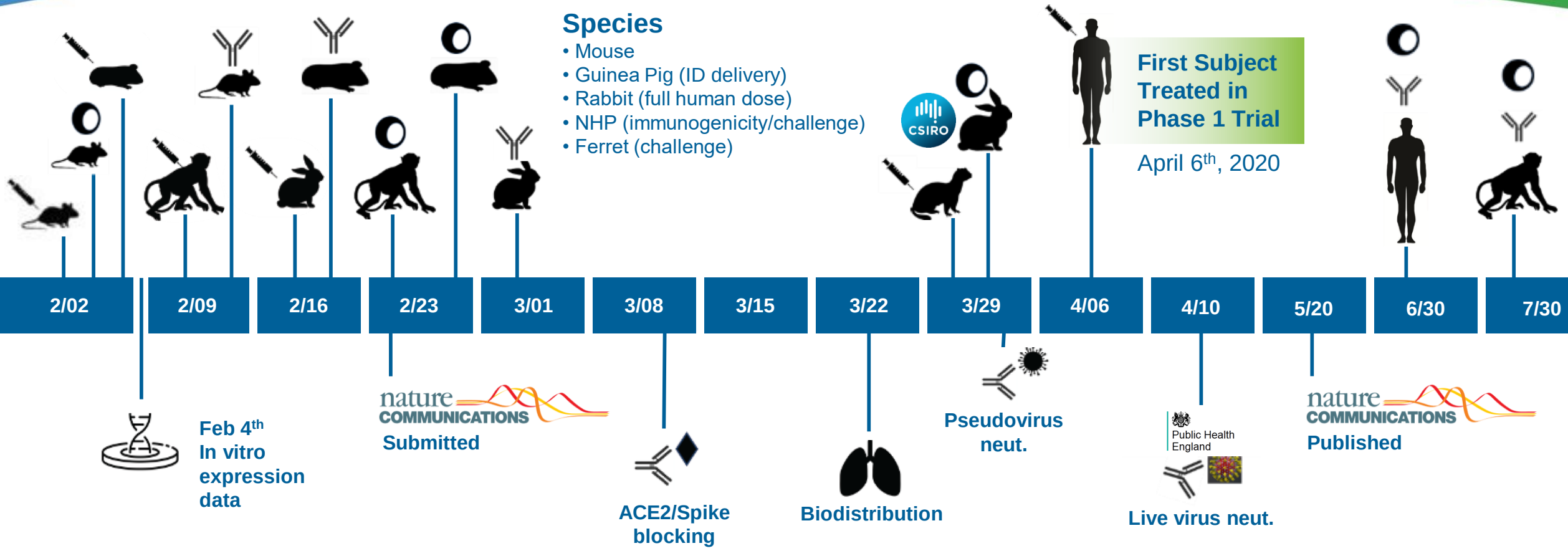
INO-4800 COVID-19 DNA vaccine production and scale up underway*

Clinical trials and preclinical challenge studies continue



*Pending appropriate regulatory guidance and external funding

INOVIO INO-4800 Rapid Response



THE WISTAR INSTITUTE

T cell data

Ab data

Immunization

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INO-4800 Demonstrates Durable Efficacy, Safety; Only COVID-19 Vaccine With No Adverse Events >Grade 1

TRIALS: INO-4800

- Protect against SARS-CoV2 virus that causes COVID-19
- Target Spike protein

Human Clinical Study:

Phase 1 study
(Initial 2 cohorts reported)

x40

40 healthy volunteers age 18-50
1 mg and 2 mg cohorts, 2 doses (Weeks 0 and 4)

Interim findings (Week 6 efficacy and Week 8 safety)	**100% (38 out of 38)** of trial participants demonstrated overall immunological responses through week 6	Demonstrated binding and neutralizing antibodies and T cell immune responses	Safe and well tolerated, no SAEs through Week 8	Trial expanded with older participants,18 and older and added dose arm of 0.5 mg

Non-Human Primate (NHP) Study:

Challenge study

x10

5 rhesus macaques received INO-4800, 5 received placebo
2 doses (Weeks 0 and 4)
Challenge with SARS-CoV-2 (Week 17)

17-week findings (13 weeks after 2nd dose)	Durable antibody and T cell responses for >4 months after initial dose	Memory T and B cell responses → reduced viral loads, faster clearance in lungs, nasal passages	Neutralizing antibodies against early virus and dominant G614 mutant variant	No antibody-dependent enhanced disease events

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INOVIO-Led Global Coalition to Advance INO-4800 & Commercial Device (CELLECTRA 3PSP)

CEPI

Department of Defense

Bill & Melinda Gates foundation

The Wistar Institute

Advaccine

International Vaccine Institute

CSIRO

Public Health England

ThermoFisher Scientific

Ology Bioservices

Richter-Helm

Defense Threat Reduction Agency

Perelman School of Medicine University of Pennsylvania

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Clinical Development Strategy for INO-4800

❑ US – Phase 1 study of INO-4800 under US IND

- Initial funding of up to $9M awarded by CEPI
- Rapid start of FIH study in young, healthy population; expanded in older adults
- Preliminary safety and robust immune response data announced in late June

❑ Ex-US Studies in China and Korea

- Collaborations formed between INOVIO and Advaccine in China, as well as IVI in Korea to build global consortium for joint clinical development
- $7.3 million from CEPI to support the Korea Phase 1/2a trial initiated in June 2020
- Phase 1 study in China also initiated

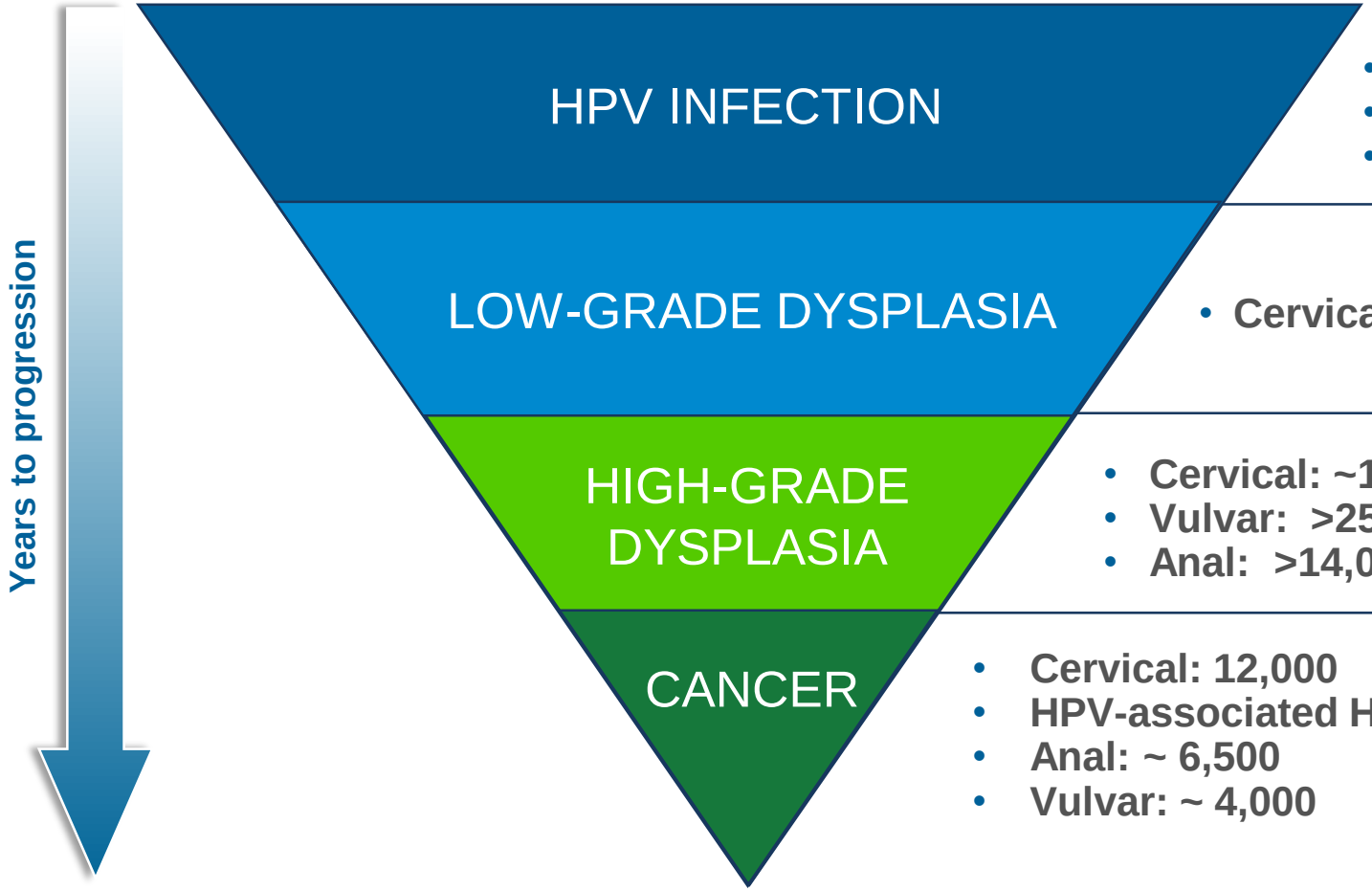
❑ Phase 2/3 Efficacy Study in the US

- Study protocol being developed to assess the efficacy for prevention of COVID-19 in high-risk population
- Expected to start in September pending regulatory approval

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: US CDC (2018) HPV and Cancer, available at: https://www.cdc.gov/cancer/hpv/statistics/cases.htm (accessed July 22, 2019); Saraiya M, Unger ER, Thompson TD, Lynch CF, Hernandez BY, Lyu CW, Steinau M, Watson M, Wilkinson EJ, Hopenhayn C, Copeland G, Cozen W, Peters ES, Huang Y, Saber MS, Altekruse S, Goodman MT; HPV Typing of Cancers Workgroup. US assessment of HPV types in cancers: implications for current and 9-valent HPV vaccines. J Natl Cancer Inst. 2015 Apr 29;107(6):djv086; Inovio Pharmaceuticals, internal estimates from published data (2015-16, 2017-18); US CDC, personal communication (2015); NCI SEER Cancer Stat Facts: Cervix Uteri, Vulvar, and Anal Cancers – https://seer.cancer.gov/statfacts (accessed 2017-18); *Measured as: Genital Warts – Initial Visits to Physicians' Offices, United States, 1966-2014. Fig. 47; Schiffman M, Solomon D. Findings to date from the ASCUS-LSIL Triage Study (ALTS). Arch Pathol Lab Med. 2003 Aug;127(8):946-9; US CDC. Genital HPV Infection – Fact Sheet.

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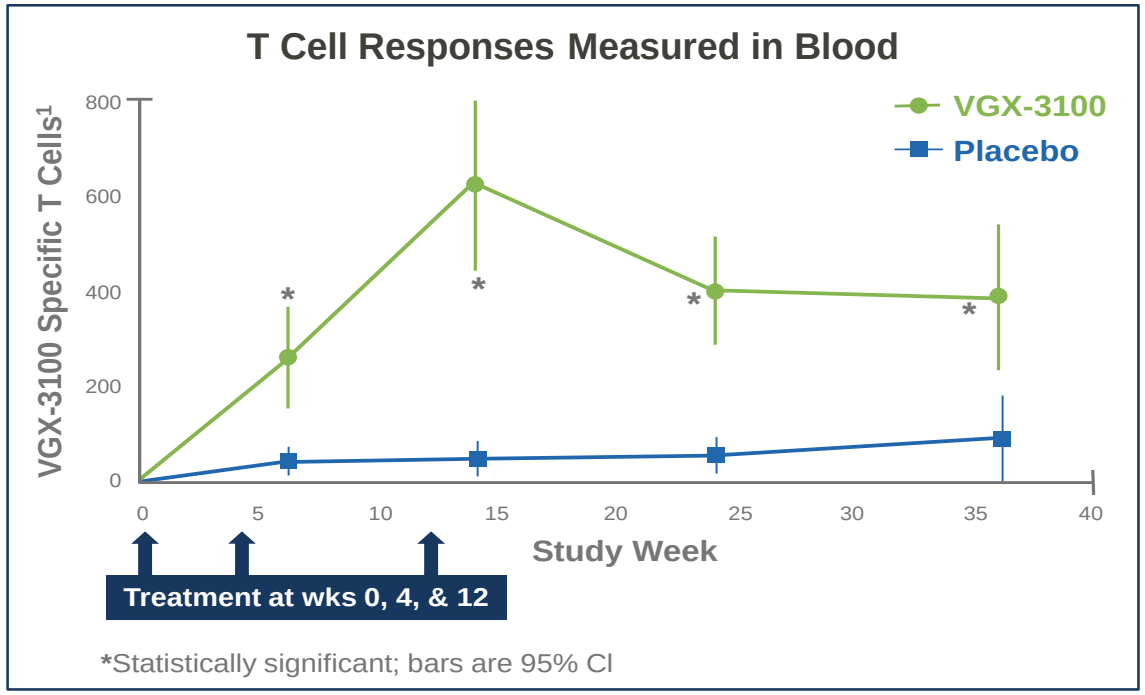
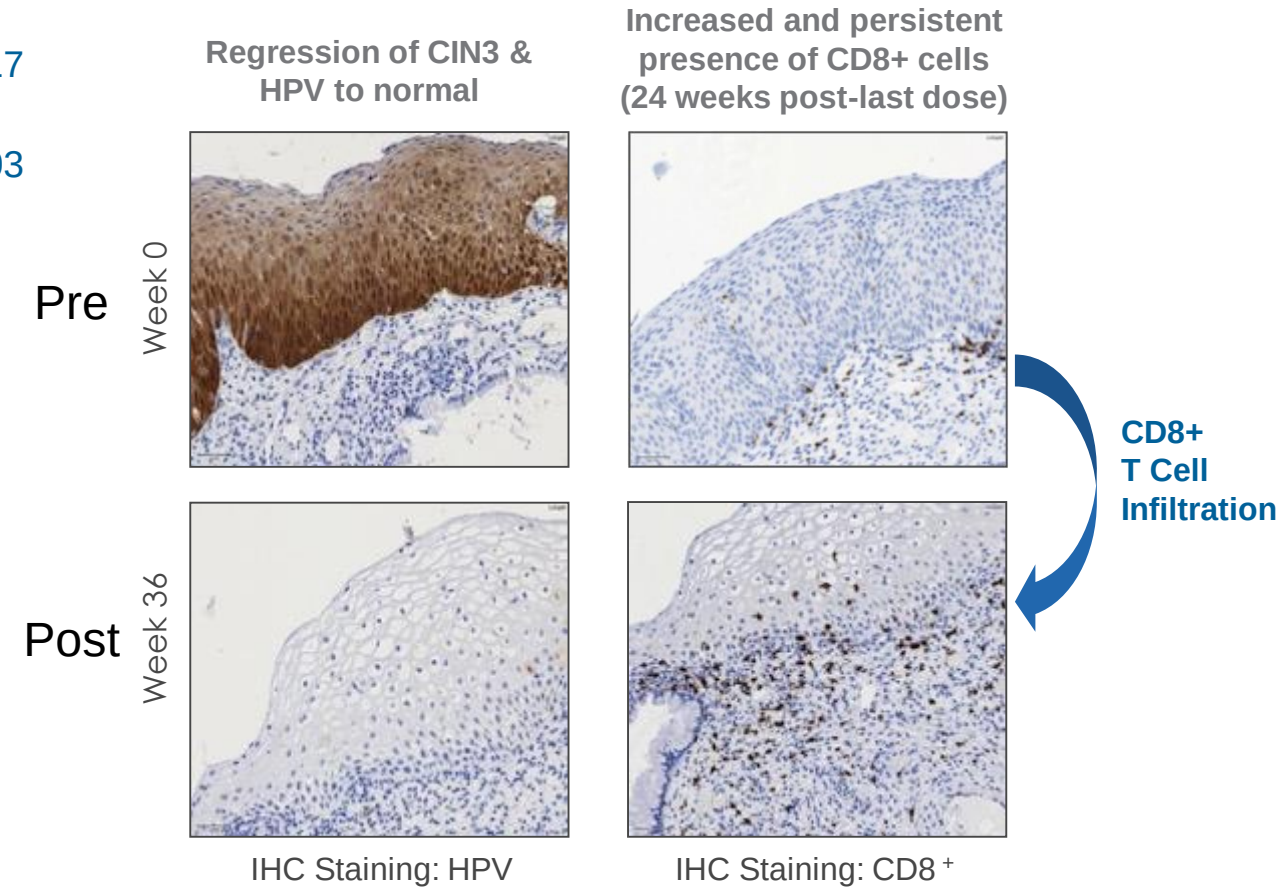
Published VGX-3100 Phase 2b Study Achieves All Primary and Secondary Endpoints

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





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

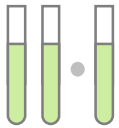
Study follow-up through week 40

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)

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VGX-3100 Phase 2 Studies in HPV-Associated Vulvar and Anal HSIL/Precancerous Dysplasias

TRIALS: VGX-3100

- Target HPV 16/18 subtypes; E6/E7 oncogenes
- Treat high-grade squamous intraepithelial lesions (HSIL)

Precancerous Vulvar Dysplasia:

Phase 2
open-label study

x33

33 women enrolled
Interim data reported for 10

Interim findings
(6 months after start of treatment)

- Decrease in lesion area: 80% of patients
- Resolution of vulvar dysplasia: 20% of patients
- Non-detectability of HPV 16/18: 20% of patients

Precancerous Anal Dysplasia:

Phase 2
open-label study

x23

23 patients enrolled
Interim data reported for 20

Interim findings
(6 months after start of treatment)

- Clearance of lesions: 50% of patients
- Decrease in number of lesions: 75% of patients

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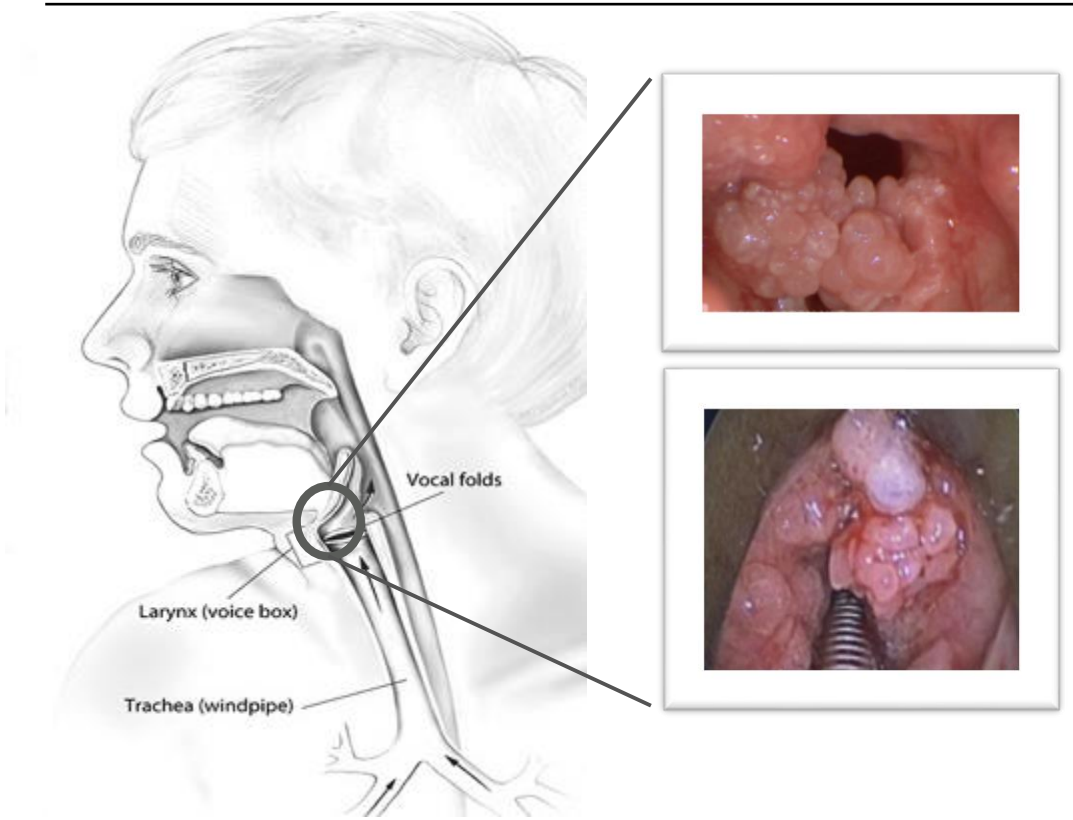
INOVIO and QIAGEN Developing Biomarker to Optimize Patient Selection

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

Areas affected by Recurrent Respiratory Papillomatosis (RRP)



- 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

Sources: RRP Foundation; Venkatesan et al. Otolaryngol Clin North Am 2013; Ivancic et al. Laryngoscope Investigative Otolaryngol; www.nidcd.nih.gov/health/recurrent-respiratory-papillomatosis; Derkay et al *Arch Otolaryngol Head Neck Surg* (1995); Armstrong et al *Arch Otolarygol Head Neck Surg* (1999); Marsico et al STDs (2014).

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INO-3106 Pilot Study in RRP – Completed

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

Phase 1 pilot, single-site, clinical study

x2

Enrolled 2 adult patients with RRP, HPV 6+

4 doses of vaccine, 3 weeks apart on Day 0, Weeks 3, 6, 9

CELLECTRA-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

Open-label Phase 1/2 study to evaluate efficacy, safety, tolerability, and immunogenicity of INO-3107 (for HPV 6 and 11)

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.

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INO-3107 Phase 1/2 Study in RRP – IND Accepted; Granted Orphan Drug Designation

TRIAL: INO-3107 (for HPV 6 and/or 11-caused RRP)

Granted Orphan Drug Designation

Phase 1/2 open-label, multicenter clinical study

x63

Target enrollment

4 doses of vaccine, 3 weeks apart on Day 0, Weeks 3, 6, 9

CELLECTRA-delivered INO-3107 plasmid encoded antigens

Enrollment criteria: Subjects who have required at least two surgical interventions per year for the past three years for the removal of associated papilloma(s)

Primary endpoint: A doubling or more in the time between surgical interventions following the first dose of INO-3107 relative to the frequency prior to study therapy

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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**

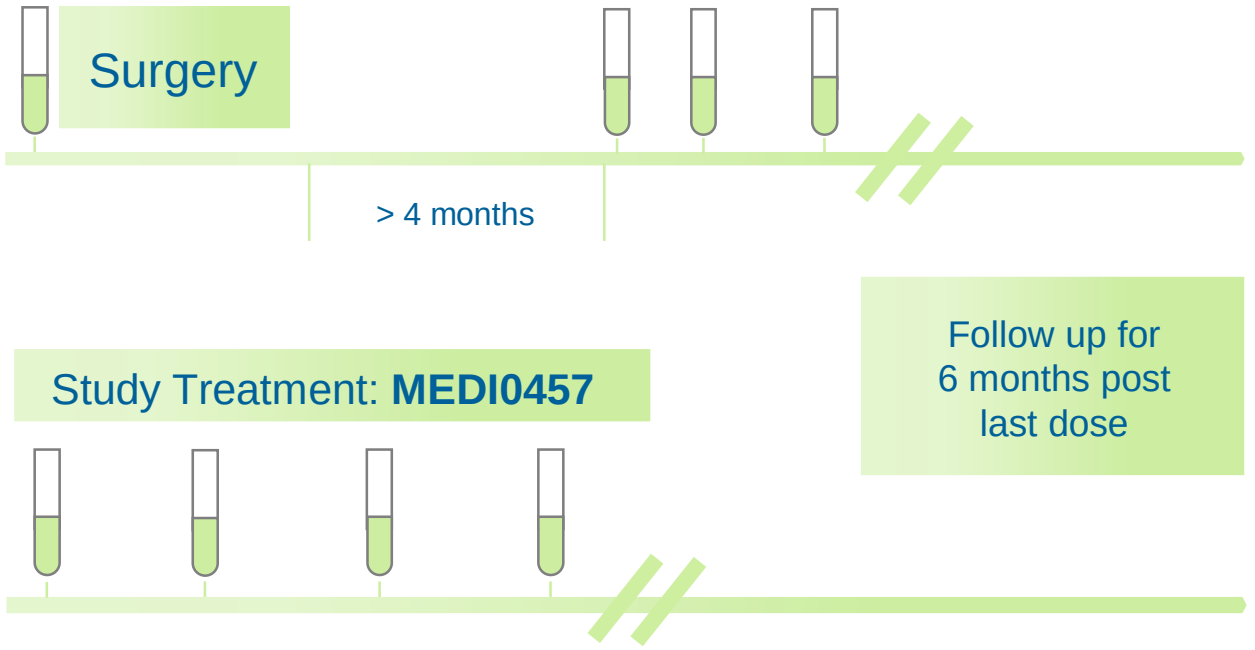
MEDI0457 Potential to Treat Head and Neck Cancer Demonstrated in Phase 1 Trial

Cohort 1
HPV 16/18+ HNSCC undergoing definitive surgery (n=5)

Immunotherapy is administered before and after surgery

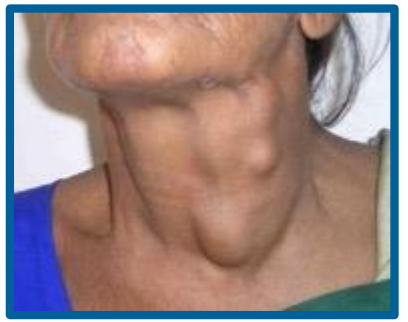
Cohort 2
HPV 16/18+ HNSCC undergoing definitive/adj chemoradiation (n=20)

Immunotherapy is administered 2 months after completion of chemoradiation



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



Primary: Safety and tolerability of DNA based immunotherapy

Secondary: Cellular and humoral immune responses

Exploratory: Anti-tumor response and progression free survival

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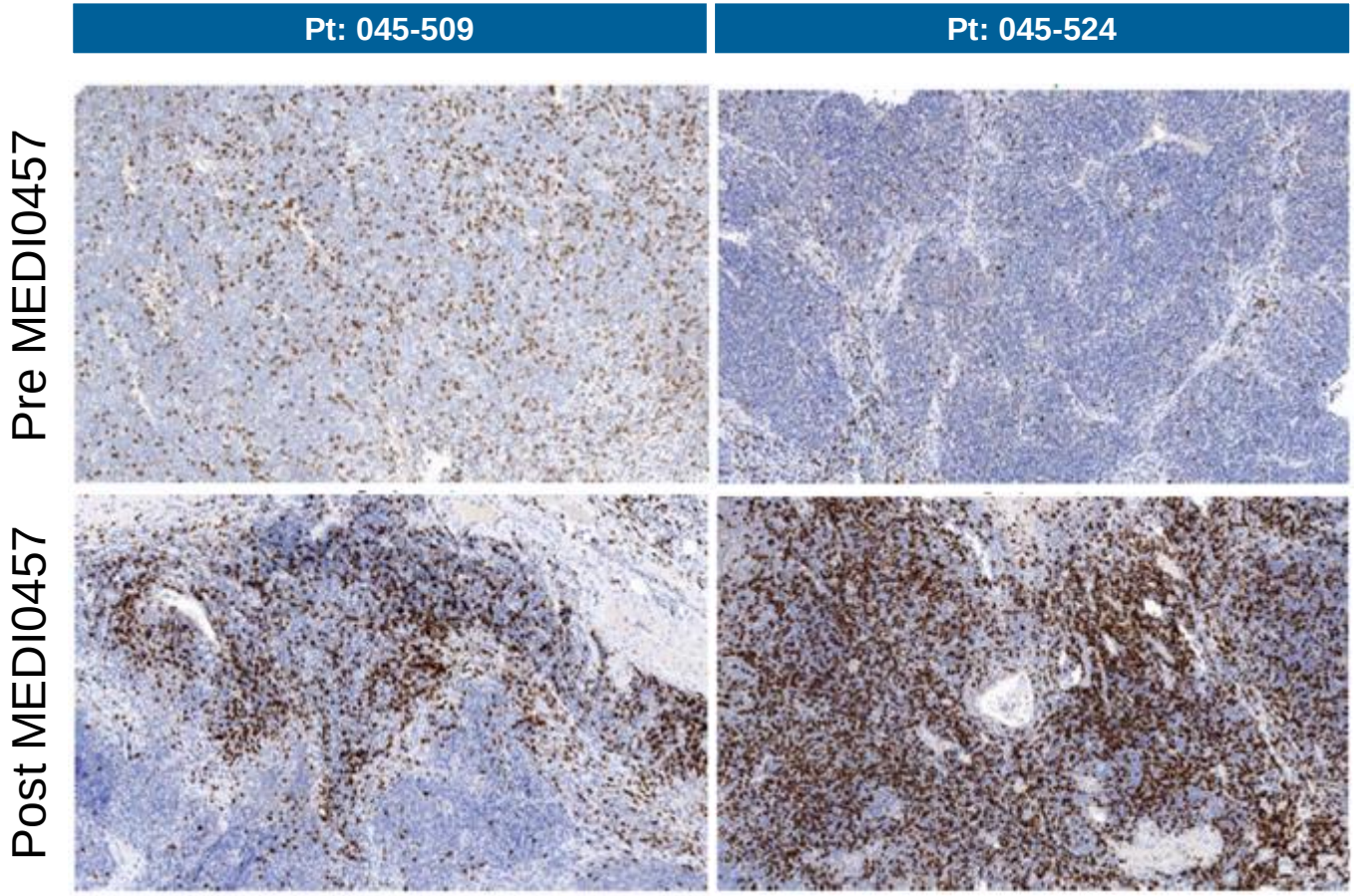
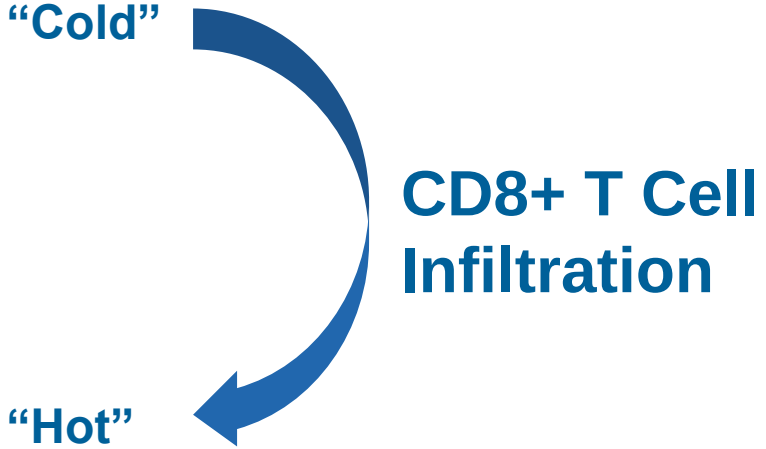
CD8+ T Cell Infiltration into Tumor Following MEDI0457 Treatment





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

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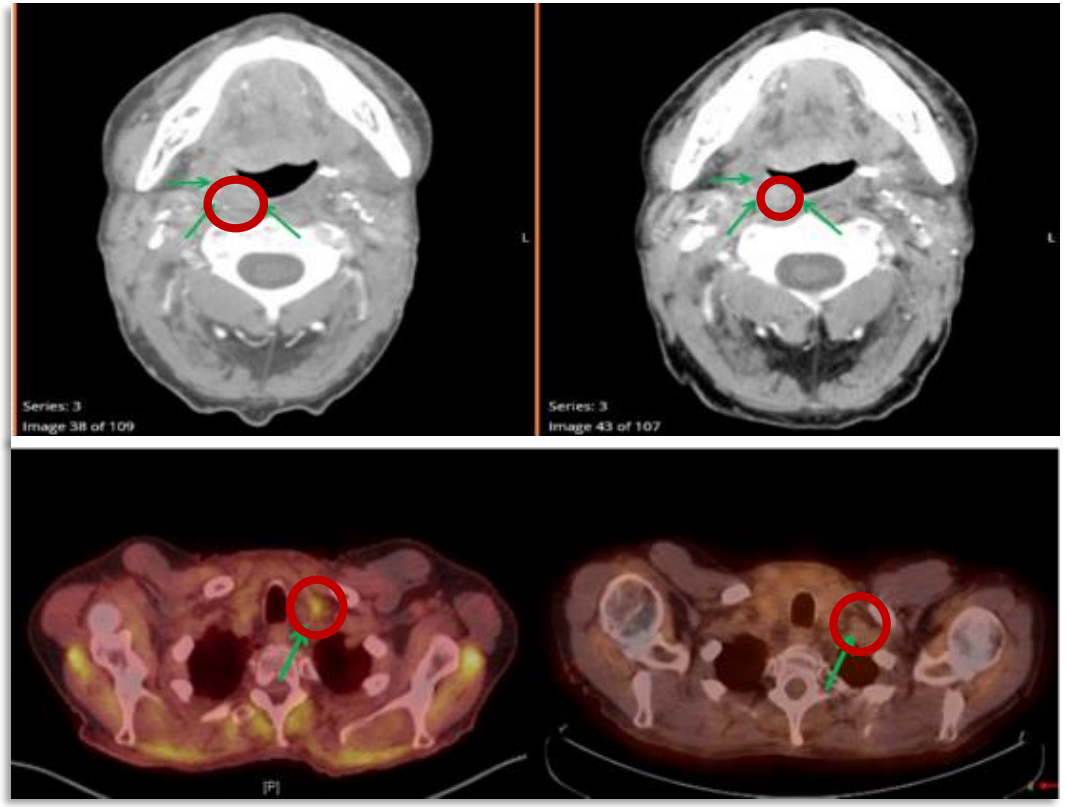
MEDI0457 Phase 1 Study Demonstrates Complete Response



- (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.

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)

Published in Clinical Cancer Research (CCR) 2018

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MEDI0457 for HPV-Associated Head & Neck Cancer in Phase 1b/2a in Partnership with AstraZeneca

TRIAL: **MEDI0457** (VGX-3100 + IL-12) AstraZeneca

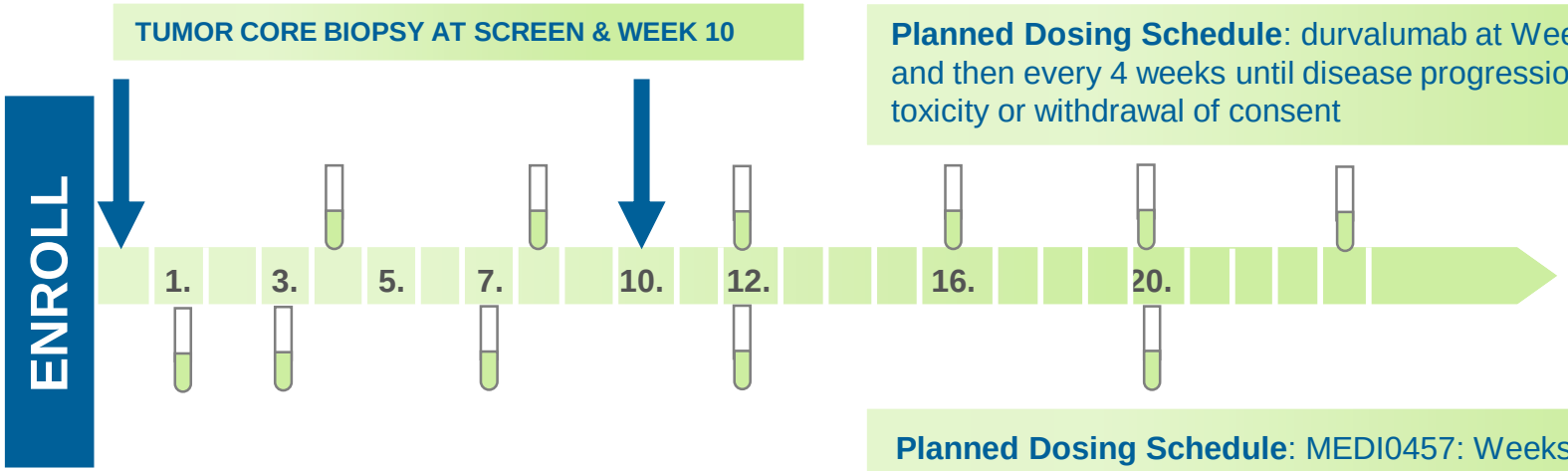
Phase 1b/2a open label study for **metastatic HPV+ HNSCC** with persistent or recurrent disease after chemotherapy treatment

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

Primary Endpoints:
Safety, tolerability
Secondary Endpoints:
Immunogenicity, ORR, PFS, Disease CR, OS

x35

Completed enrollment of 35 subjects in August 2019



Planned Dosing Schedule: durvalumab at Weeks 4, 8 and 12 and then every 4 weeks until disease progression, unacceptable toxicity or withdrawal of consent

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

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Immuno-Oncology Programs

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)

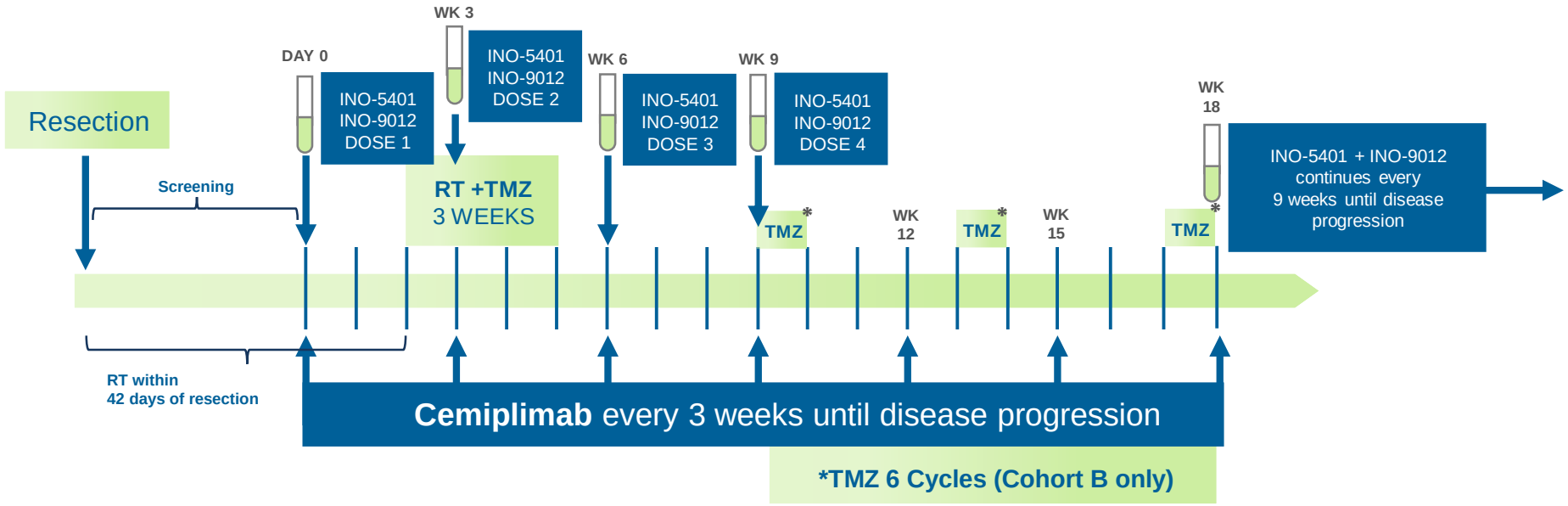
Phase 1b/2 open label study for **newly diagnosed glioblastoma (GBM)**

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

Primary Endpoints:
Safety, tolerability
Secondary Endpoints:
Immunological impact,
PFS and OS

x32
Cohort A:
MGMT Promoter Unmethylated:
32 patients

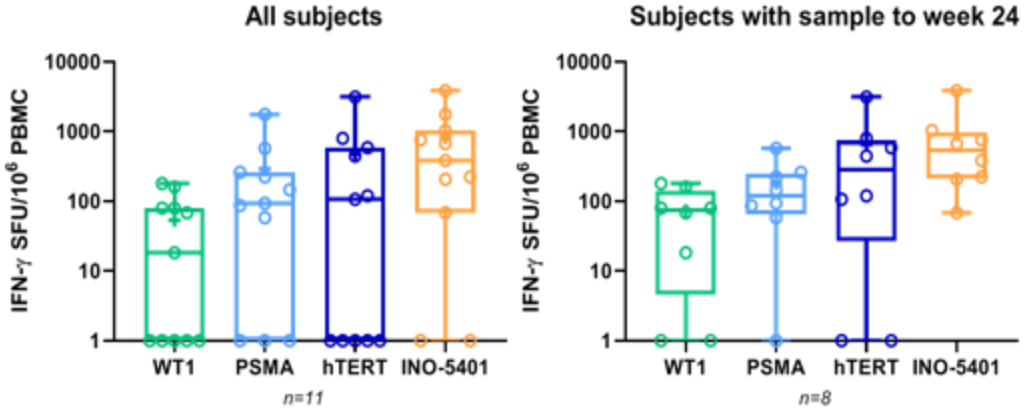
x20
Cohort B:
MGMT Promoter Methylated:
20 patients

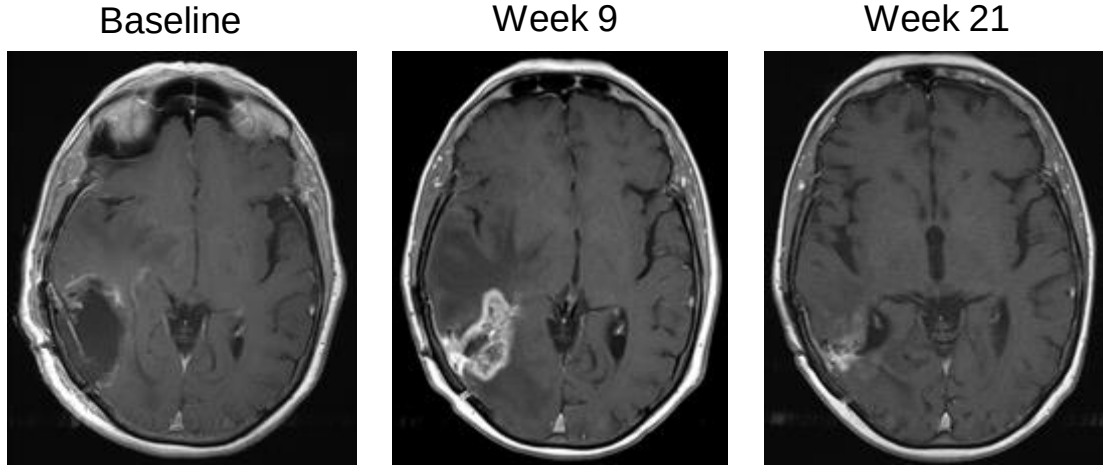


INO-5401 Results: Promising 12-Month Overall Survival Data and 6-Month Progression-Free Survival Data; OS18 Data in 4Q2020

- **Overall survival at 12 months** (OS12) to be presented at ASCO 2020 Annual Meeting
  - **MGMT Promoter Unmethylated OS12 of 84.4%**
  - **MGMT Promoter Methylated OS12 of 85%**
  - **Compares favorably with historical value of 65%**
- Previously reported PFS6 at SITC 2019
  - MGMT Promoter Unmethylated PFS6 of 75%
  - MGMT Promoter Methylated PFS6 of 80%
  - Compares favorably with historical value of 40-60%
- **Majority of patients tested had a T cell immune response to one or more tumor-associated antigens encoded by INO-5401**
- **Combination of INO-5401 + INO-9012 with cemiplimab, with radiation and temozolomide, is promising**
- **Overall survival results (OS18) will be presented 4Q 2020**

Immunology Output to Date





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

Stupp et al. N Eng J Med 2005; Hegi et al. N Eng J Med 2005; Stupp et al. N Eng J Med 2009

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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-5151 in Cohort C**

Cohort C – 15 patients

INO-5151 (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

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CANCER RESEARCH INSTITUTE

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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

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

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Strong Balance Sheet to Support Critical Milestones

$371.7M
Cash and short-term investments

As of June 30, 2020

168M
Common stock shares outstanding

As of August 10, 2020

VGX-3100

- ✓ 1Q20: Report interim data from Phase 2 VIN/AIN clinical trials
- ❑ 4Q20: REVEAL 1 Phase 3 top-line efficacy & safety data
- ❑ 2H20: Report full data from Phase 2 VIN/AIN clinical trials

MEDI0457

- ❑ 2020: Interim data from AZ on MEDI0457 Phase 2 study in HNSCC

INO-3107

- ✓ 1H20: Initiate Phase 1/2 trial of INO-3107 for RRP (HPV6 and 11)
- ✓ July 2020: Received Orphan Drug Designation from FDA

INO-5401

- ✓ 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®)

INO-4800

- ✓ April 2020: Initiate Phase 1 trial of INO-4800 for COVID-19
- ❑ Sep 2020: Initiate Phase 2/3 trials of INO-4800 for COVID-19

Platform Development

- ❑ 2020: CEPI- funded INO-4700 against MERS into Phase 2 in Middle East & Africa
- ❑ 2020: Interim Phase 1 results from first-in-human trial of dMAb™ plasmid candidate INO-A002 (for preventing or treating Zika virus infection)

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INOVIO DNA Medicine Value Proposition

- **Validated Technology Platform**
  - Demonstrated **Phase 2b clinical efficacy** of lead asset VGX-3100
  - **Validated safety data** in >2,000 patients and >7,000 administrations with CELLECTRA smart device, and consistent demonstration of high levels of **T cell and antibody immune responses**
  - Well-protected with over **1,000 issued and pending patents**
- **Over $210M in non-dilutive funding since 2009**
- **Partnerships with major pharma and organizations:**

CEPI · Bill & Melinda Gates foundation · PICI Parker Institute for Cancer Immunotherapy · AstraZeneca · REGENERON · DARPA · Department of Defense · NIH

- **Multiple catalysts in 2020**
  - VGX-3100 Phase 3 cervical precancer topline data readout
  - INO-5401 Phase 2 GBM OS18 data
  - INO-4800 Phase 1 safety/immunogenicity publication/Conduct Phase 2/3

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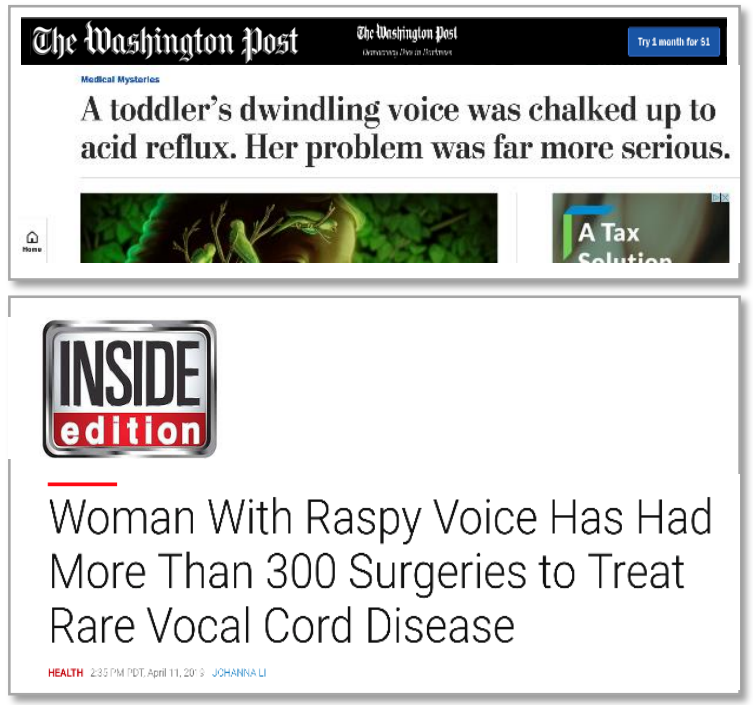
Appendix

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** age18-59 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 life-threatening in children and adults;** only current treatment is **multiple, lifelong surgeries**



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INOVIO DNA Medicines Will Meet Urgent Health Needs Worldwide
(continued)

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

REGENERON

- ~3.1M men in U.S. have **prostate cancer,** the **most common** cancer among men except for skin cancer

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Infectious Diseases (non-HPV associated)

- HIV — NIH NIAID; HIV VACCINE TRIALS NETWORK
- Ebola — DARPA
- MERS — GeneOne Life Science 진원생명과학(주); CEPI
- Zika — GeneOne Life Science 진원생명과학(주); BILL & MELINDA GATES foundation
- Lassa Fever — CEPI
- COVID-19 — CEPI; BILL & MELINDA GATES foundation

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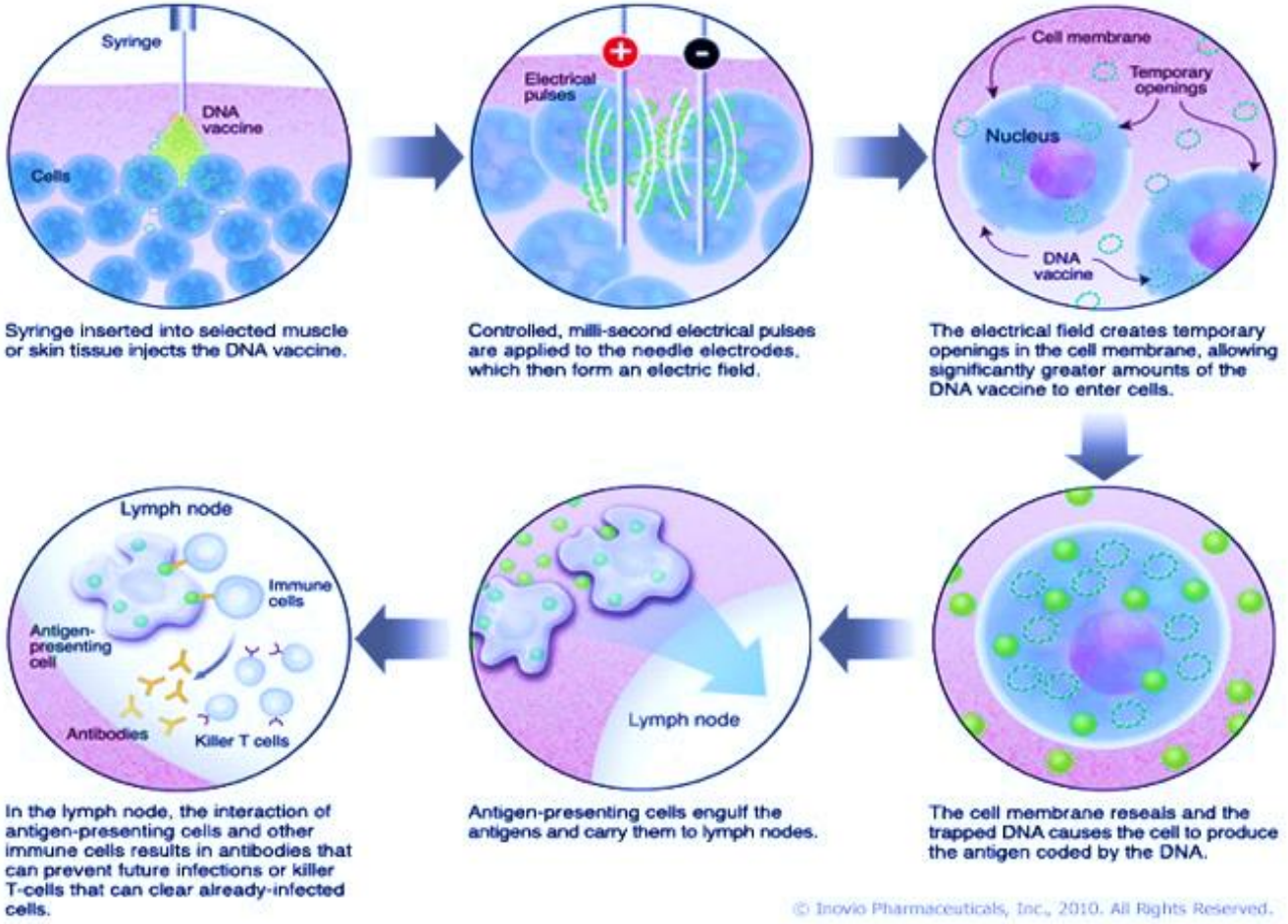
INOVIO's Technology Delivering Precisely Designed Plasmids with Proprietary Smart Devices

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



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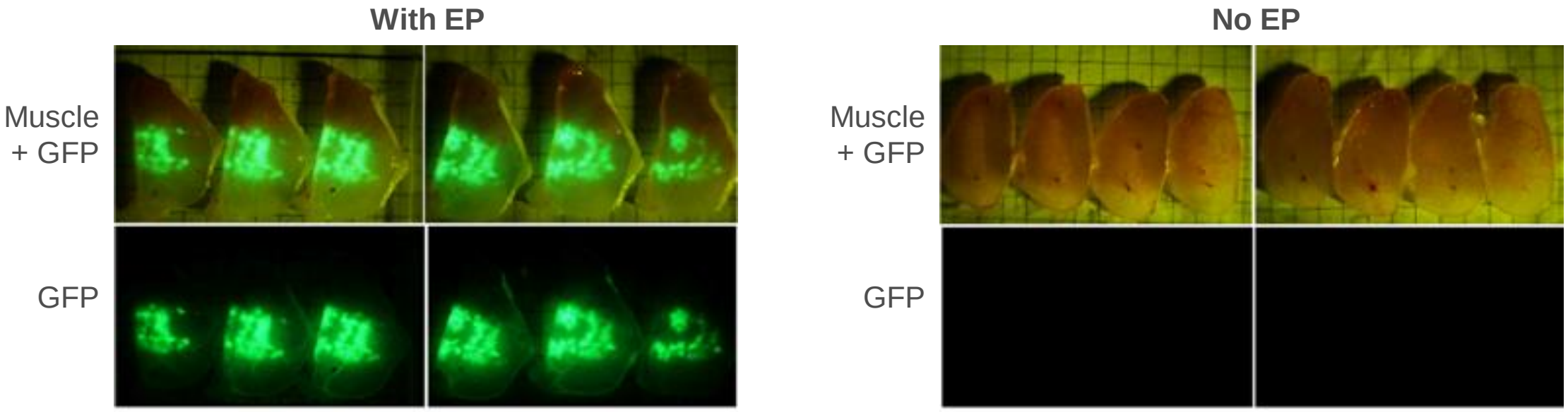
Precise Design + Intracellular Delivery = Improved Immune Responses



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

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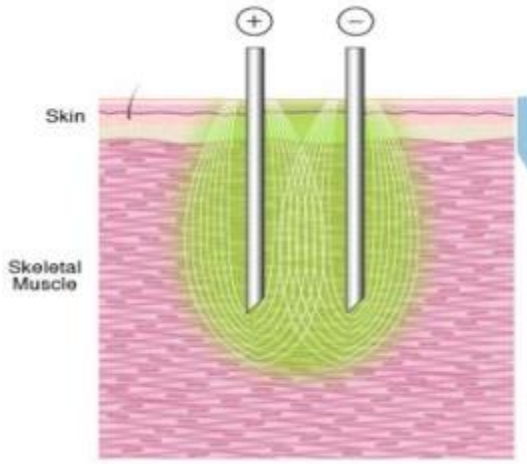
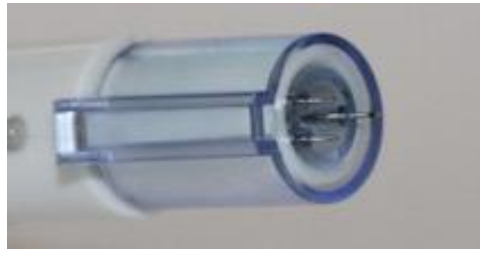
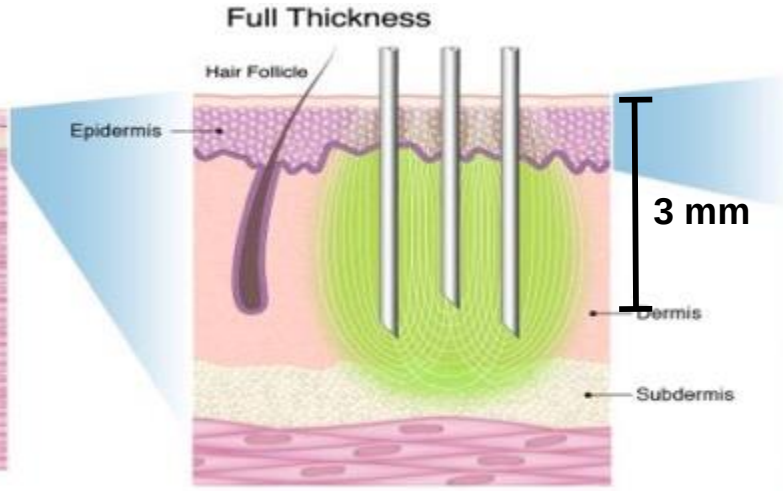
Innovation in the Delivery of SynCon® DNA Medicine

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

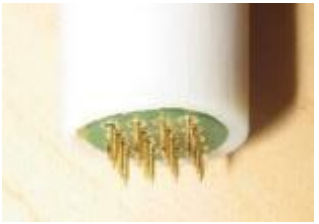


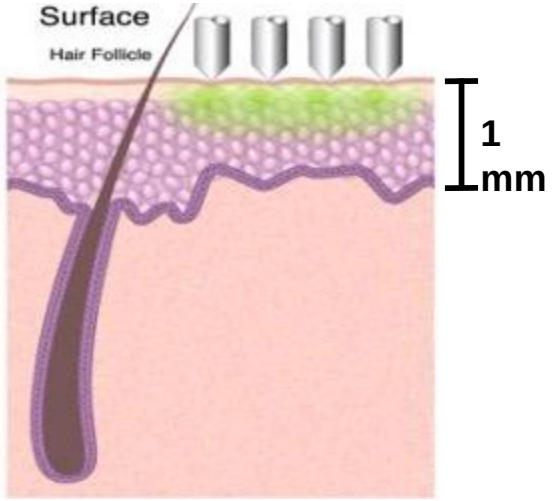
CELLECTRA®-3P
- Intradermal – minimally invasive
- 3mm electrodes
- In clinical use





Surface EP (SEP)
- Surface
- Noninvasive
- 4x4 electrode array
- Specifically targets epidermis
- In late-stage preclinical development





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CELLECTRA® Platform

CELLECTRA-5PSP
Intramuscular EP

CELLECTRA-3P
Intradermal EP

CELLECTRA-3P technology
in a hand-held portable device

CELLECTRA® 2000 EP Technology – Track record of success in the clinic

- >2,000 human subjects and >7,000 doses
- CELLECTRA® 5PSP device developed to support Phase 3 and commercial launch
- Phase 2 efficacy data combining DNA vaccine and EP
- Global – Regulatory approval for studies in 6 continents (including Central & Sub-Saharan Africa); both devices CE marked in Europe

CELLECTRA® 5PSP – INOVIO's First Commercial Smart Device

CELLECTRA® 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

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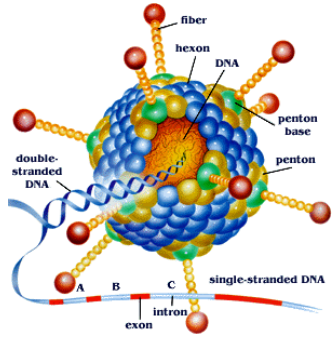
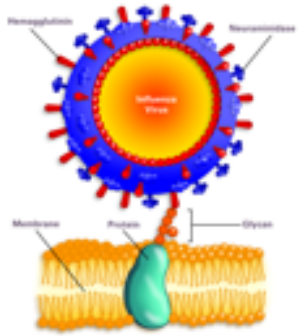
Limitations of Other Approaches

Viral Vectors – Receptor/cell target based mediated entry

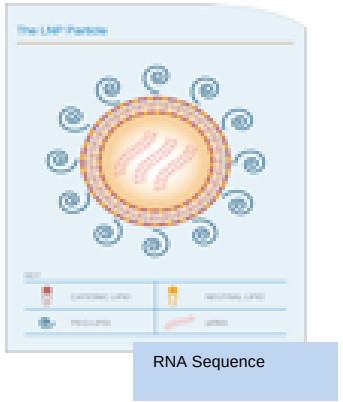
- Systemic delivery/local injection
- Preexisting or induced immunity is an issue
- Biologic variability of take
- Immune bias tuned by vector
- Hard to re-administer/tissue tropism limits and positives





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



RNA Sequence

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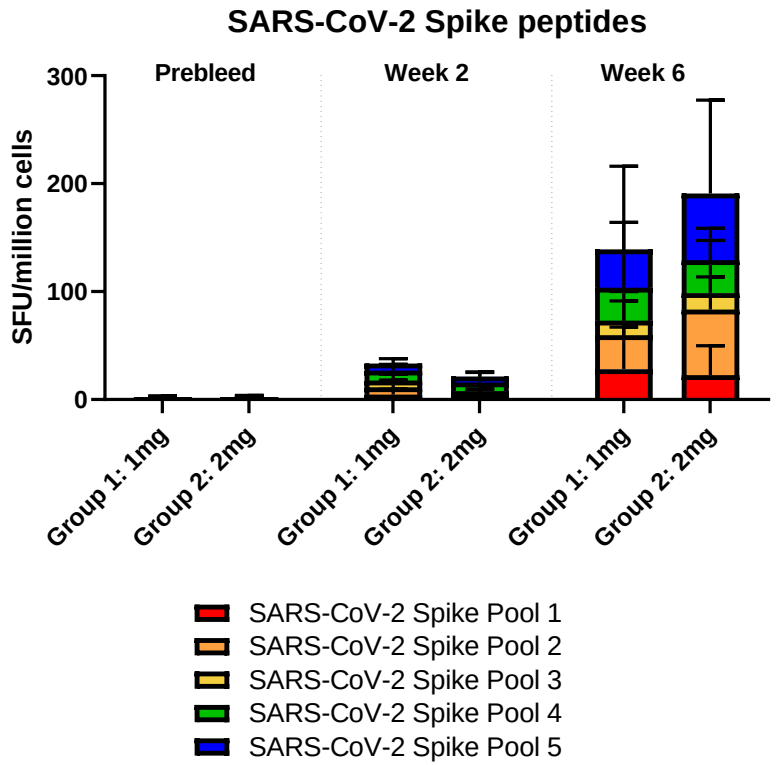
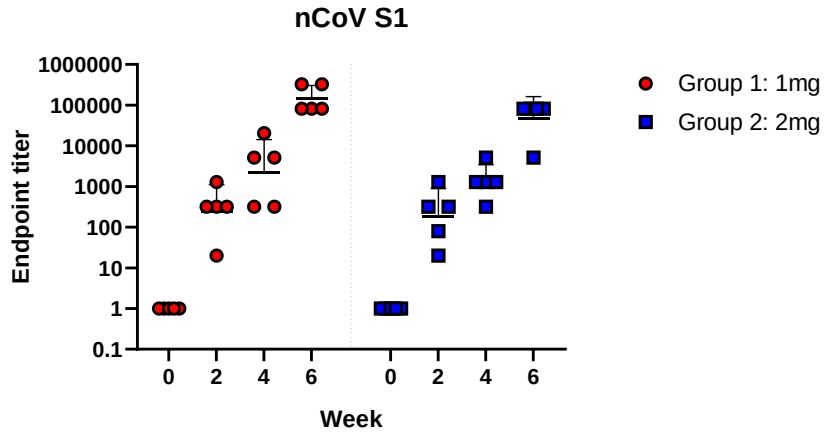
Robust Cellular and Humoral Immune Responses Following Immunization of INO-4800 in Rhesus Monkeys

Animal: Rhesus macaque

Treatment: Day 0 and 28 ID delivery of pDNA

Group	Vaccine	Delivery	Dose per immunization	n
1	pGX9501	ID, 1 site	1 mg	5
2	pGX9501	ID, 2 sites	2 mg	5





Robust and rapid B and T cell responses in NHPs

HPV-Related Clinical Program Overview

Precancerous Dysplasias (VGX-3100)

- Cervical dysplasia: Phase 2b PoC trial demonstrated a **complete response in 43 out of 107** patients in regression of high-grade cervical lesions ***and*** elimination of HPV infection
- Vulvar dysplasia: Open-label Phase 2 trial showed **8 out of 10** women had **reduction in lesion area**; 2 of 10 had no virus at 6 months (interim)
- Anal dysplasia: Open-label Phase 2 trial showed **clearance of precancerous lesions** in **10 out of 20** patients, decrease in lesions for 15 of 20 (interim)

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)

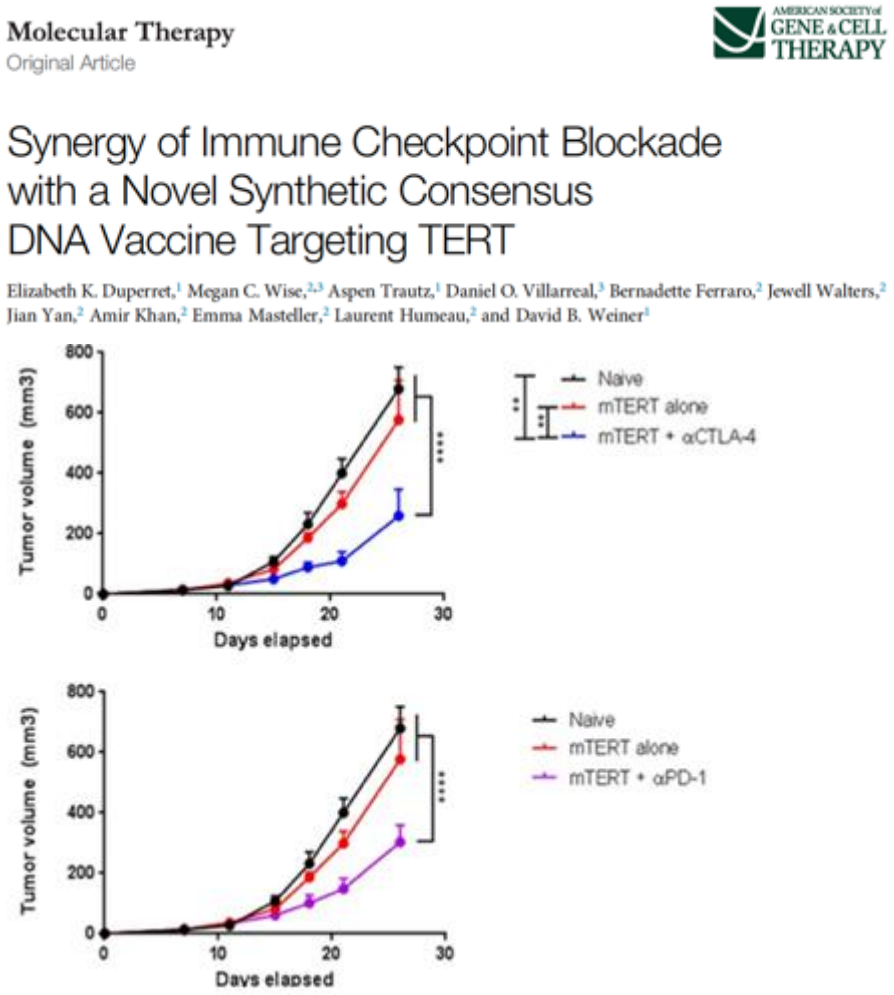
RRP (INO-3107)

- 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

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

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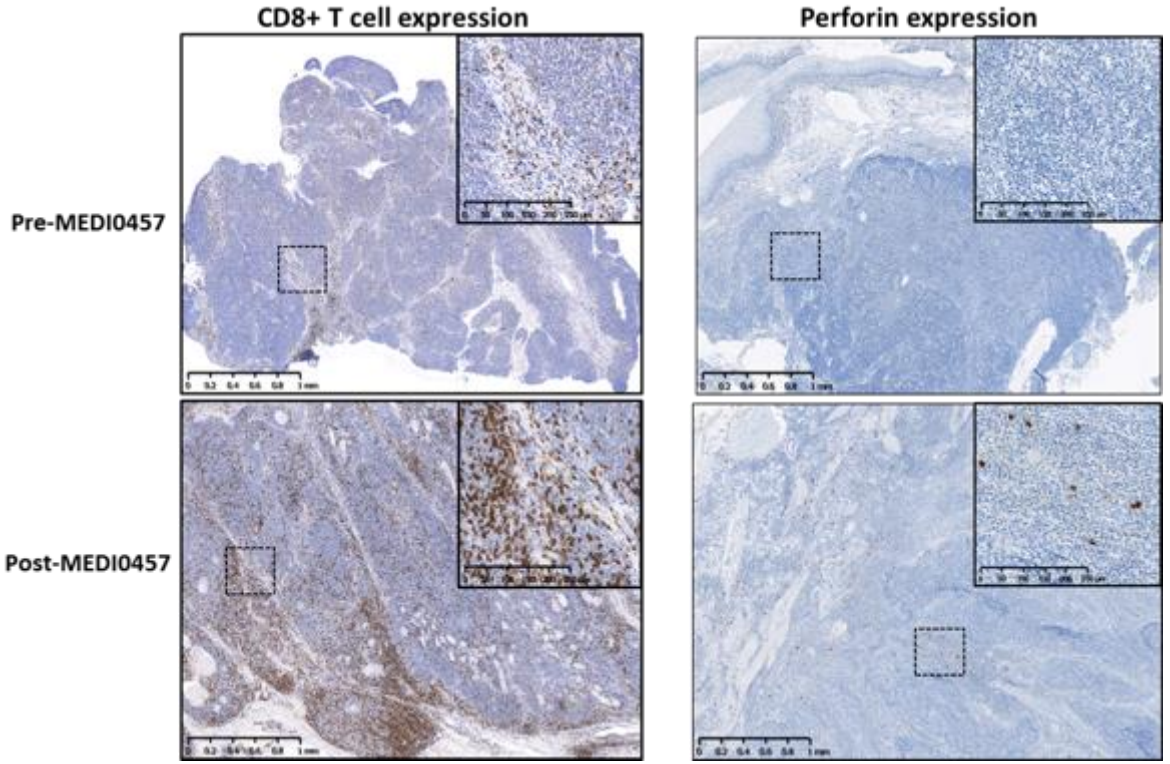
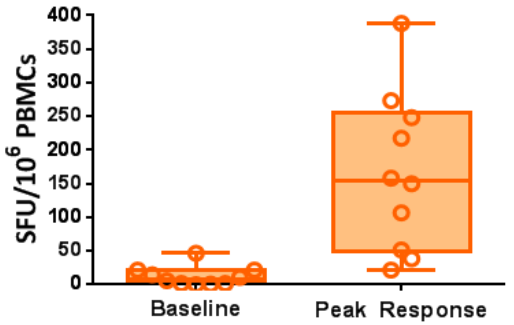
MEDI0457 (HPV16/18) Induces Robust Anti-Tumor Immunity in Head and Neck Cancer

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

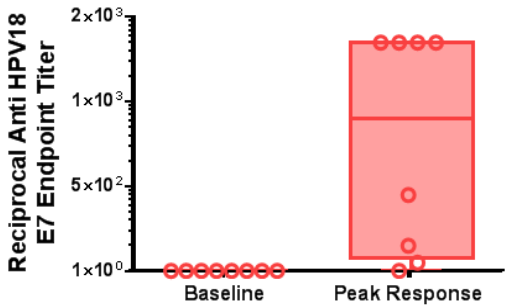
Strong invasion by CD8 T cells into tumors following immunization with MEDI0457 in HPV associated HNSCCa.



Induction of T cells:
Quantitative non-cultured ELISpots



Induction of Antibodies:
Endpoint titers to HPV18 E7



Aggarwal et al Clinical Cancer Research 2018

Most participants respond immunologically to the vaccine

GBM (Newly-diagnosed) Phase 1/2 Study

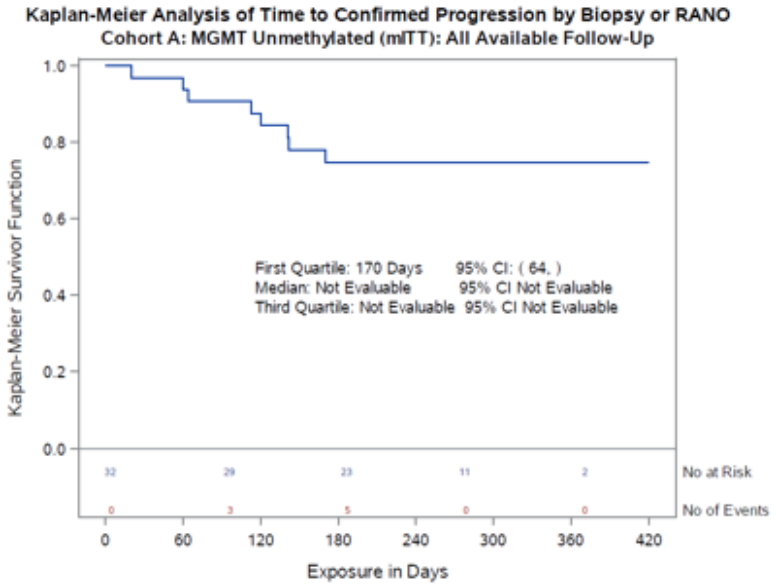
Trial Treatment (NCT03491683)

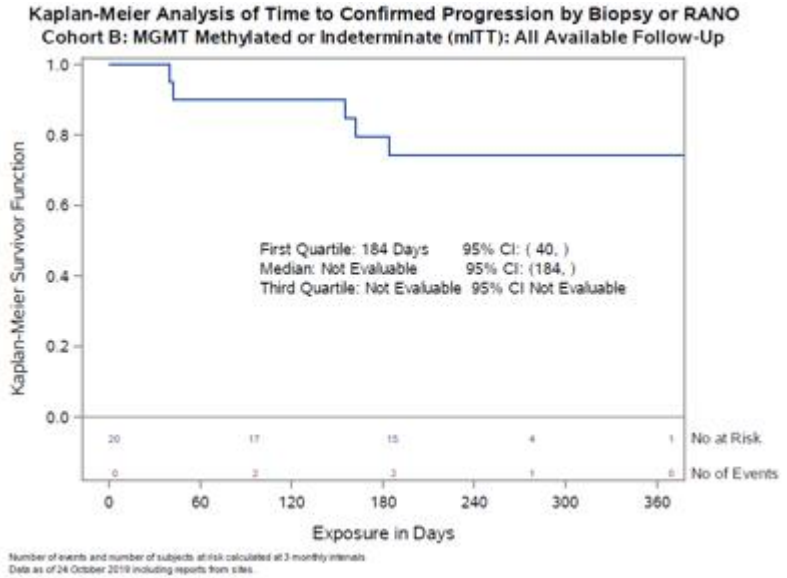
- **INO-5401** (3 mg of each WT1, PSMA and hTERT plasmids) combined with 1 mg INO-9012, (total 10 mg of DNA) IM injection followed by EP given every 3 weeks for 4 doses, then every 9 weeks; and
- **Cemiplimab (LIBTAYO®)** (350 mg/dose IV every 3 weeks)

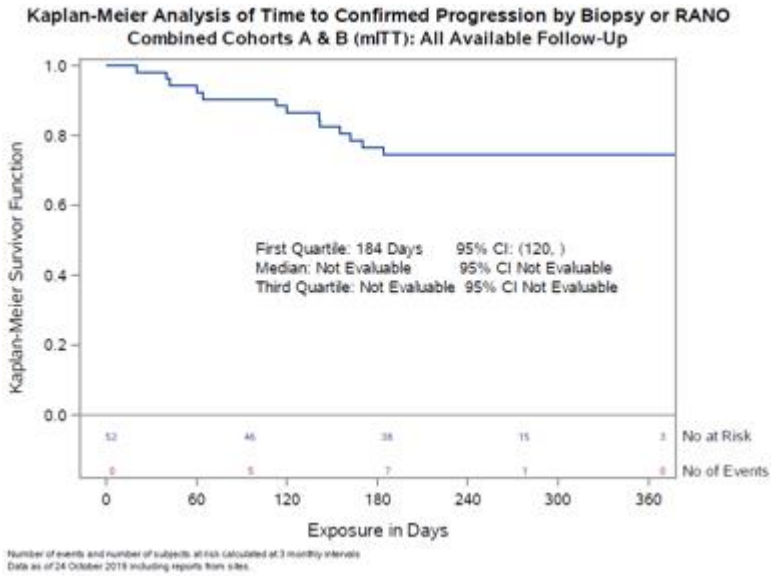
Chemoradiation Treatment

- **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)







Cohort	N Subjects	N Event-free Subjects	PFS6 (%)	95% CI Lower Bound	95% CI Upper Bound
Cohort A (MGMT Unmethylated)	32	24	75	56.6	88.5
Cohort B (MGMT Methylated)	20	16	80	56.3	94.3
Both Cohorts Combined	52	40	77	63.2	87.5

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.

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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

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- 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

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- “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
- ~50 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

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