



Powering a New Decade of DNA Medicines

May 2020



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.

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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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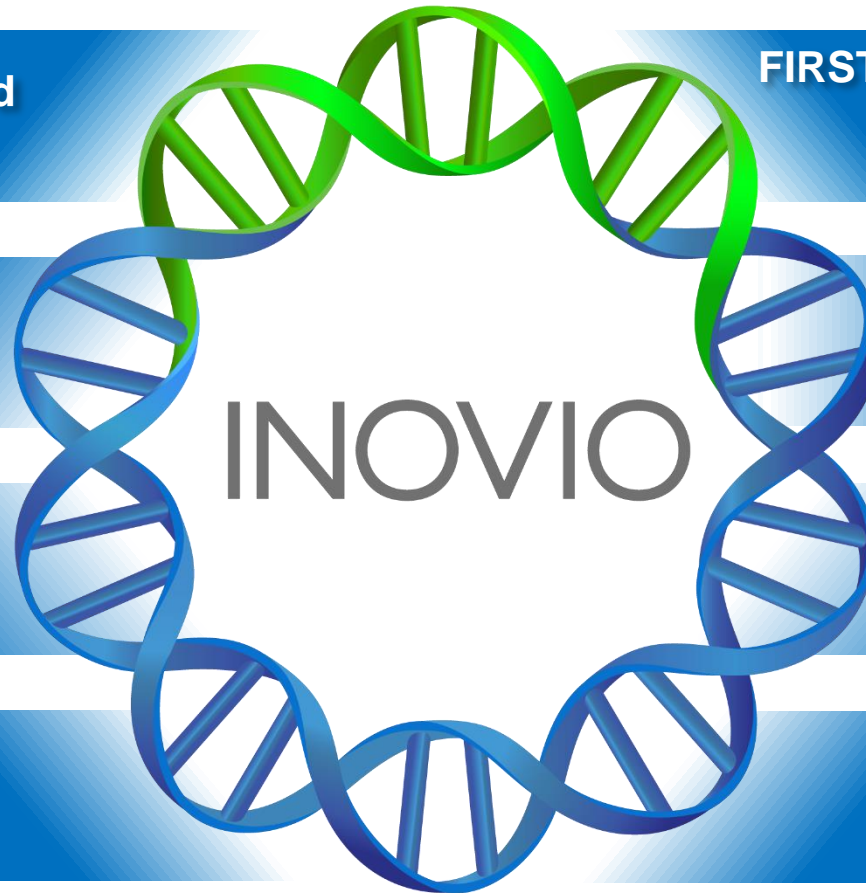
Powering a New Decade of DNA Medicines

Precisely Designed Plasmids Delivered
Through Proprietary Smart Device

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



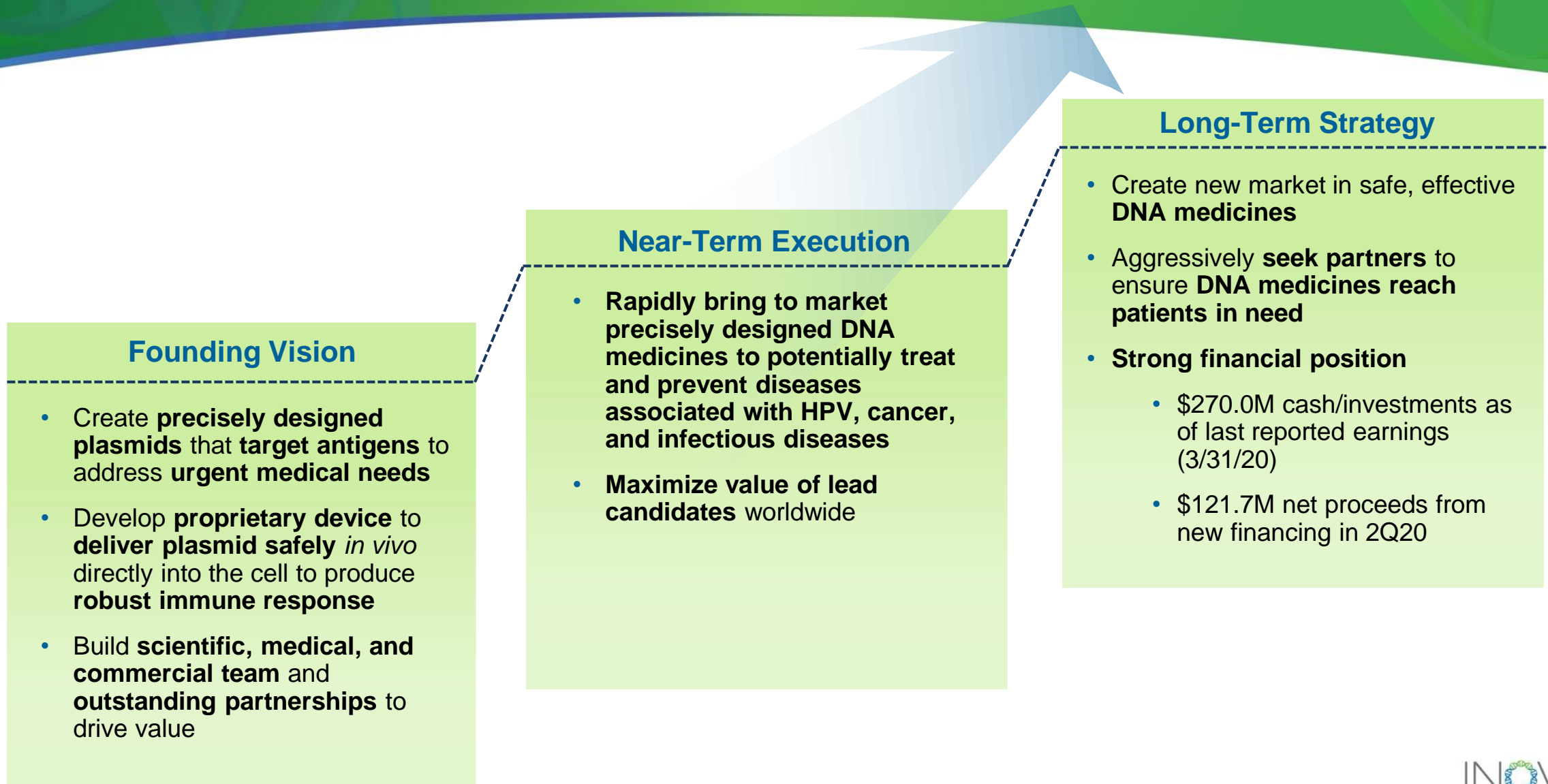
FIRST DNA Medicine in Phase 3 Clinical Trials
(VGX-3100 for Precancerous
Cervical Dysplasia)

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™ Plasmid in Phase 1
for Zika (INO-A002)

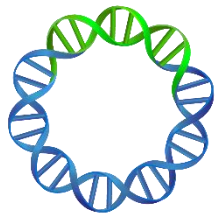
INOVIO Vision to Build the Leading DNA Medicine Company



Vision Built on INOVIO Proprietary Technology

OPTIMIZED PLASMID DESIGN AND DELIVERY TECHNOLOGY

**PRECISELY
DESIGNED PLASMIDS**
(SynCon®)



**PROPRIETARY
SMART DEVICE**
(CELLECTRA®)



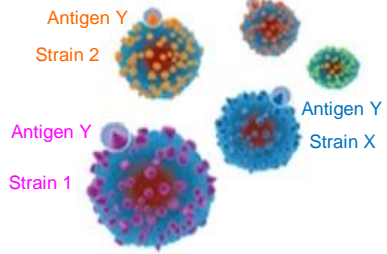
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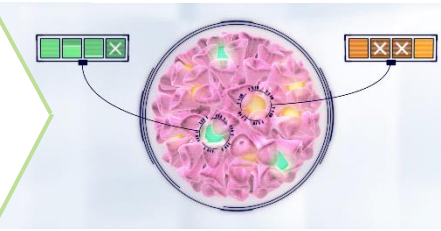
INOVIO Technology – Powering Potent Antigen Specific Immune Responses

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

Sequence 1	EMEKIVLLFAIV...SL
Sequence 2	AMESIVLLFAIV...SL
Sequence X Consensus	AMEKIVLLFAIV...SK
	AMEKIVLLFAIV...SL

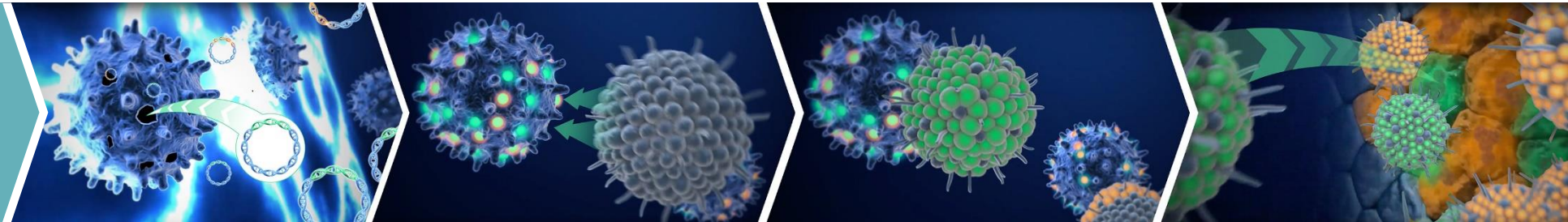
4. Insert SynCon sequence for each selected antigen into a separate precisely designed plasmid



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



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 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™ 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





INOVIO DNA Medicines Pipeline

PRODUCT	INDICATION	ANTIGEN	PRECLINICAL	PHASE 1	PHASE 2	PHASE 3	PARTNER/COLLABORATOR/FUNDER
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HPV-TARGETED

VGX-3100	Precancerous Cervical Dysplasia (HSIL)	HPV 16 E6, E7/ HPV 18 E6, E7					 Apollobio <i>(China; INOVIO maintains global rights)</i>
	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					 

 INTERNALLY FUNDED  EXTERNALLY FUNDED

INOVIO DNA Medicines Pipeline (Continued)

PRODUCT	INDICATION	ANTIGEN	PRECLINICAL	PHASE 1	PHASE 2	PHASE 3	PARTNER/COLLABORATOR/FUNDER
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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					GENE, CEPI
INO-4600 (GLS-5700)	Zika	Glycoprotein					GENE
INO-4500	Lassa Fever	Glycoprotein					CEPI
INO-4800	COVID-19 (Coronavirus)	Spike					CEPI, BILL & MELINDA GATES foundation

dMAb™ (DNA-ENCODED MONOCLONAL ANTIBODIES)

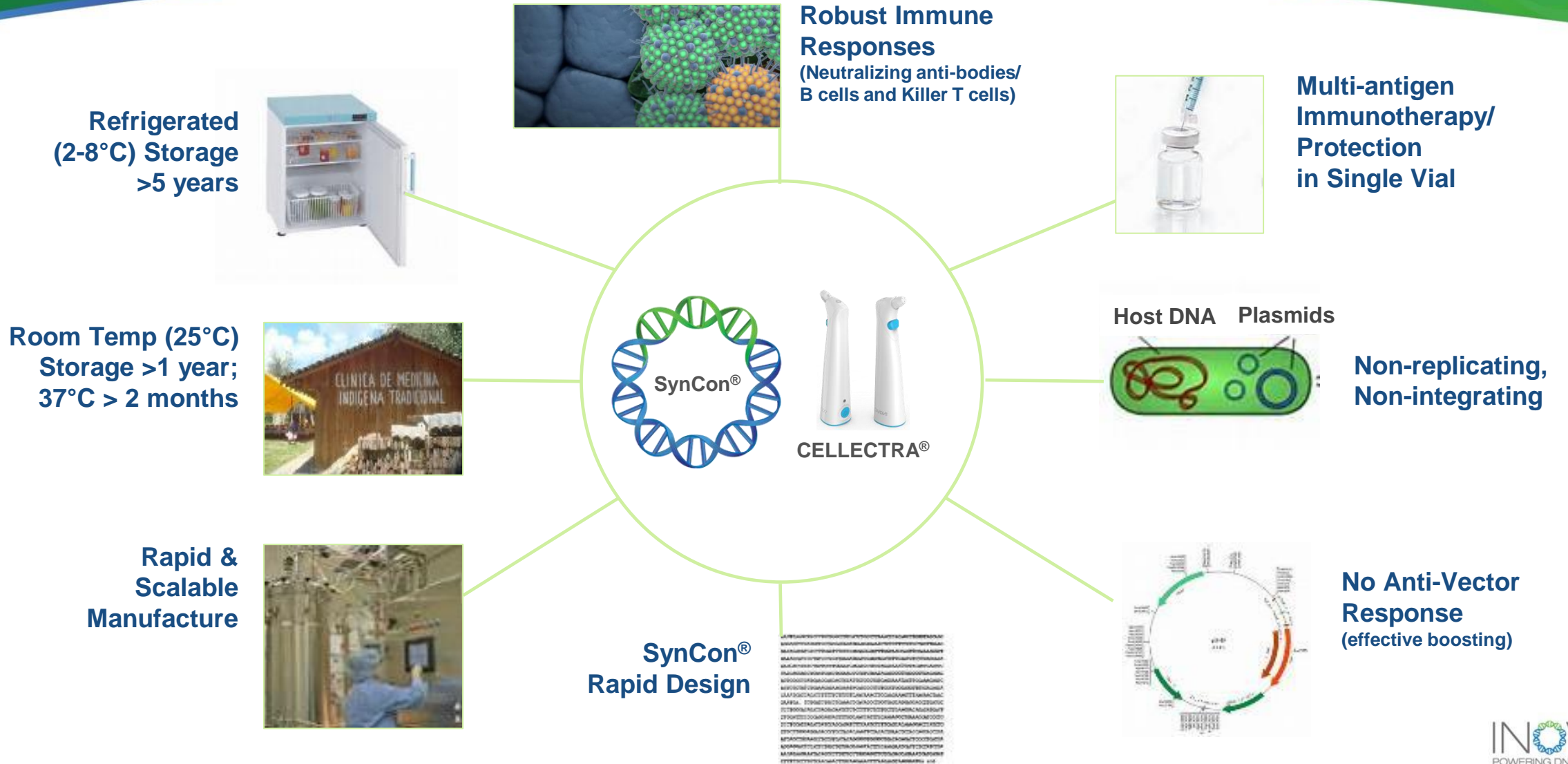
INO-A002	Zika	Glycoprotein					BILL & MELINDA GATES foundation
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 INTERNALLY FUNDED  EXTERNALLY FUNDED

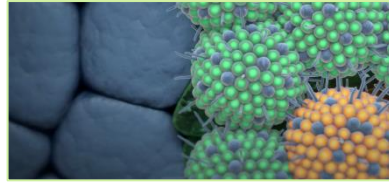
Infectious Disease Programs



Key Characteristics of INOVIO's DNA Vaccine Platform



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



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



**Multi-antigen
Immunotherapy/
Protection
in Single Vial**

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



Host DNA Plasmids



**Non-replicating,
Non-integrating**

**Rapid &
Scalable
Manufacture**








**SynCon®
Rapid Design**




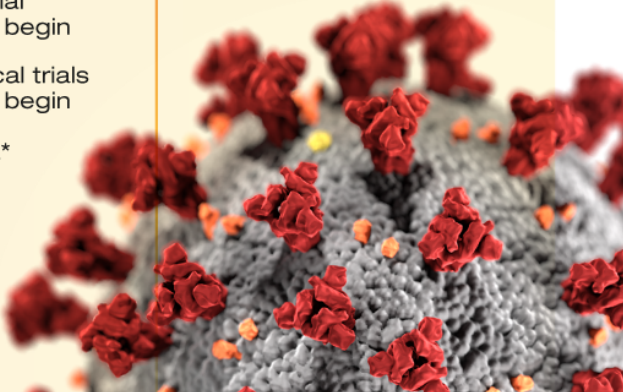
**No Anti-Vector
Response
(effective boosting)**

Infectious Disease Platform: Positive Clinical Data and Partnering Opportunities



Product	Indication	Data Reported (to date)	Partner/s	Next Milestone
PENNVAX-GP	HIV	<ul style="list-style-type: none"> 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 	  HIV VACCINE TRIALS NETWORK	Interim results from Phase 1/2 HIV trial study 2020 (UCSF; Deeks)
INO-4201	Ebola	<ul style="list-style-type: none"> 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 		Seeking additional grant funding for Phase 2 development
INO-4700 (GLS-5300)	MERS	<ul style="list-style-type: none"> Phase 1: High levels of binding and neutralizing antibodies in >90% of subjects 98% generated an antibody and/or T cell response against MERS 	 진원생명과학(주) GeneOne Life Science	Publish Phase1 data – <i>Lancet ID</i> 2019 Presentation at ASGCT 2020
INO-4600 (GLS-5700)	Zika	<ul style="list-style-type: none"> 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 	 진원생명과학(주) GeneOne Life Science	Report on Puerto Rico study 2020

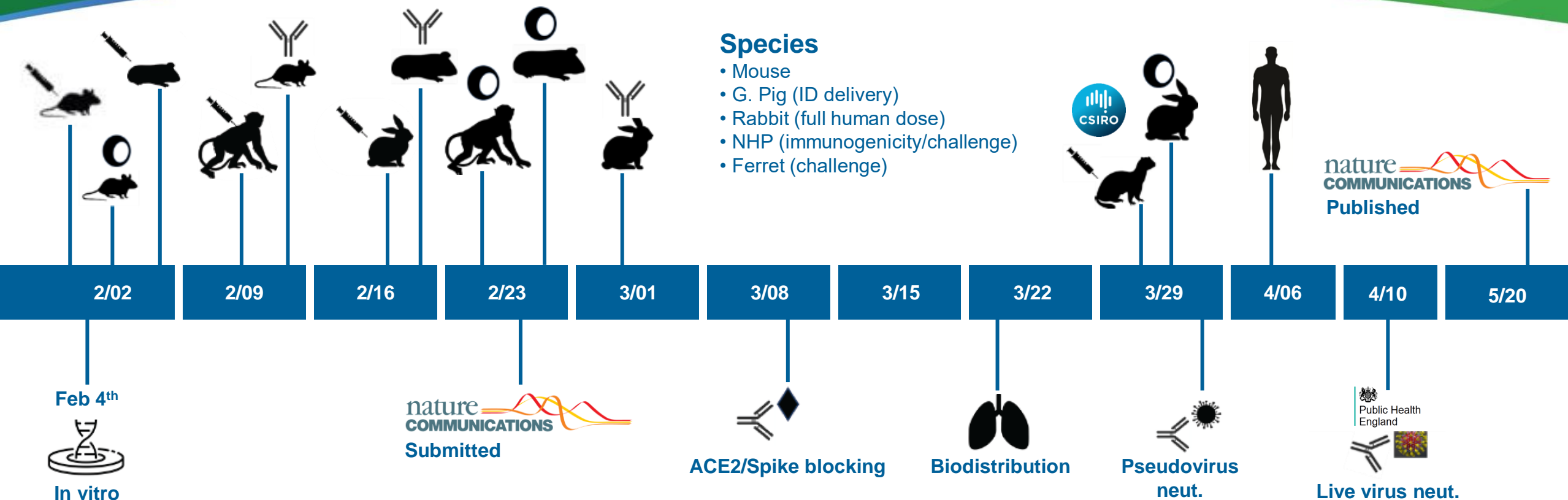
INOVIO's COVID-19 DNA Vaccine INO-4800 Development Timeline

DECEMBER 2019	JANUARY 10/11, 2020	JANUARY 10 - JANUARY 23, 2020	JANUARY 23, 2020	JANUARY 23 - FEBRUARY 29, 2020	MARCH 2020
<p>INOVIO coronavirus experts learn about a novel coronavirus (SARS-CoV-2) which caused an outbreak of respiratory disease in Wuhan, China, now referred to as COVID-19</p>	<p>Chinese researchers share the genetic sequence of the novel coronavirus on 1/10</p> <p>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</p> <p>INO-4800 was designed to precisely match the DNA sequence of the virus just after midnight on 1/11</p>	<p>INOVIO coronavirus experts race to manufacture INO-4800 and begin preclinical testing and clinical trial design</p>	<p>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</p> <p>CEPI</p>	<p>Preclinical testing continues, with immune responses generated in animal models; initial preclinical data submitted to peer-reviewed journal; human clinical trial designs developed and shared with regulators</p>	<p>Ongoing preclinical studies, including challenge studies; initial preclinical data "under consideration" at peer-reviewed journal; 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</p>
MARCH 12, 2020	MARCH 26, 2020	APRIL 6 - APRIL 23, 2020	MAY 2020	JUNE - JULY 2020	ONGOING
<p>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</p> <p>BILL & MELINDA GATES foundation</p>	<p>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</p> 	<p>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</p> <p>U.S. study fully enrolled 40 healthy volunteers; study sites are the University of Pennsylvania and a clinic in Kansas City, MO</p>	<p>Preclinical data published in peer-reviewed journal Nature Communications</p>	<p>In June, U.S. Phase 1 trial results to be announced</p> <p>Phase 2/3 trial expected to begin</p> <p>Human clinical trials expected to begin in China and South Korea*</p>	<p>INO-4800 COVID-19 DNA vaccine production and scale up underway*</p> 

Clinical trials and preclinical challenge studies continue

*Pending appropriate regulatory guidance and external funding

INOVIO INO-4800 Rapid Response



First Subject Treated in Phase 1 Trial – April 6th, 2020

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
- Preliminary safety and immune response data by 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 expected to start in June 2020
- A Phase 1 study in China planned to start in June 2020

□ Phase 2/3 Efficacy Study

- Study protocol being developed to assess the efficacy for prevention of COVID-19 in healthcare workers
- Ongoing preparation to start the study in July pending regulatory approval

INOVIO-Led Global Coalition to Advance INO-4800

CEPI

BILL & MELINDA
GATES *foundation*

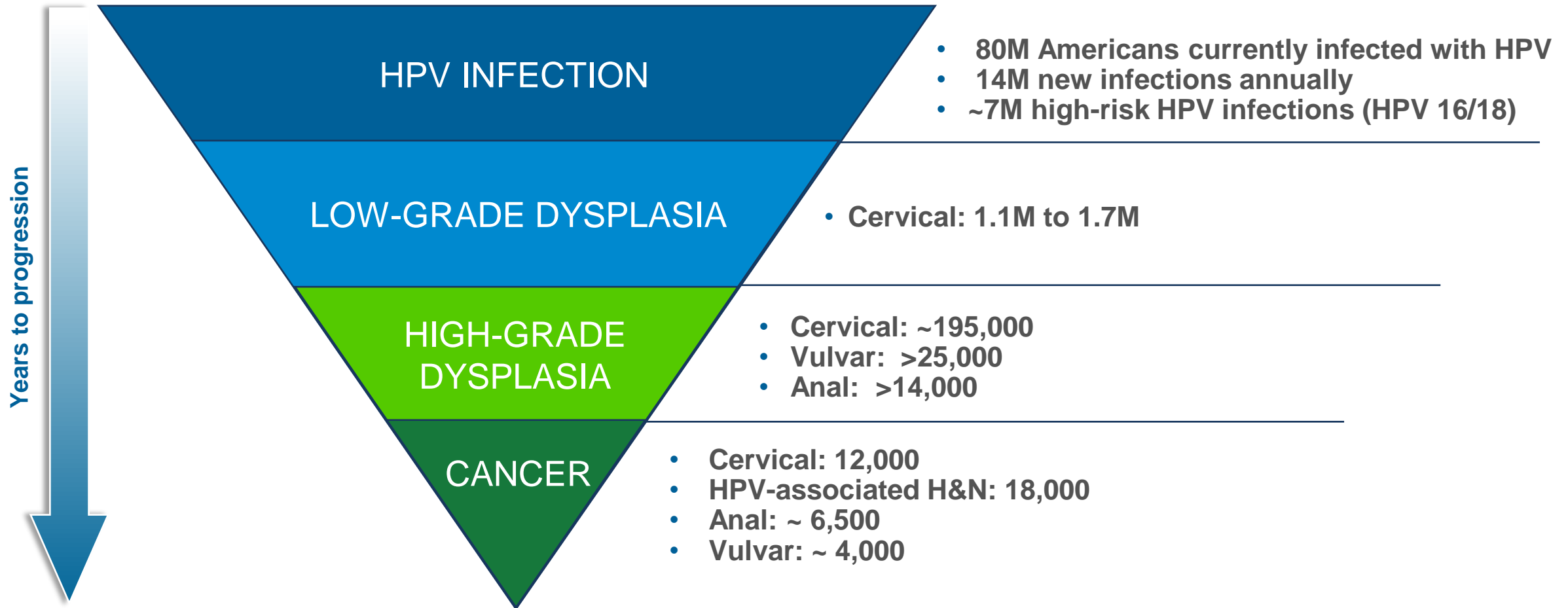


HPV-Related Programs



HPV-Associated Diseases Market Overview

HPV-associated conditions per year in US:



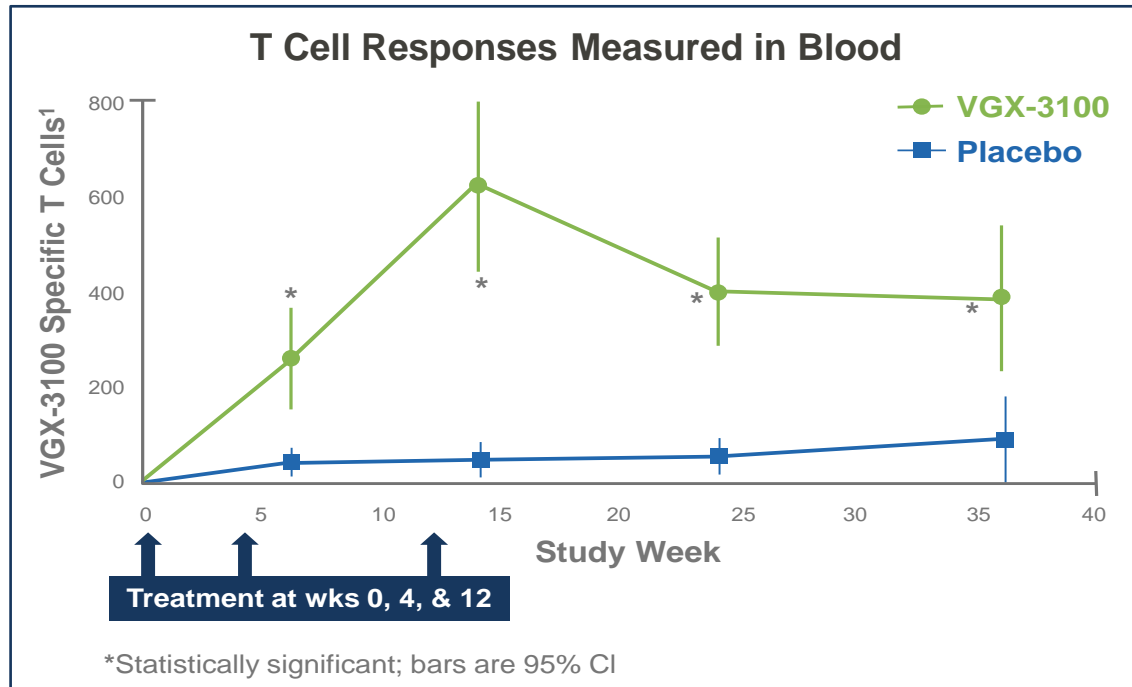
Sources: US CDC (2018) HPV and Cancer, available at: <https://www.cdc.gov/cancer/hpv/statistics/cases.htm> (accessed July 22, 2019); Saraiya M, Unger ER, Thompson TD, Lynch CF, Hernandez BY, Lyu CW, Steinau M, Watson M, Wilkinson EJ, Hopenhayn C, Copeland G, Cozen W, Peters ES, Huang Y, Saber MS, Altekruse 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):dju086; 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.

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

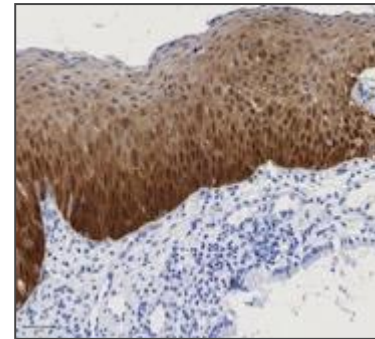
Phase 2b Endpoints (n=167)

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

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



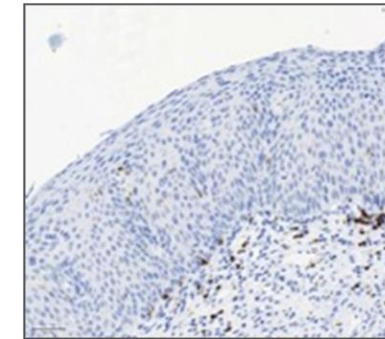
Regression of CIN3 & HPV to normal



Pre

Week 0

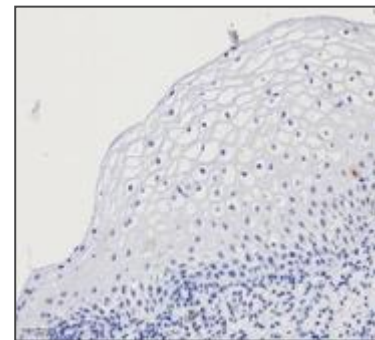
Increased and persistent presence of CD8+ cells (24 weeks post-last dose)



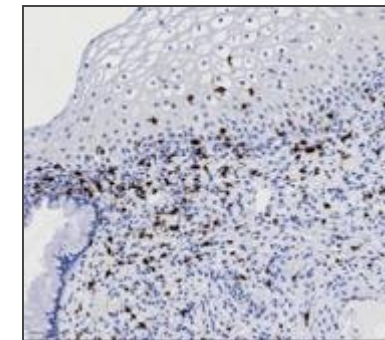
CD8+ T Cell Infiltration

Post

Week 36



IHC Staining: HPV



IHC Staining: CD8+

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

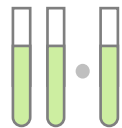
REVEAL2 (confirmatory) n=198 – Now Enrolling
Study follow-up through week 40

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)

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

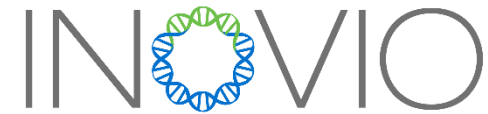
23 patients enrolled
Interim data reported for 20

Interim findings
(6 months after start of treatment)

Clearance of lesions: 50% of patients

Decrease in number of lesions: 75% of patients

INOVIO and QIAGEN Developing Biomarker to Optimize Patient Selection

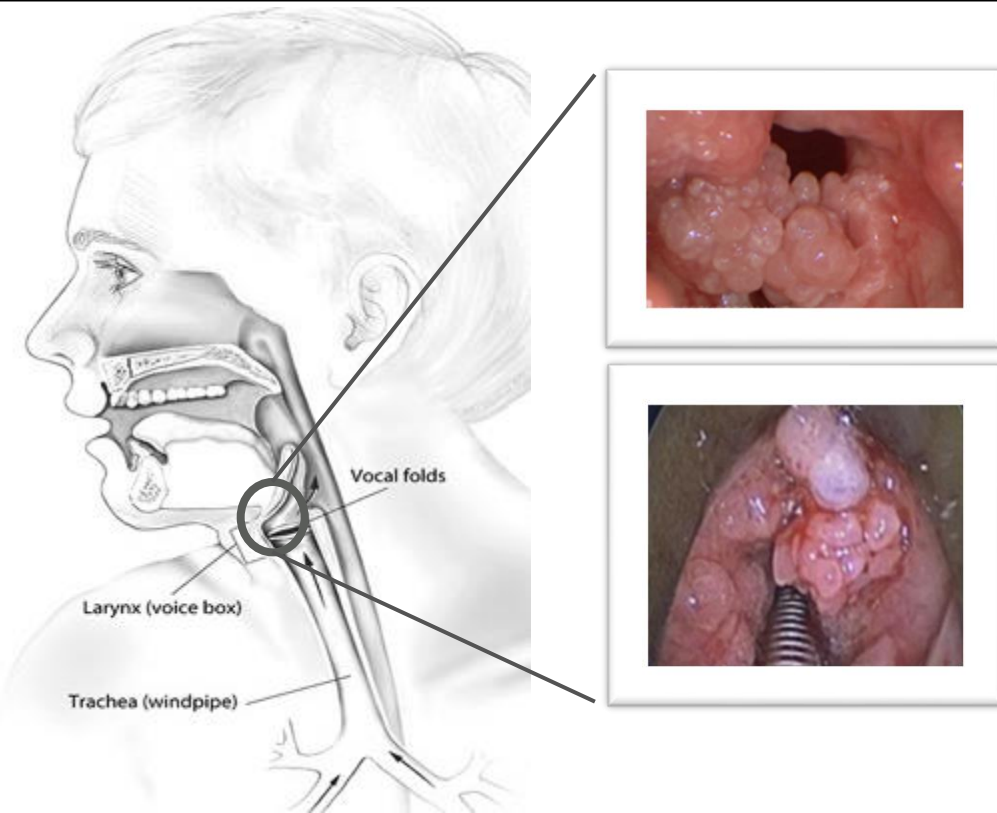


In 2Q 2019, INOVIO entered into collaboration with QIAGEN to co-develop a liquid biopsy-based pretreatment commercial test kit to guide patient selection for VGX-3100:

- 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

INO-3106 Pilot Study in RRP – Completed

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



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**

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

INO-3107 Phase 1/2 Study in RRP – IND Accepted

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



Phase 1/2 open-label, multicenter clinical study



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

MEDI0457 for HPV-Related Cancers in Partnership with AstraZeneca



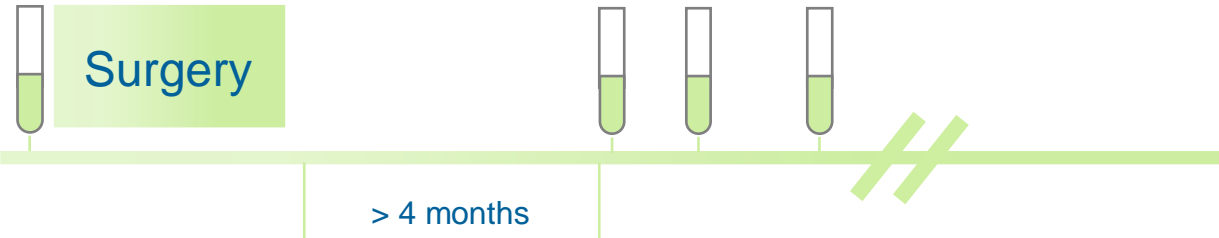
- **MEDI0457** (formerly INO-3112) = VGX-3100 + INO-9012 (IL-12 plasmid)
- In 2015, **AstraZeneca acquired exclusive rights to MEDI0457**
 - \$27.5M upfront
 - ~\$250M in potential development and commercial milestones
 - Double-digit tiered royalties on MEDI0457 sales
- **AstraZeneca is evaluating MEDI0457 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)

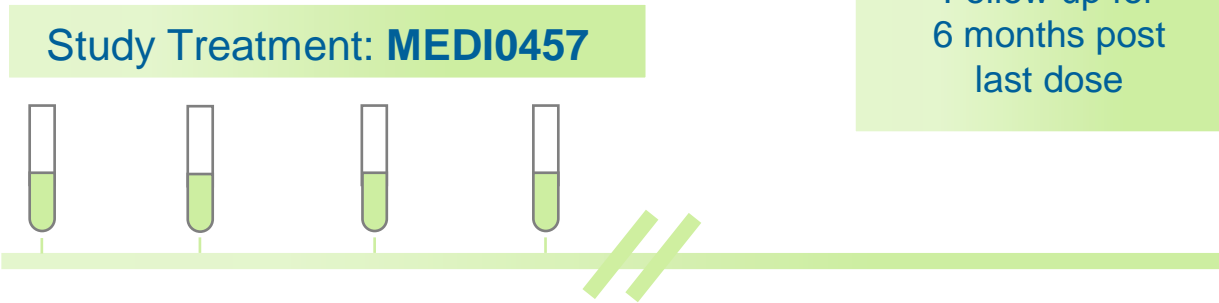
Immunotherapy is administered before and after surgery



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 administered prior to surgery, but total 4 treatments are scheduled

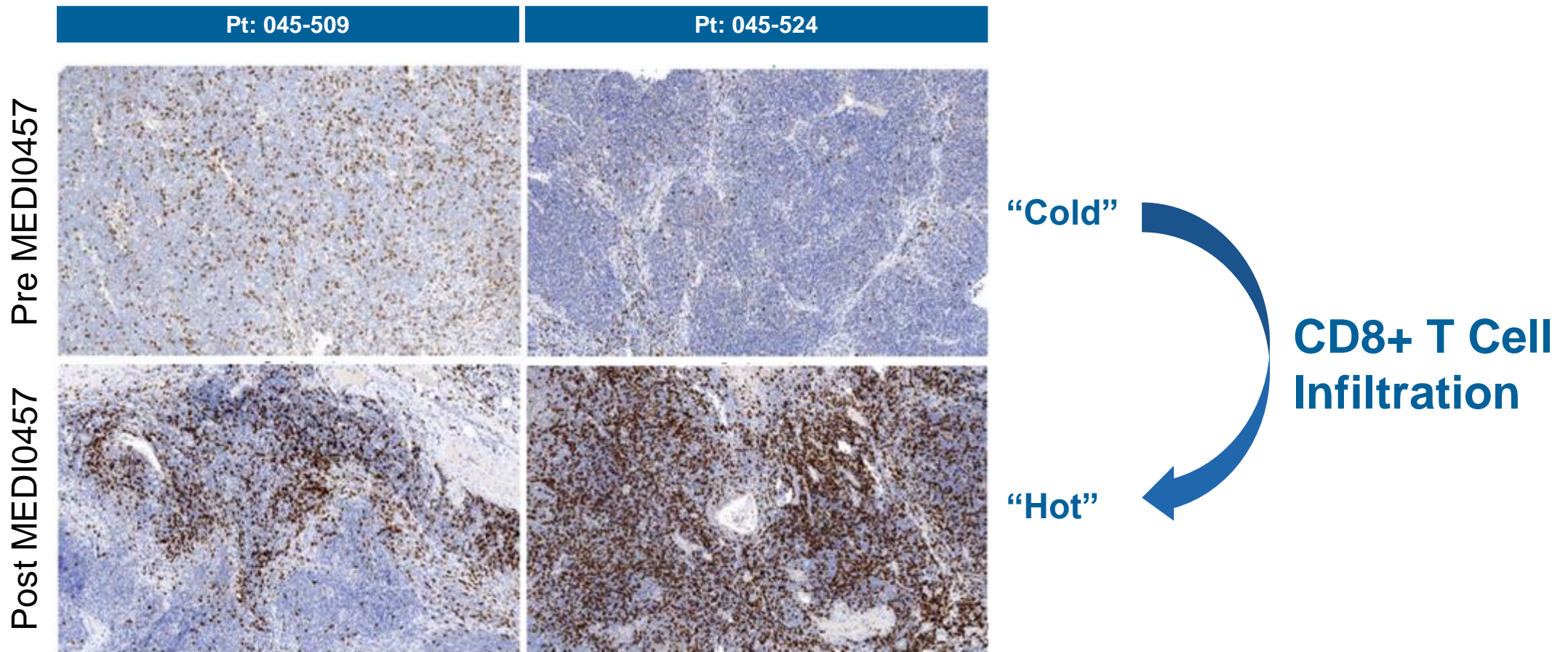


Primary: Safety and tolerability of DNA based immunotherapy

Secondary: Cellular and humoral immune responses

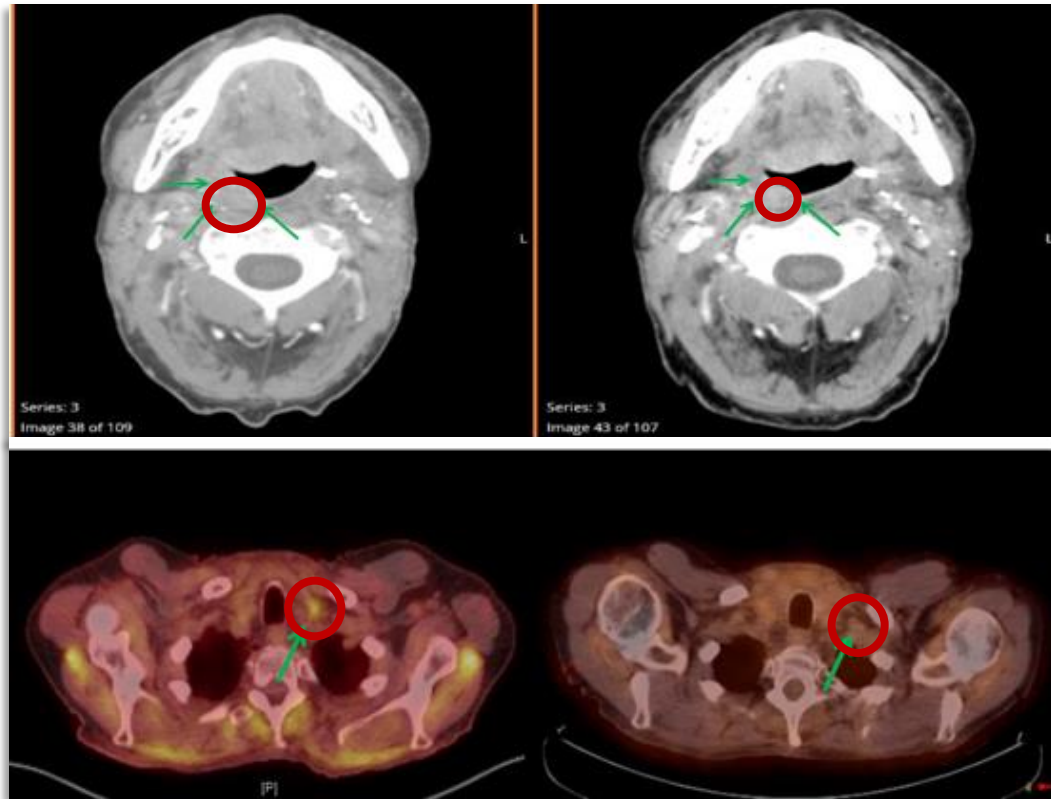
Exploratory: Anti-tumor response and progression free survival

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)

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)

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

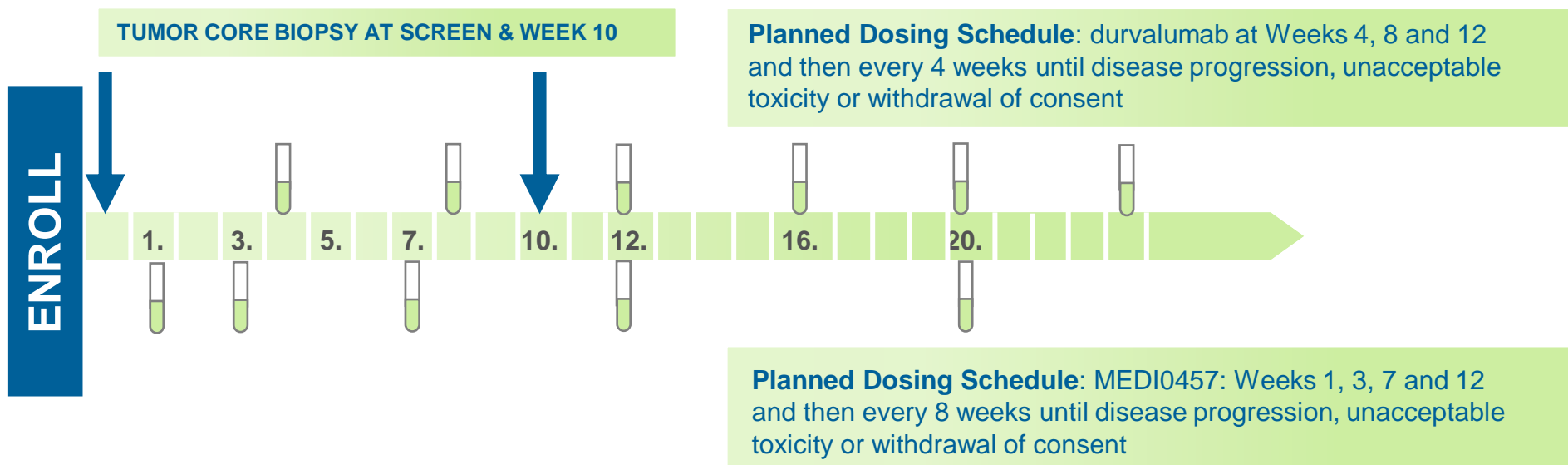
Secondary Endpoints:

Immunogenicity, ORR, PFS, Disease CR, OS



x35

Completed enrollment of 35 subjects in August 2019



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 **cemiplimab (Libtayo®)**

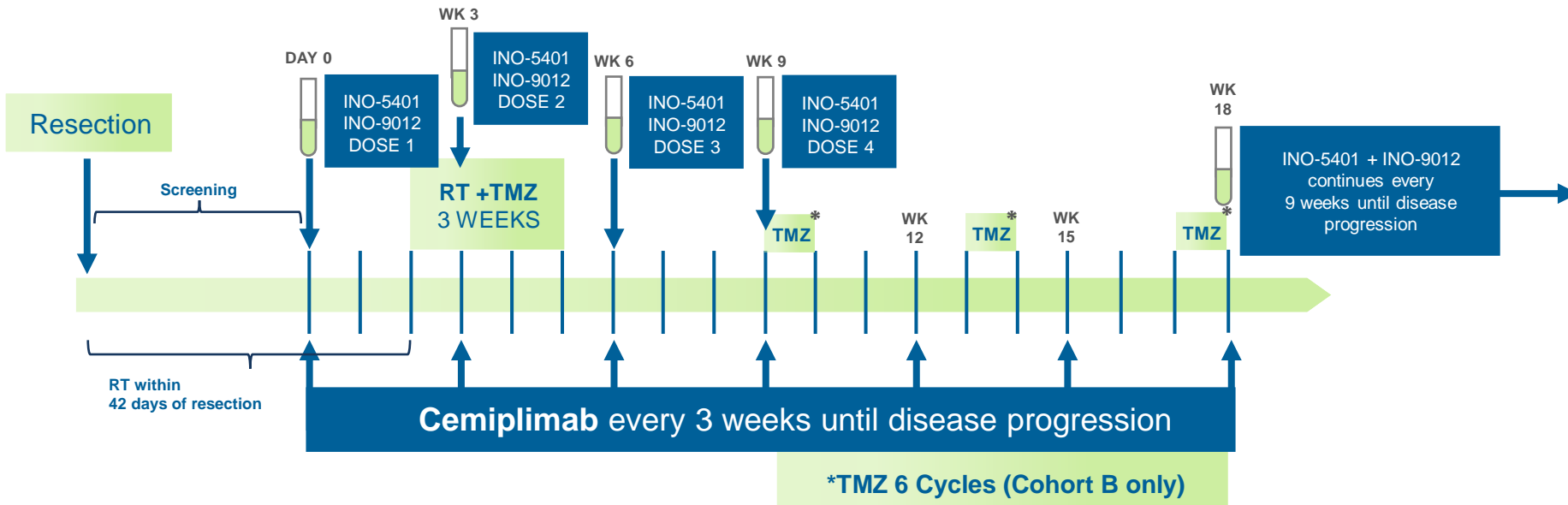
Primary Endpoints:
Safety, tolerability
Secondary Endpoints:
Immunological impact, **PFS and OS**



Cohort A:
MGMT Promoter
Unmethylated:
32 patients



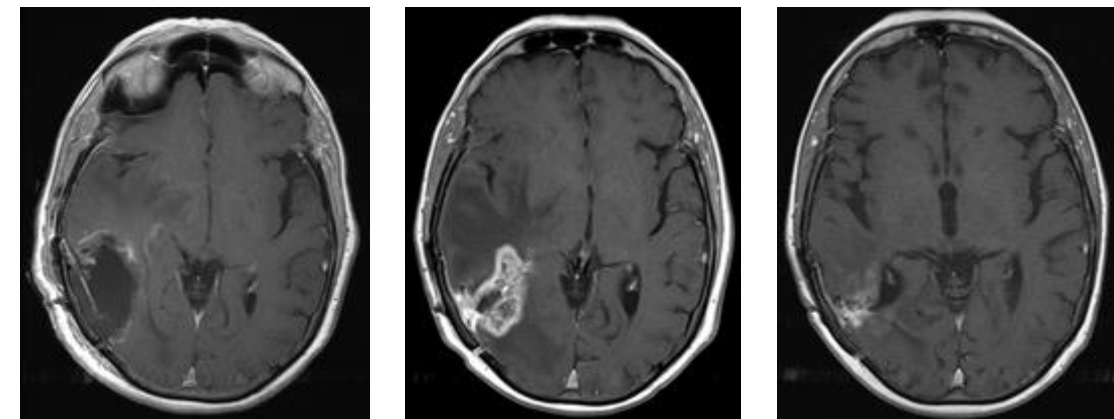
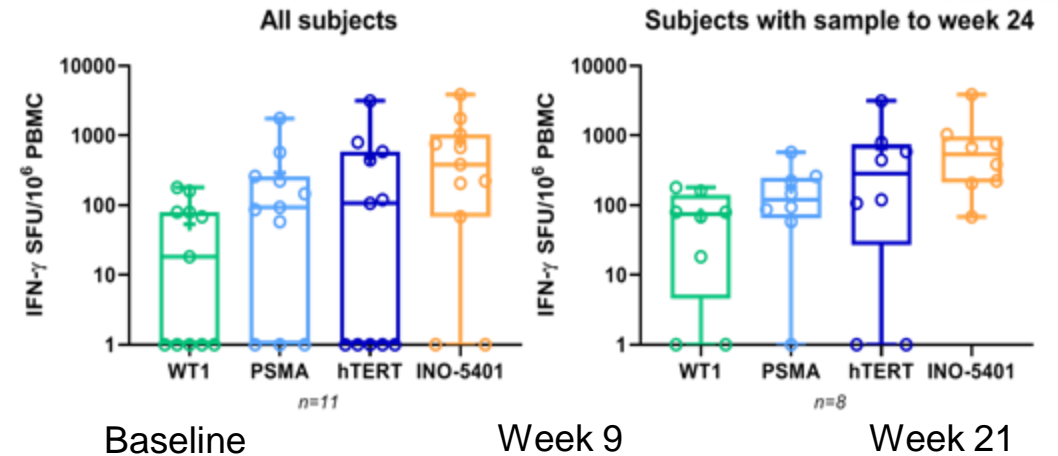
Cohort B:
MGMT Promoter
Methylated:
20 patients



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

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



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

\$270.0M

Cash and short-term
investments

As of March 31, 2020

\$121.7M

Net proceeds from
new financing in 2Q20

158M

Common stock shares
outstanding

As of May 12, 2020

Milestones

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

- ❑ 2H20: Potential presentation 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)

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®)

Platform Development

- ✓ April 2020: Initiate Phase 1 trial of INO-4800 for COVID-19
- ❑ 2H20: Initiate Phase 2/3 trial of INO-4800 for COVID-19
- ❑ 2020: Advance INO-4700 against MERS into Phase 2 field study in Middle East & Africa (CEPI-funded)
- ❑ 2020: Interim Phase 1 results from first-in-human trial of dMAb™ plasmid candidate INO-A002 (for preventing or treating Zika virus infection)

- **Validated Technology Platform**

- Demonstrated **Phase 2b clinical efficacy** of lead asset VGX-3100
- **Over 2,000 patients safety data** 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:**

- **Multiple catalysts in 2020**

- VGX-3100 Phase 3 cervical precancer topline data readout
- INO-5401 Phase 2 GBM OS18 data
- INO-4800 Phase 1 COVID-19 safety/immunogenicity data





INOVIO
POWERING DNA MEDICINES™

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

JNCI JOURNAL of the NATIONAL CANCER INSTITUTE

HealthDay

HPV Blamed for Rising Rates of Anal Cancer

Nov. 20, 2019, at 12:00 p.m.

By Steven Reinberg

HealthDay Reporter WEDNESDAY, Nov. 20, 2019 (HealthDay News) – Anal cancer rates have surged in the past 15 years, and the sexually transmitted human papillomavirus (HPV) may



AD AMP Top tools

PEOPLE

New Study Reveals a Rise in Anal Cancer Rates and Deaths in the United States

A majority of the cases observed by researchers were caused by the human papillomavirus

By Claudia Harnate November 20, 2019 02:04 PM




Facebook Twitter

CNN health

Anal cancer rates and deaths are climbing in the US, study says

By Kristen Rogers, CNN

Updated 10:27 PM ET, Tue November 19, 2019



PIAGET Heineken THOUSANDS OF CLICKS OR ONE

The Washington Post

Medical Mysteries

A toddler's dwindling voice was chalked up to acid reflux. Her problem was far more serious.



A Tax Solution



Woman With Raspy Voice Has Had More Than 300 Surgeries to Treat Rare Vocal Cord Disease

HEALTH 2:35 PM PDT, April 11, 2015 JOHANNA LI

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



Infectious Diseases (non-HPV associated)

- HIV



HIV VACCINE TRIALS NETWORK

- Ebola



- MERS



CEPI

- Zika



BILL & MELINDA GATES foundation

- Lassa Fever

CEPI

- COVID-19

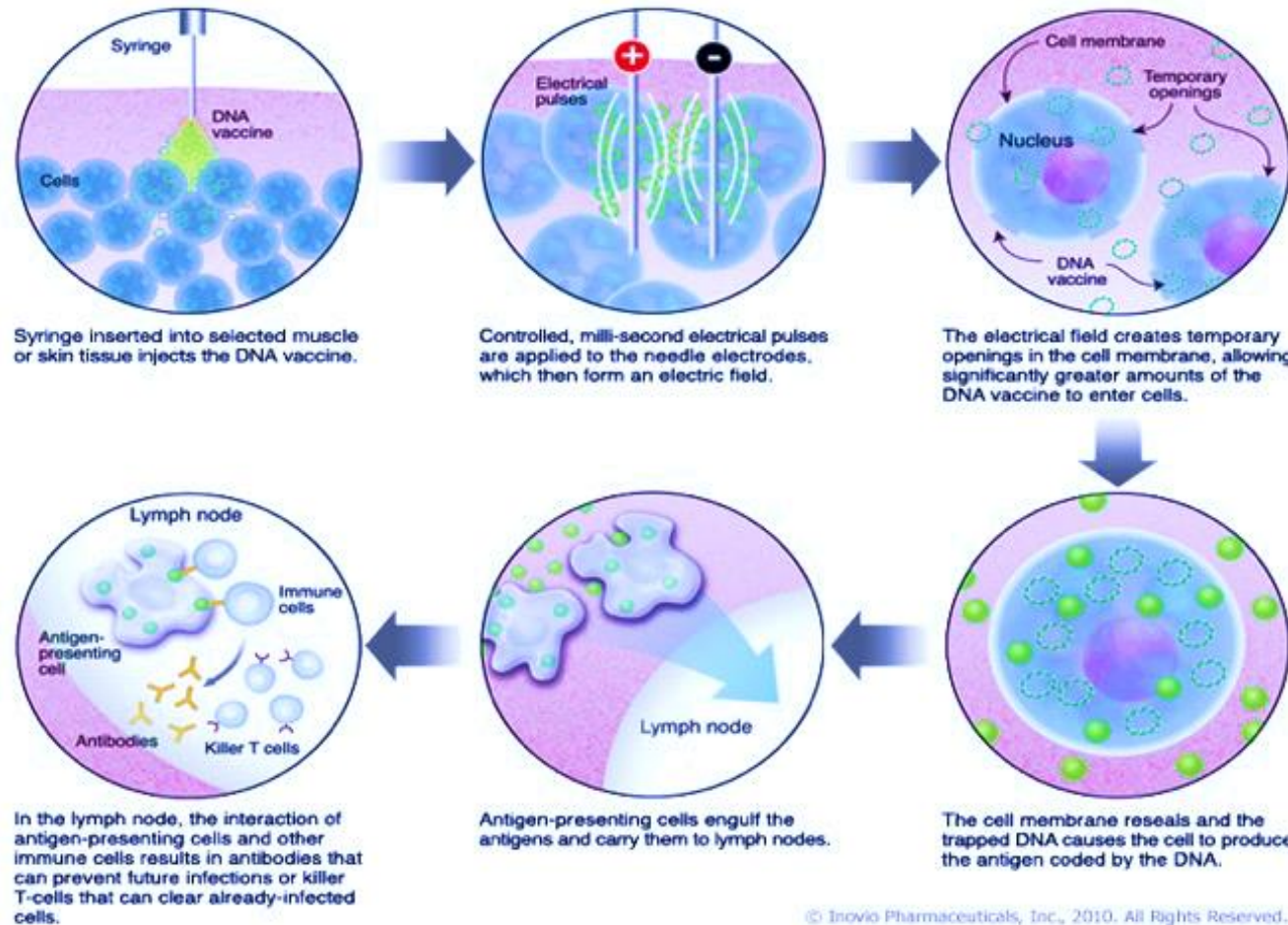


CEPI

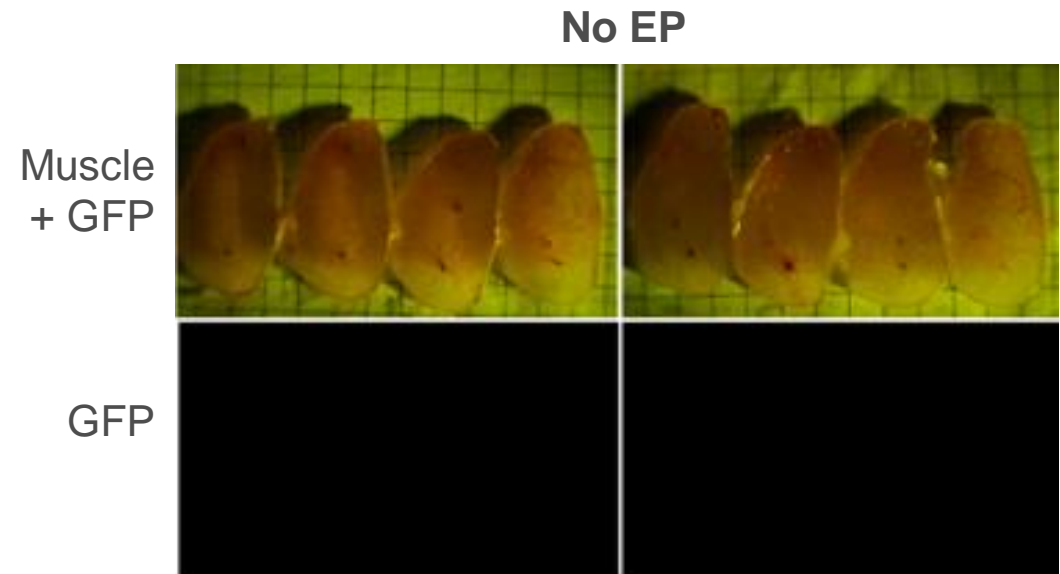
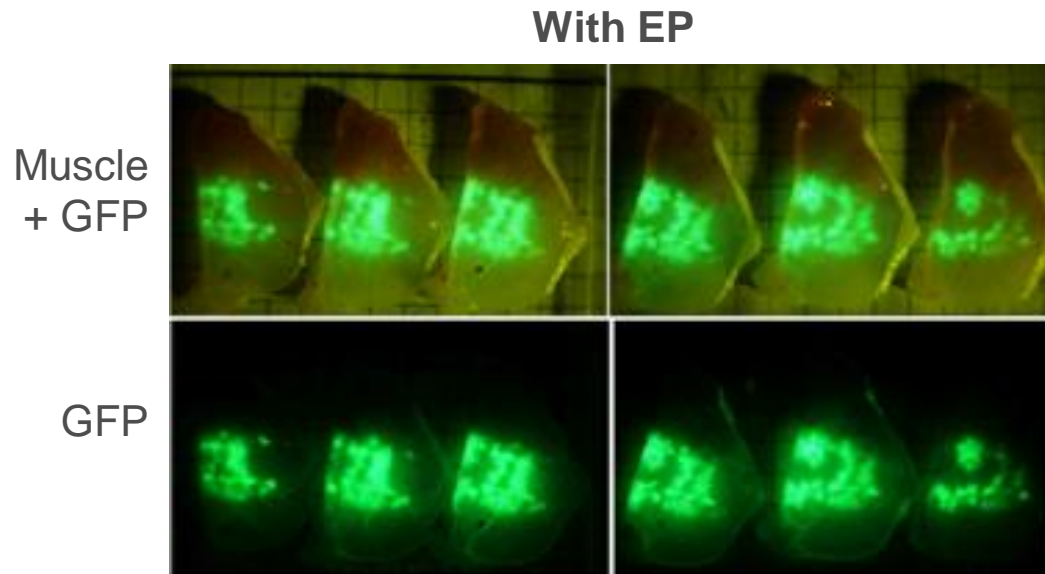
BILL & MELINDA GATES foundation

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



Precise Design + Intracellular Delivery = Improved Immune Responses

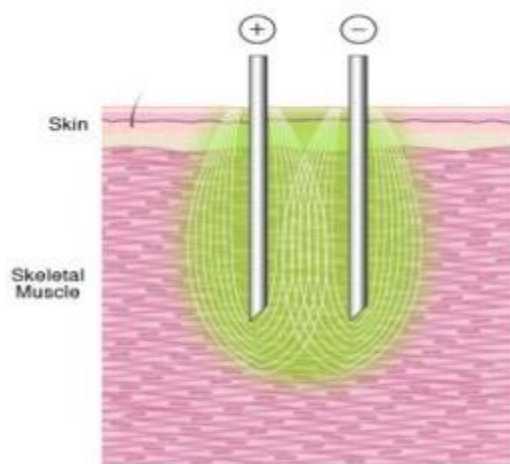


Display of GFP (green fluorescent protein) gene expression after CELLECTRA[®] delivery into rabbit muscle

Innovation in the Delivery of SynCon[®] DNA Medicine

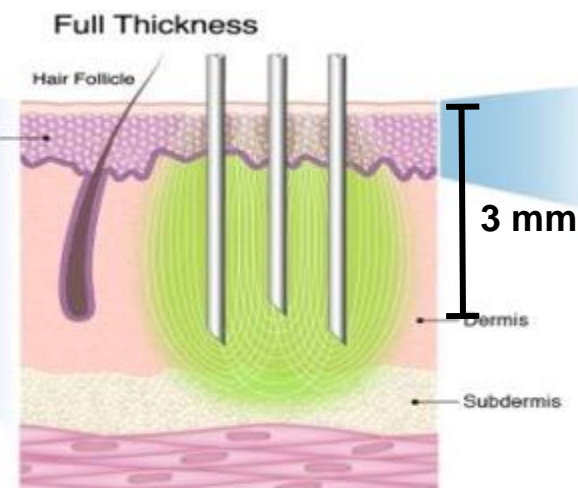
CELLECTRA[®]-5PSP

- Intramuscular
- 13, 19, 25mm electrodes
- In clinical use



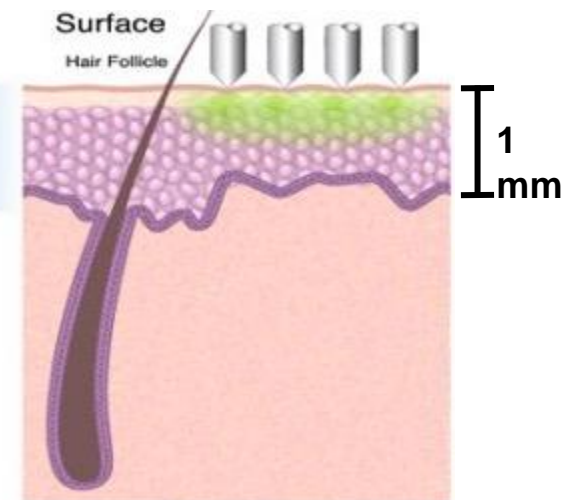
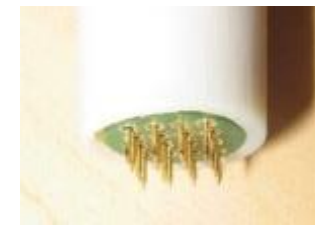
CELLECTRA[®]-3P

- Intradermal – minimally invasive
- 3mm electrodes
- In clinical use



Surface EP (SEP)

- Surface
- Noninvasive
- 4x4 electrode array
- Specifically targets epidermis
- In late-stage preclinical development



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

- >2000 human subjects and >6000 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



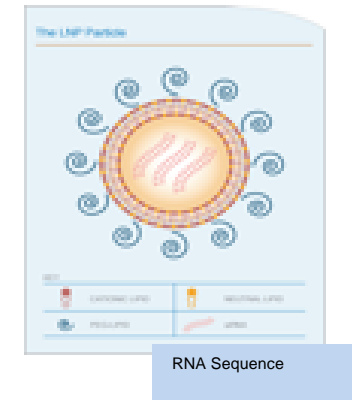
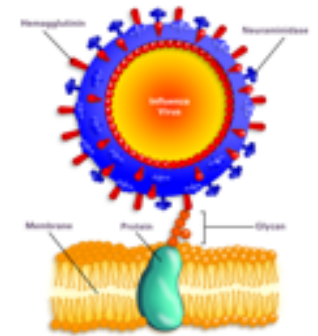
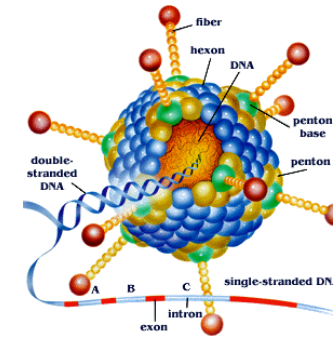
Limitations of Other Approaches

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

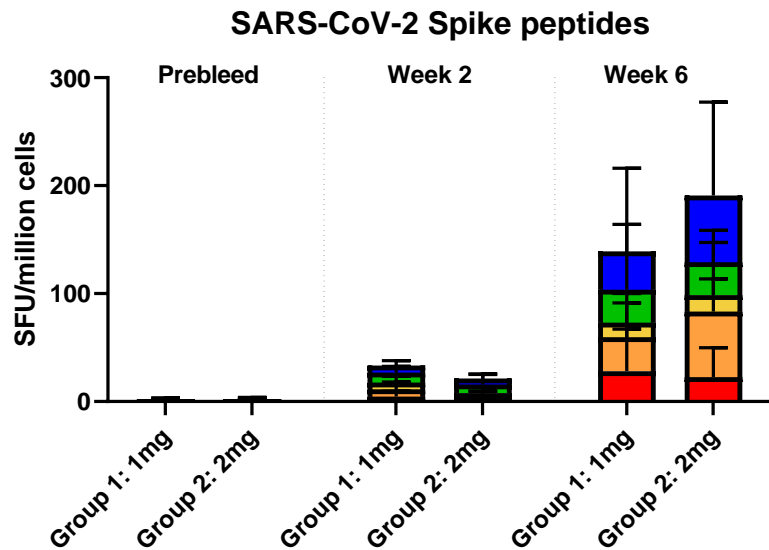


Robust Cellular and Humoral Immune Responses Following Immunization of INO-4800 in Rhesus Monkeys

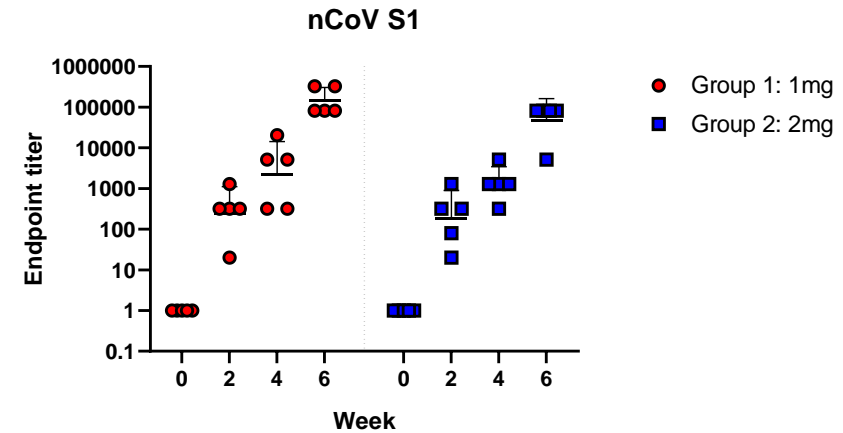


Animal: Rhesus macaque
Treatment: Day 0 and 28 ID delivery of pDNA

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



- SARS-CoV-2 Spike Pool 1
- SARS-CoV-2 Spike Pool 2
- SARS-CoV-2 Spike Pool 3
- SARS-CoV-2 Spike Pool 4
- SARS-CoV-2 Spike Pool 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

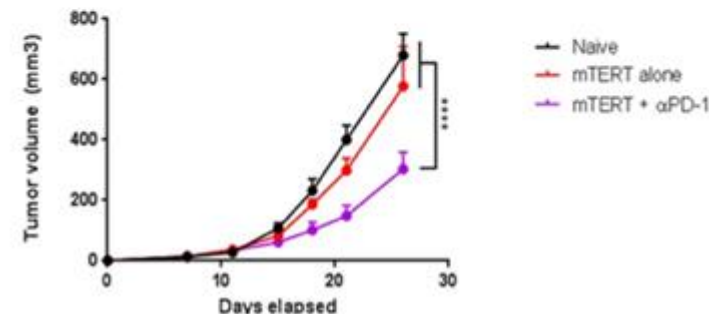
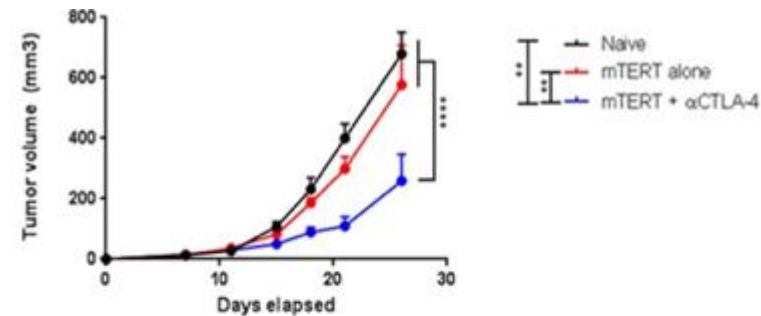
- Potential to improve response rates, without adding toxicity
- Tumor infiltration of antigen-specific, functional CD8+ T cells may prime patients for treatment with checkpoint inhibitors and increase response rates
- Combination studies initiated
 - **MEDI0457** with AstraZeneca PDL-1
 - **INO-5401** with Regeneron PD-1
 - **INO-5151** with BMS PD-1 + Celldex FTL3L (PICI Study)

Molecular Therapy
Original Article



Synergy of Immune Checkpoint Blockade with a Novel Synthetic Consensus DNA Vaccine Targeting TERT

Elizabeth K. Duperret,¹ Megan C. Wise,^{2,3} Aspen Trautz,¹ Daniel O. Villarreal,³ Bernadette Ferraro,² Jewell Walters,² Jian Yan,² Amir Khan,² Emma Masteller,² Laurent Humeau,² and David B. Weiner¹

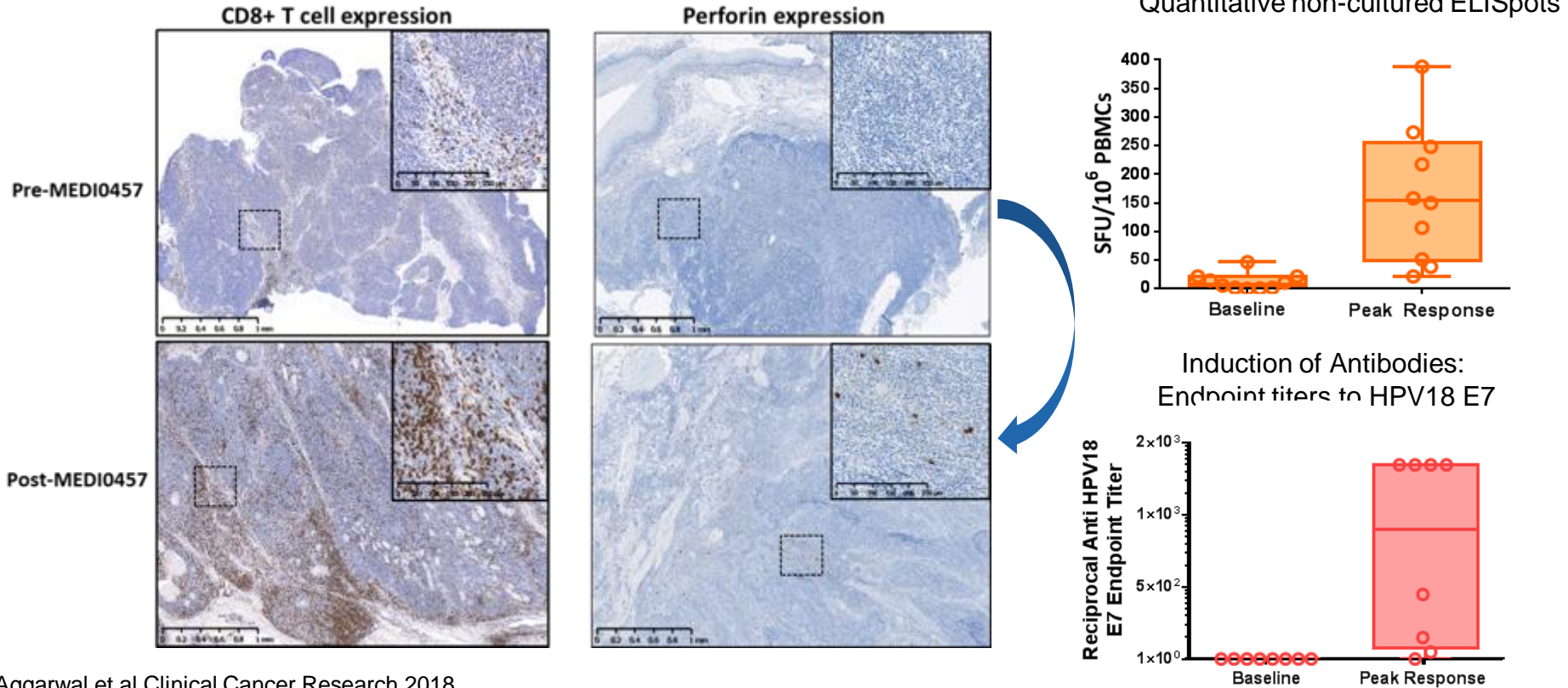


Paper published in *Molecular Therapy* 2017

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

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

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



Aggarwal et al Clinical Cancer Research 2018

Most participants respond immunologically to the vaccine

GBM (Newly-diagnosed) Phase 1/2 Study

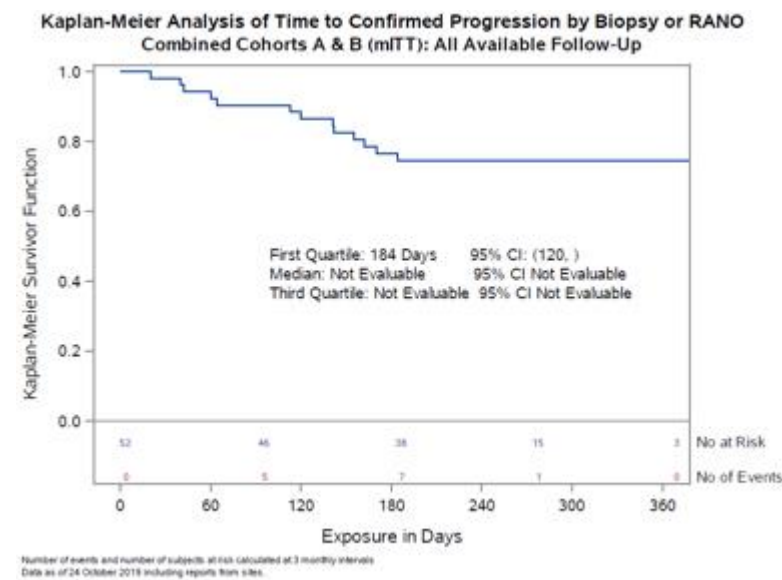
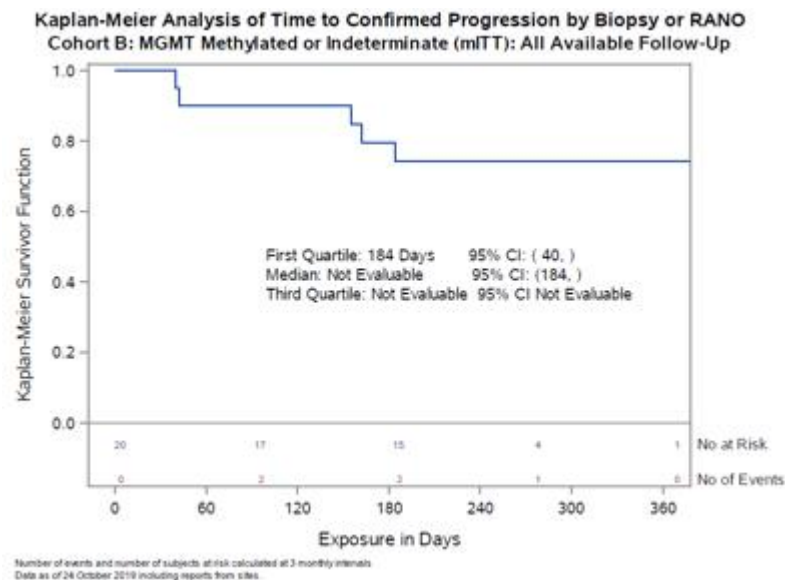
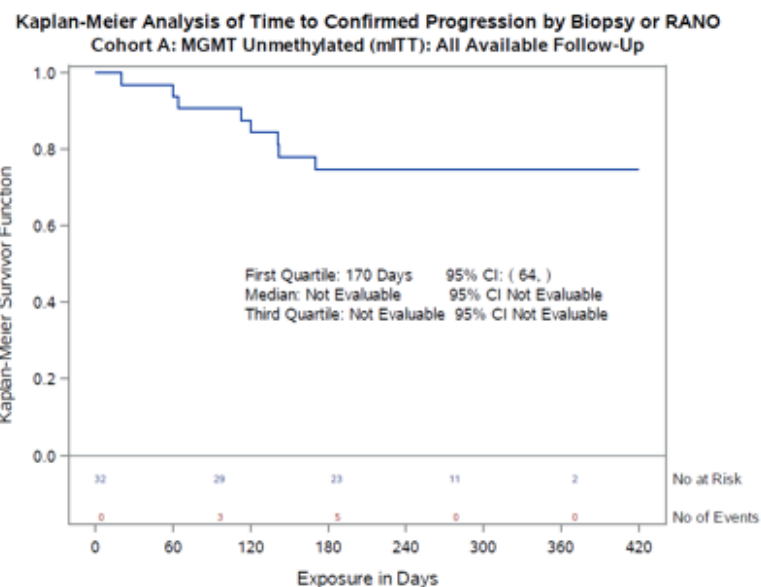
Trial Treatment (NCT03491683)

- **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 methyalted 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.

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



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