Powering a New Decade of DNA Medicines

May 2021

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, 2020 and Form 10-Q for the quarter ended March 31, 2021, 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 DNA Medicines

15 DNA medicine clinical programs currently in development (HPV-associated diseases, cancer, and infectious diseases, including COVID-19)

Precisely designed plasmids delivered through **proprietary smart device**

Extensive patent portfolio protecting technology platform

Designed to **treat and prevent cancers & infectious diseases**

Strong and experienced management team

Well-tolerated and robust immune responses in more than 3,000 patients

No anti-vector response

No frozen storage issues (room temp storage >1 yr.)

Targets multiple antigenic sequences; combining multiple antigens into single vial

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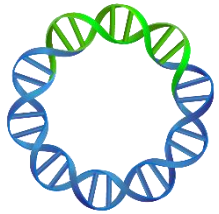
DNA Medicines Platform Built on INOVIO's Proprietary Technology

OPTIMIZED PLASMID DESIGN AND DELIVERY TECHNOLOGY

PRECISELY DESIGNED PLASMIDS (SynCon®)



PROPRIETARY SMART DEVICES (CELLECTRA®)

Intramuscular Device for Pre-Cancers & Cancers

Intradermal Device for Vaccines

IN VIVO

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INOVIO's Technology Advantages

Clinical Efficacy

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

Tolerability

- **Favorable safety profile tested in over 3,000 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 additional boosting

Rapid and Scalable Manufacturing

- "Off-the-shelf" product; **no cold chain required** (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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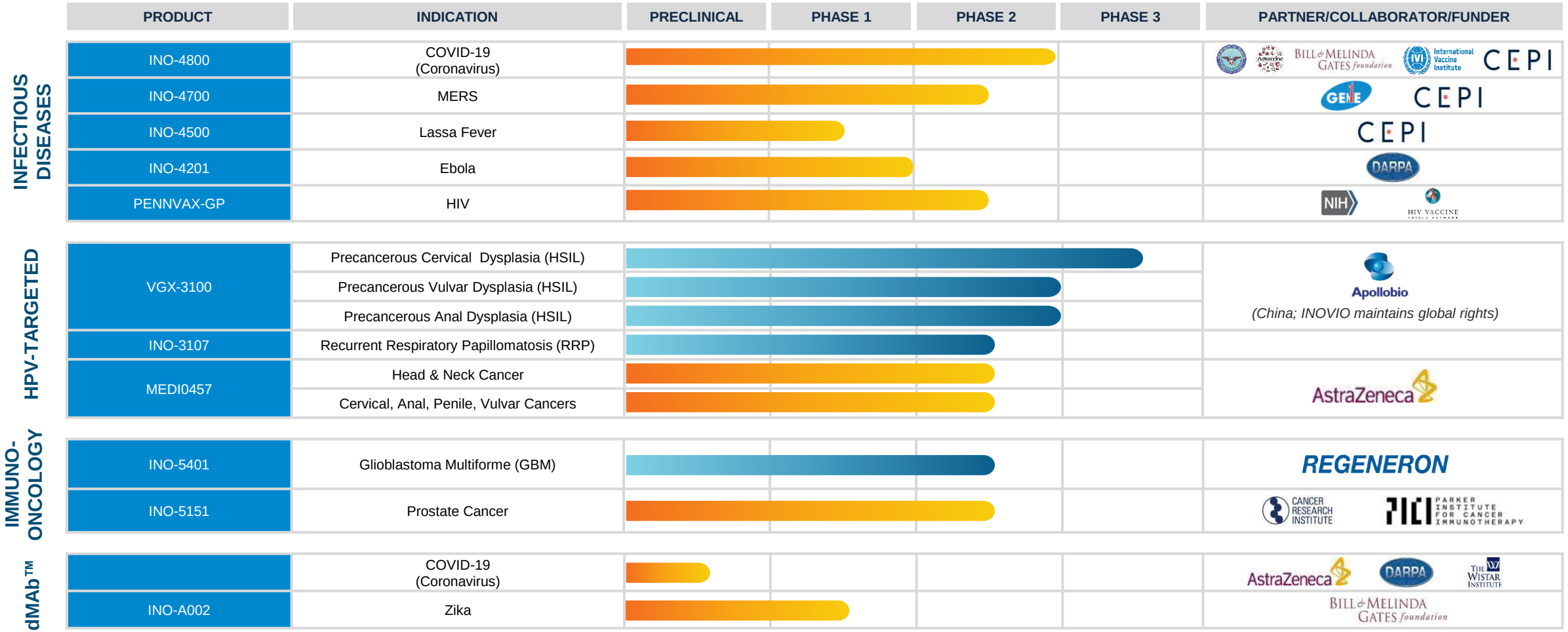
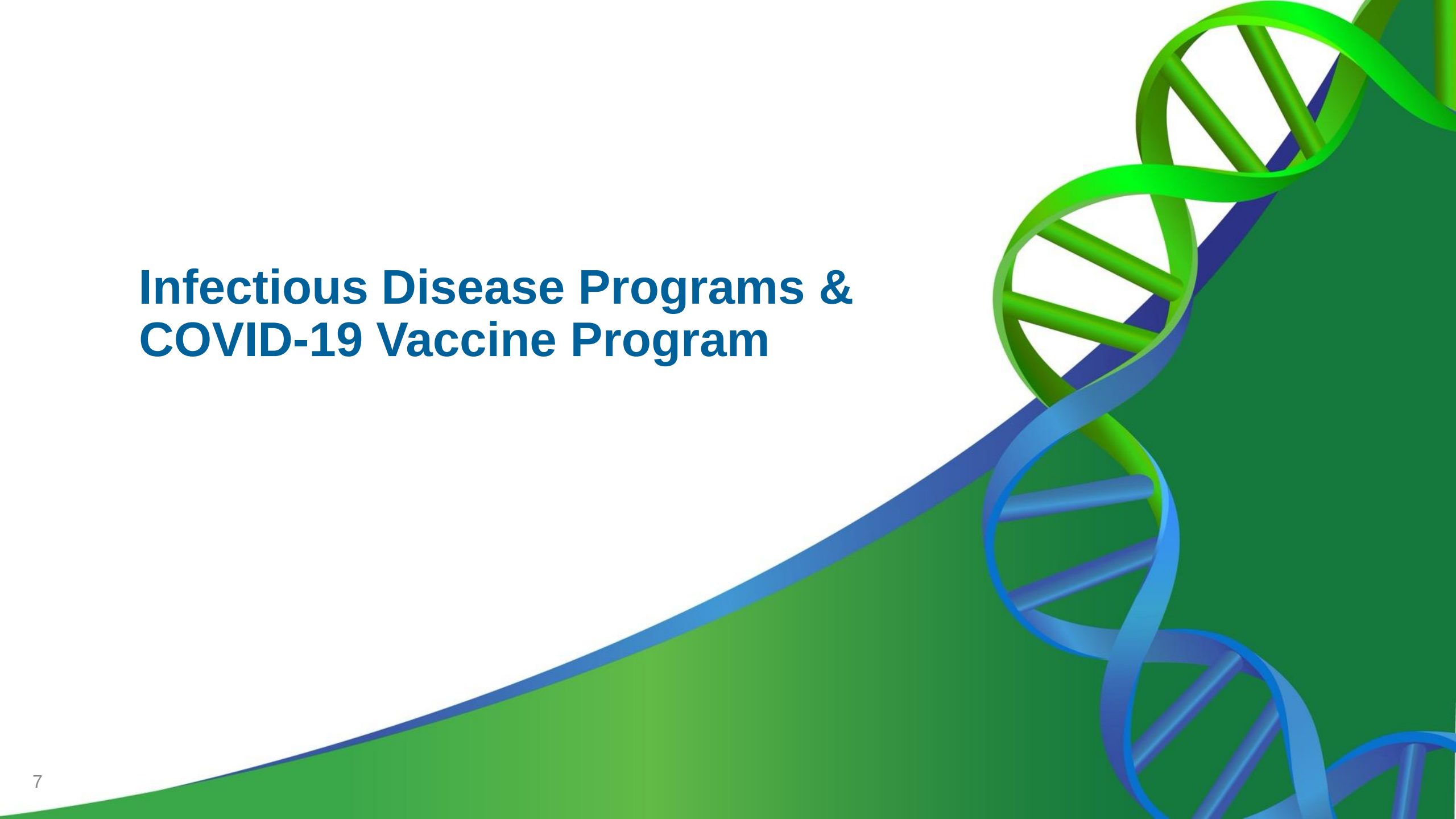
INOVIO DNA Medicines Pipeline



Infectious Disease Programs & COVID-19 Vaccine Program



INO-4800 Updates

COVID- 19 Vaccine

INOVIO is developing a two-dose **INO-4800 regimen** for protection against **COVID-19 disease**

Addressing New Variants of Concerns

- Evaluating new strains, with focus on UK, South African and Brazilian, on immune profile of INO-4800
- Using our SynCon® technology, **we are developing a pan-COVID vaccine candidate** to potentially provide better protection against both known and future strains

Clinical Data and Plan

Phase 1 dosing regimen complete

- Showed favorable safety and tolerability profile
- Elicited a broad immune response across multiple assays, preliminary clinical responses
- **Demonstrated binding, neutralizing antibodies & cellular responses at week 6**
- **Boosting with INO-4800 –** in process for Phase 1 cohort

Phase 2 dosing regimen complete

- Fully funded by U.S. DoD
- Showed favorable safety and tolerability profile
- 2mg dose selected - GMFR of binding and neutralizing antibody levels were statistically significantly greater in the 2.0 mg dose group versus the 1.0 mg dose group.

Phase 3 planned

- Global, blinded, case-driven, immunogenicity and efficacy trial

Ongoing Phase 2 clinical trials in China and South Korea

Manufacturing & Scale up

- Scaling up plasmid and device through consortium of CMOs and partnerships globally
- **Excellent stability profile**, room temperature for >1 year, anticipated 5- year shelf life at 2-8°C

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INO-4800 Key Differentiators

Favorable Safety & Tolerability:

- INO-4800 has demonstrated favorable safety and tolerability
- Administered intradermally and has caused only very limited side effects (mild injection site reactions)

Immunogenic:

- 100% of Phase 1 participants demonstrated overall immunological response rates
- Balance of neutralizing antibodies and favorable T-cell responses (CD8 and CD4)

Temperature Stable and Transportable:

- Vaccine is projected stable at room temperature for more than a year, at 37°C for more than a month
- Five-year projected shelf life at normal refrigeration temperature and does not need to be frozen during transport or storage

Repeat Administration:

- INO-4800 can be re-administered if immunity wanes
- Potential for seasonal boosting usage with no concerns of generating an anti-vector response, based on observations to date

INO-4800 Ph 1 Trial Data: Regimen was well-tolerated and generated both B and T cell immune response

EClinicalMedicine
Published by THE LANCET

Data from 40 subject cohort of Phase 1 peer-reviewed and published in *EClinicalMedicine*:

A
- **Tolerability**
  - 1.0mg and 2.0mg doses of INO-4800 in a 2-dose regimen is well tolerated in initial cohort of younger (18-50) subjects evaluated in the U.S.

B
- **Immunogenicity**
  - INO-4800 induced a balanced immune response comprising both B cell (neutralizing and binding antibodies) and T cell (Th1 effector and memory cell) responses

Phase 1 expansion (120 subjects) and booster study is ongoing:

- Tolerability and immunogenicity of 1.0mg and 2.0mg doses in expanded age groups of older subjects (51-64) and elderly (65 years and older)
- Tolerability and immunogenicity of 0.5mg dose in a 2-dose regimen (Days 0, 28) at age groups of 18-50, 51-64 and 65+ years
- 93/120 subjects from Phase 1 were administered a booster at 6-10 months from their second dose

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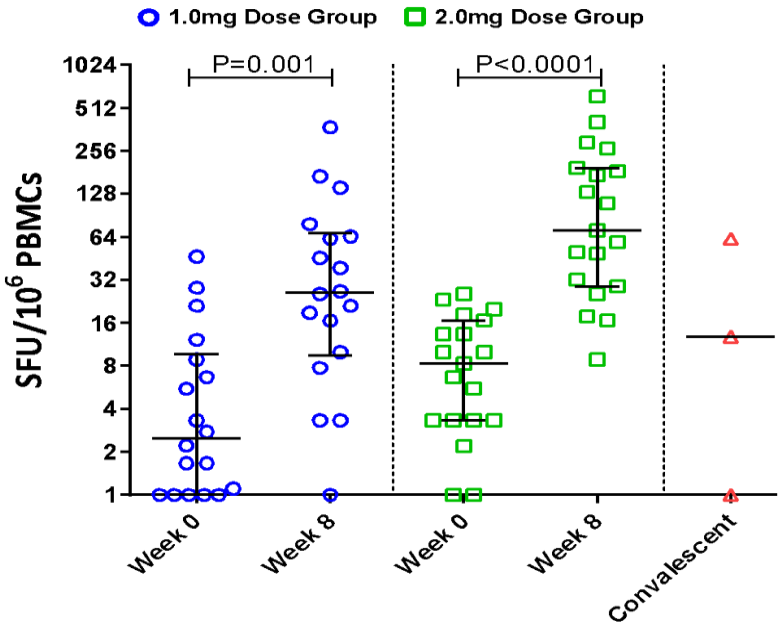
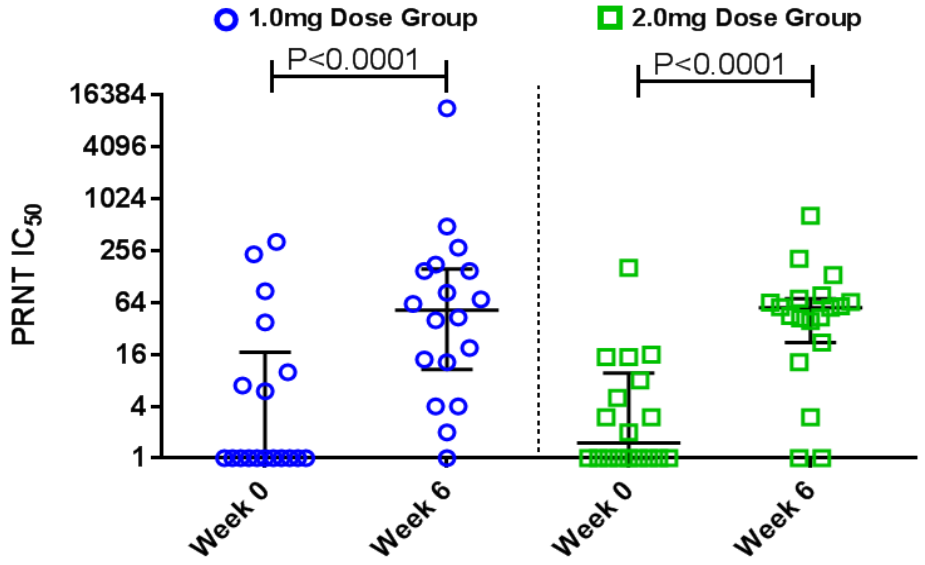
U.S. Phase 1: Week 8 Immunogenicity on 40 Subjects in 18-50 year age group

**Induction of Antigen Specific T Cells by ELISpot*
1.0mg vs 2.0mg**



**LIVE SARS-CoV-2 Neutralization*
1.0mg vs 2.0mg**



- Strong CD4 and CD8 T cell responses generated to multiple regions of the spike protein
- 74% of the subjects had T cell responses at the 1.0 mg dose group and 100% of the subjects in the 2.0 mg dose group demonstrated cellular responses
- The 1.0 mg and 2.0 mg dose group both demonstrated seroconversion in 95% of the subjects
- 78% demonstrating neutralizing antibodies in the 1.0 mg dose group and 84% demonstrating neutralizing antibodies in the 2.0 mg dose group

* *Published in EClinicalMedicine, an open access clinical journal published by The Lancet.* "Safety and immunogenicity of INO-4800 DNA vaccine against SARS-CoV-2: a preliminary report of an open-label, Phase 1 clinical trial." Date of publication: December 24, 2020.

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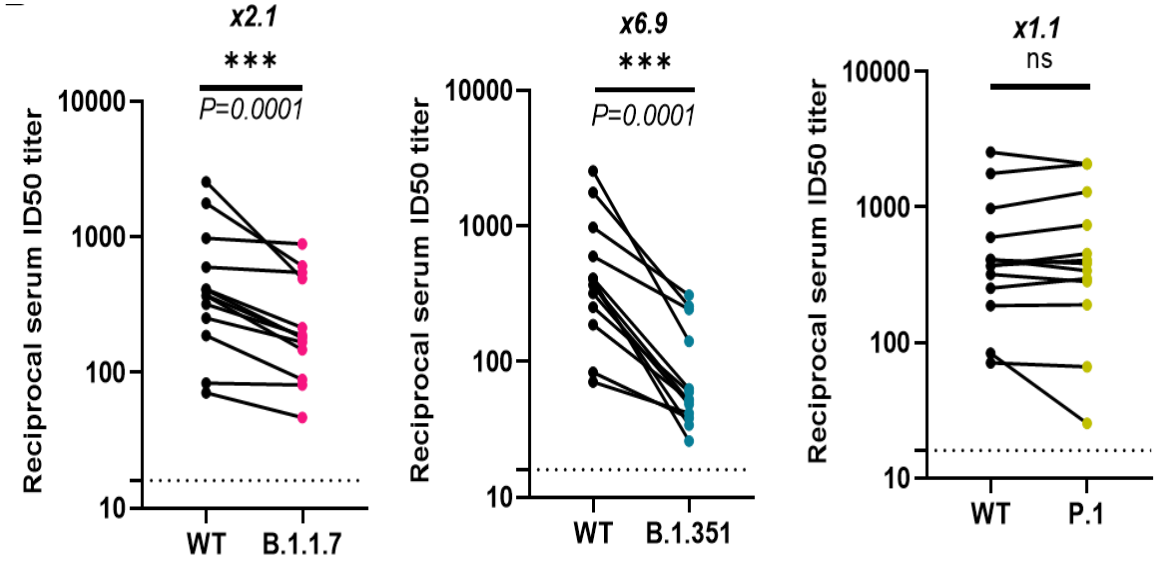
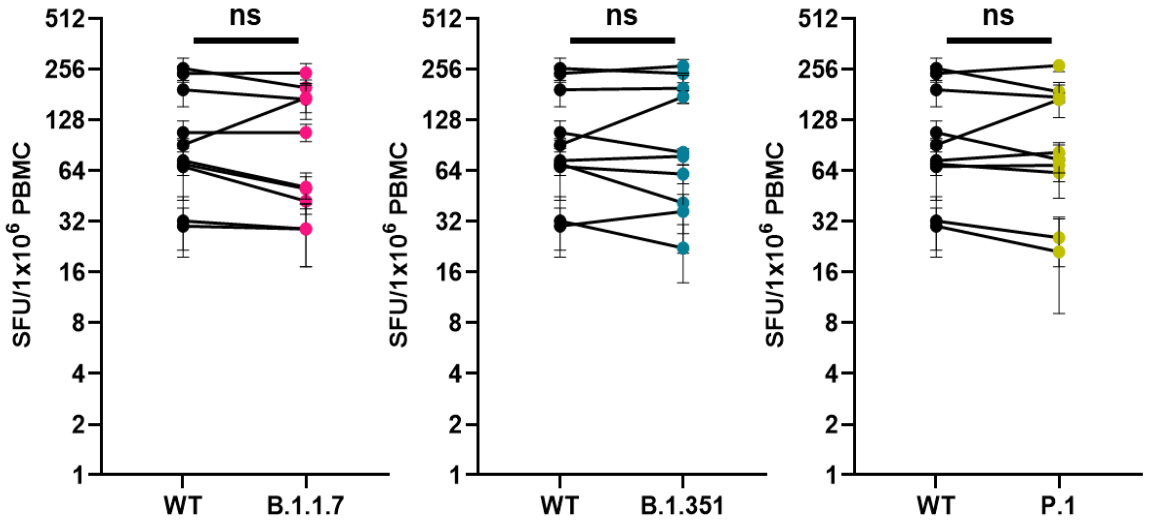
Addressing Variant of Concerns: INO-4800 DNA Vaccine Induces Neutralizing Antibodies and T cell Activity Against Global SARS-CoV-2 VoCs

Humoral antibody cross-reactivity responses against SARS-CoV-2 variants. a) Sera from Phase 1 INO-4800 vaccinees were neutralization to WT, B.1.1.7, B.1.351, and P.1 variants.



INO-4800 Cellular immune response against SARS-CoV-2 variants. PBMCs from 10 Phase 1 subjects were collected 8 weeks after receiving the second dose of INO-4800.



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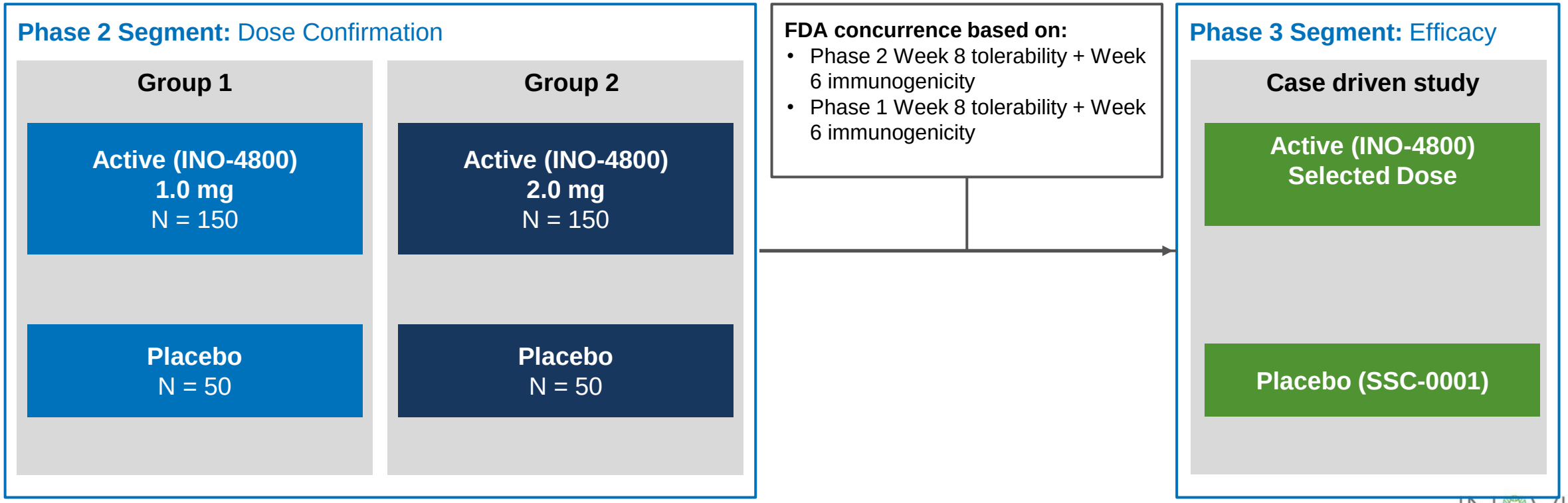
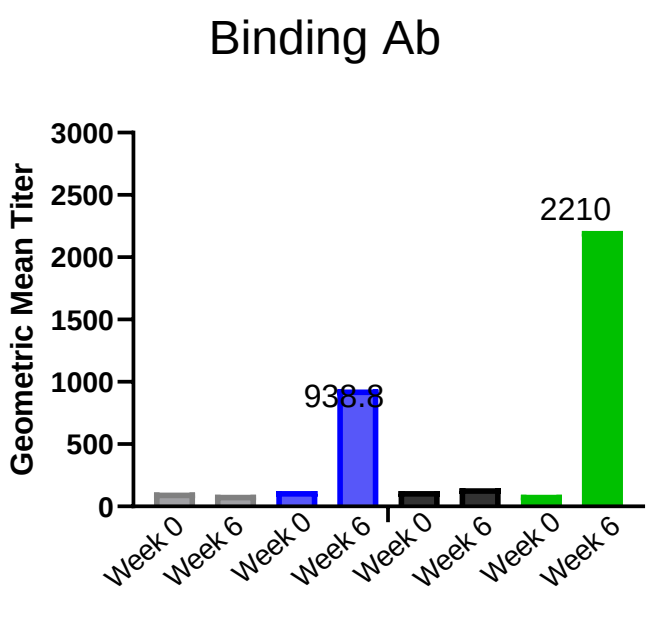
Phase 2/3 Clinical Trial- INNOVATE (INovio INO-4800 VAccine Trial for Efficacy)

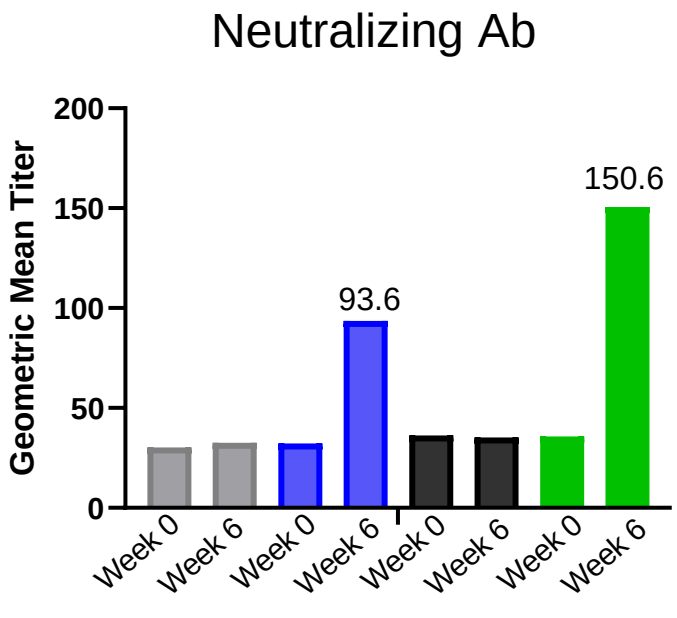
Evaluating efficacy in subjects 18+ years of age with optimal dose for each age group

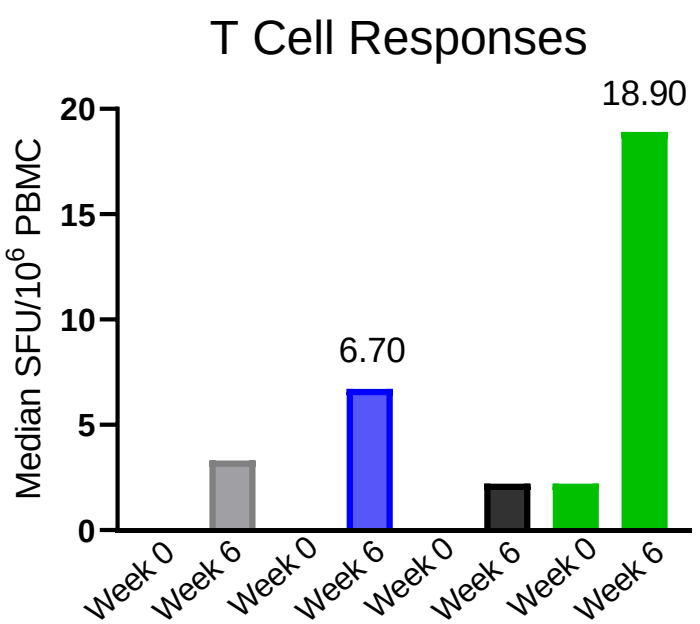
- Phase 2 segment: to evaluate tolerability and immunogenicity in order to select dose(s) for efficacy evaluation in Phase 3
- Phase 3 segment: to evaluate efficacy using the selected dose(s) from Phase 2 segment in a case-driven fashion



INO-4800 Phase 2 Immune Responses across All Age Groups







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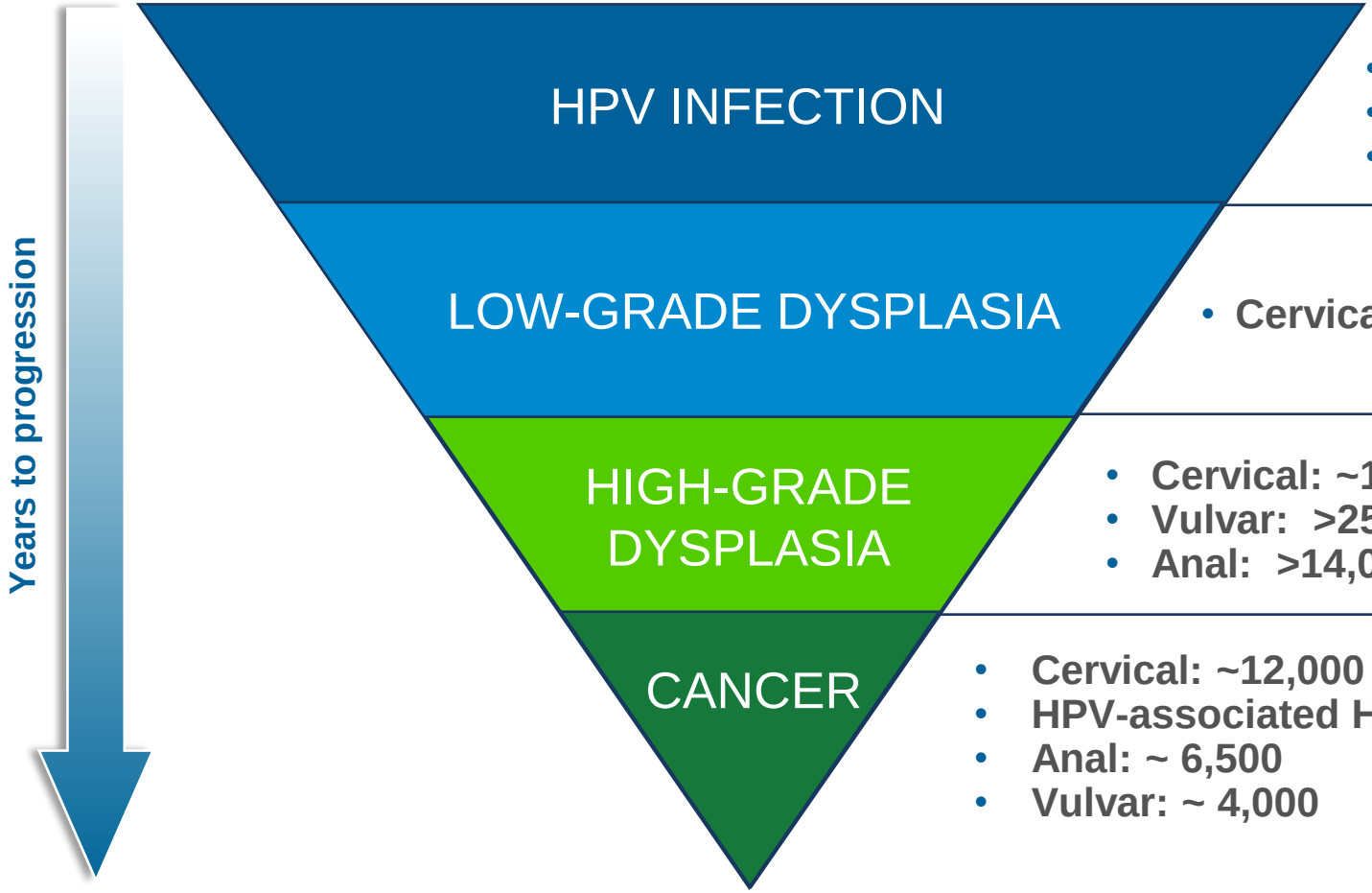
HPV Programs

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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Complications of Current Standard of Care: Loop Electrosurgical Excision Procedure (LEEP)

Pain[1,2]

- Local anesthetic injections
- Excision
- Post-procedural cramping

Surgical Complications[1,3]

- Disfigurement
- Swelling, drainage, bleeding, numbness, redness, burning
- Opening of suture, itching, scarred skin
- Cervical stenosis

Loss of Reproductive Health

Increased risk of:

- Preterm delivery[6,7]
- Premature rupture of membranes[6,7]
- 2nd trimester miscarriage[8]
- Terminations[8]

[1]Harper DM, et al. J Family Practice. 1994;39:249–256.
[2]Ferenczy A, et al. Obstet Gynecol. 1996;87:332–337.
[3]Mitchell MF, et al. Obstet Gynecol. 1998;92:737–744.
[4]Wright TC, et al. Obstet Gynecol. 1992;79:173–178.
[5]IARC.Colposcopy and Treatment of CIN: A Beginner's Manual. 2003.
[6]Kyrgiou M, et al. Lancet. 2006;367:489–498.
[7]Kyrgiou M, et al. BMJ. 2016;354:i3633.
[8]Kyrgiou M, et al. Cochrane Database Syst Rev. 2015;CD008478.

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VGX-3100 Phase 3 Program: HPV-Associated Cervical HSIL/ Precancerous Dysplasia

TRIAL: VGX-3100

- Targets HPV 16/18 subtypes; E6/E7 oncogenes
- Designed to treat high-grade squamous intraepithelial lesions (HSIL)

Phase 3 consists of 2 studies in parallel:

REVEAL 1 (primary) n=201 – Enrollment Closed

Study follow-up through week 88 (as in Phase 2b)

Topline efficacy data reported 1Q21

REVEAL 2 (confirmatory) n=198 – Now Enrolling

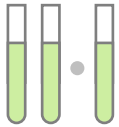
Study follow-up through week 40

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)

6 mo. Primary endpoint measured 6 months after completion of dosing (as in Phase 2b)

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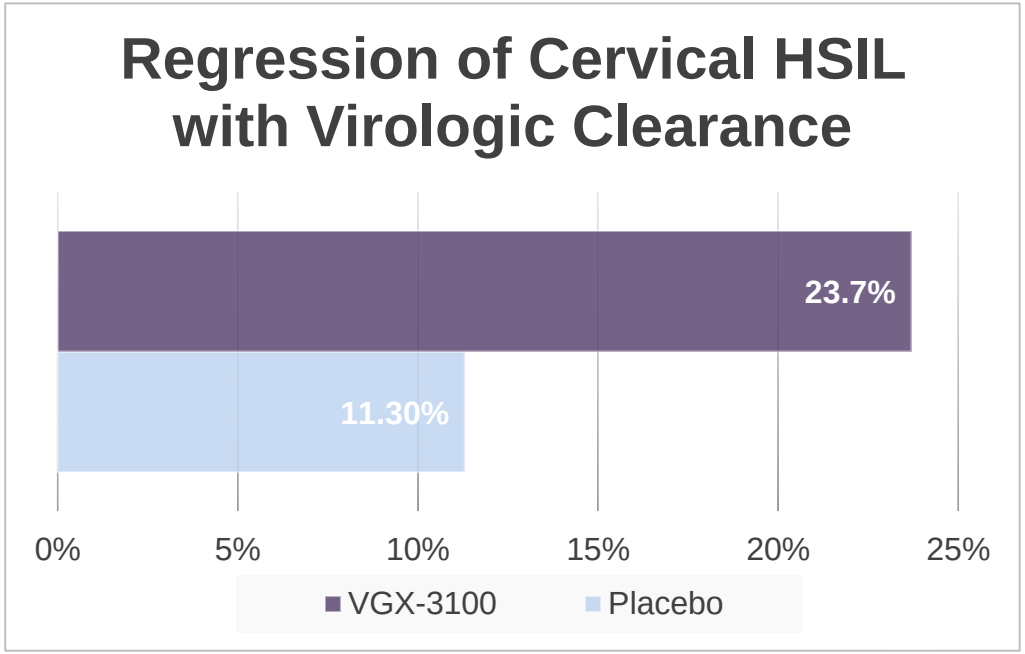
REVEAL 1: VGX-3100 Phase 3 Pivotal Trial for Cervical HSIL Meets Primary & Secondary Efficacy Objectives for All Evaluable Subjects

First DNA medicine to **achieve efficacy endpoints** in a **Phase 3** trial

No treatment-related serious adverse events; most adverse events were mild to moderate and self-resolving

Partnership with QIAGEN to develop **pre-treatment predictive biomarker** to help identify those likely to respond to VGX-3100

- **Achieved statistical significance for primary objective:** regression of cervical HSIL combined with virologic clearance of HPV-16/18, 6 months after administration
  - 23.7% (31/131) in treatment group vs. 11.3% (7/62) in placebo group
  - p=0.022; 12.4 difference in percentage, 95%CI: 0.4,22.5
  - mITT includes all subjects w/ endpoint data (N=193) *
- **All secondary efficacy objectives achieved**
- REVEAL 2 is currently ongoing



** mITT, ITT and a third per-protocol (PP) were pre-specified in trial protocol. PP analysis will be performed upon trial completion.*

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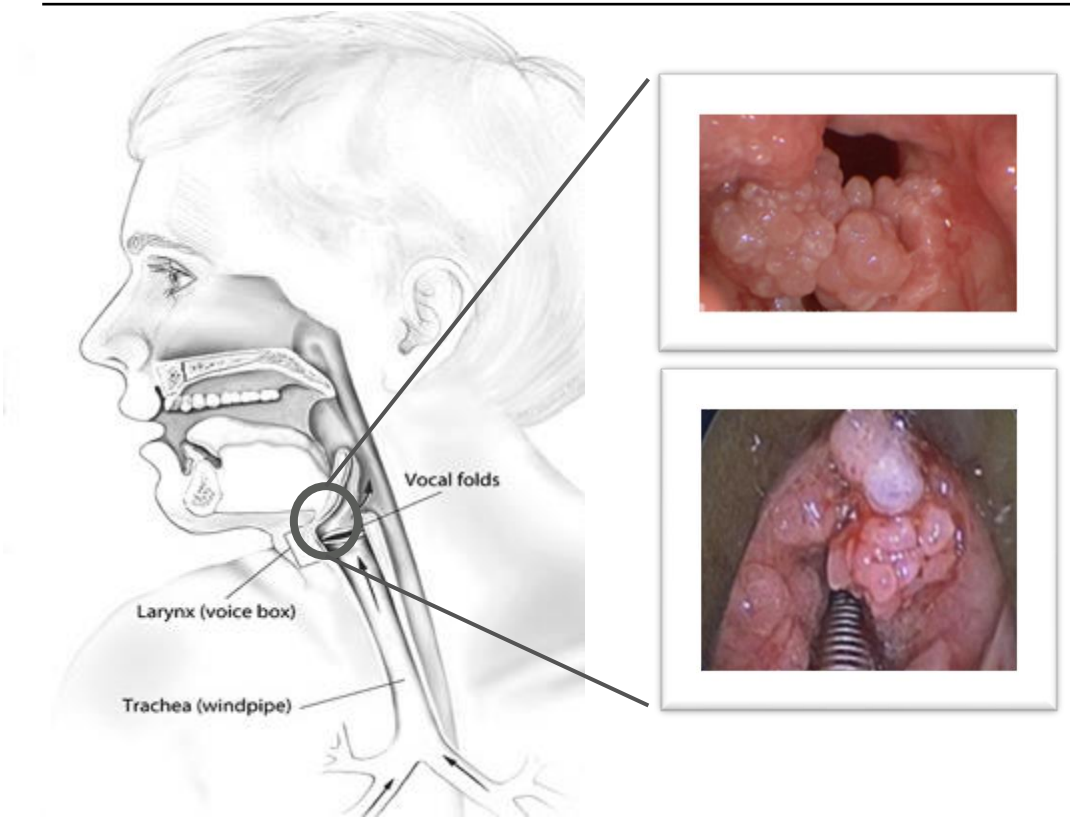
Recurrent Respiratory Papillomatosis (RRP) Caused by HPV 6 and 11

Areas affected by Recurrent Respiratory Papillomatosis (RRP)



- HPV-associated disease; **caused by HPV 6 and 11**
- Rare, orphan disease with **~15,000 total active cases** within the U.S., where **virtually all of those require surgical procedures**
  - **~6,000 new cases per yr. in the U.S.**
- Growths can lead to life-threatening airway obstructions
- **SoC is lifelong surgery (repeated/multiple times per 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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Immuno-Oncology Programs (INO-5401 for Newly Diagnosed GBM)

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)

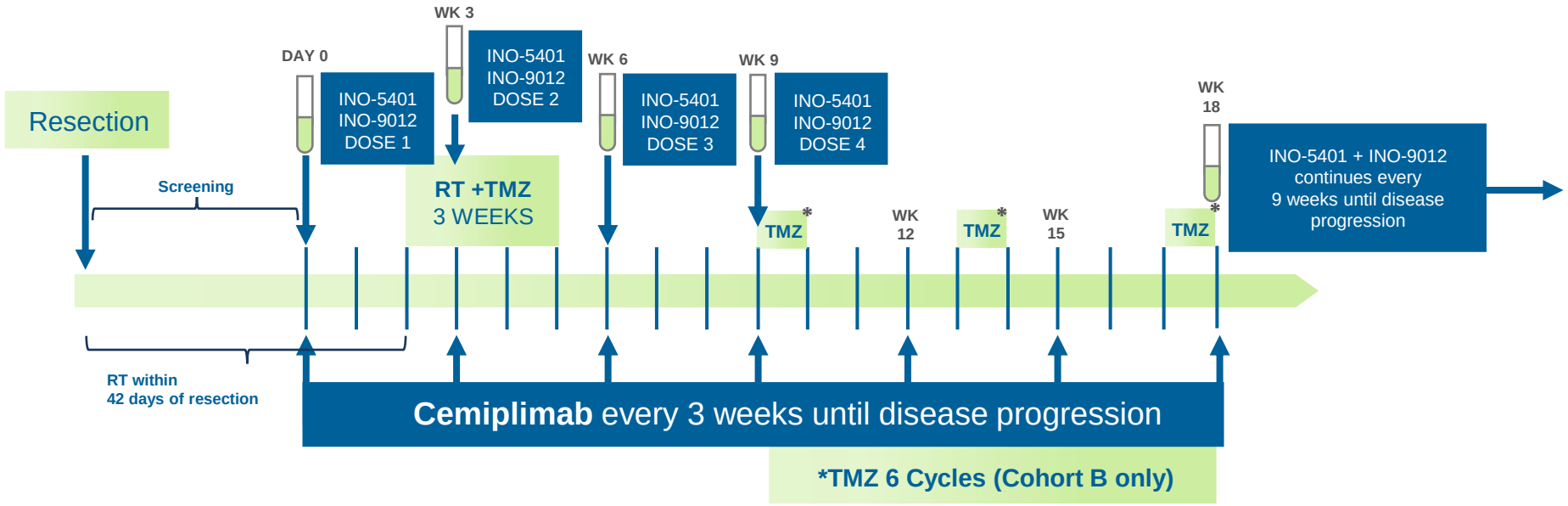
Phase 1b/2 open label study for **newly diagnosed glioblastoma (GBM)**

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

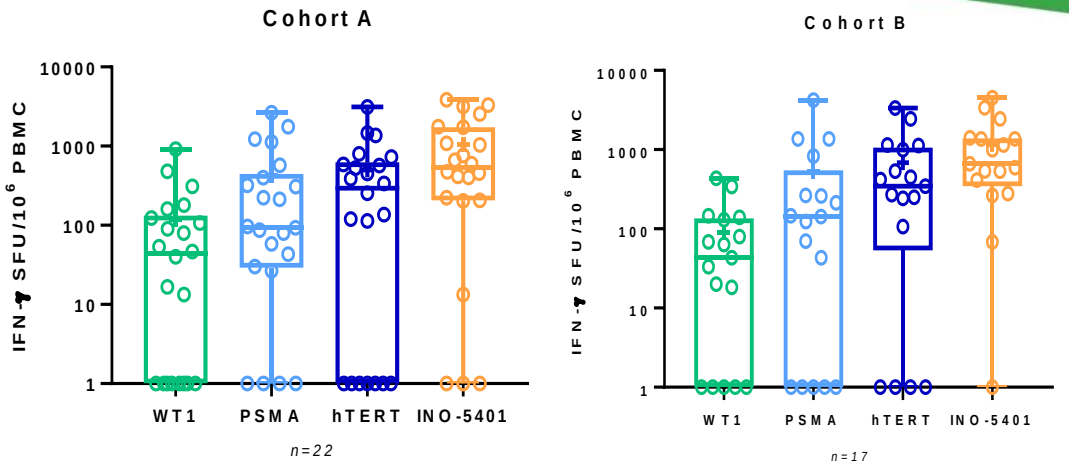
x20
Cohort B:
MGMT Promoter Methylated:
20 patients

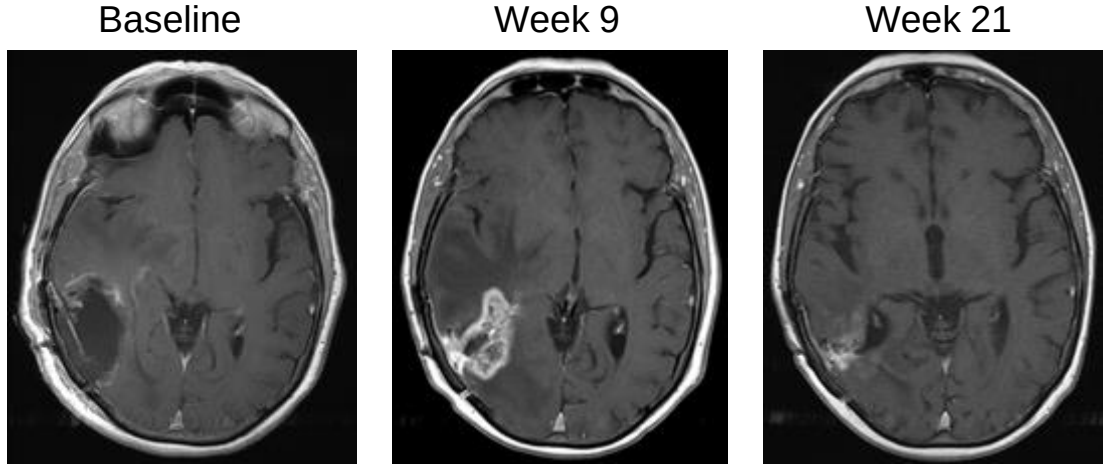


INO-5401 Results: Interim review in newly diagnosed GBM patients OS18 data, demonstrated immunogenicity and tolerability in a majority of patients

- **Overall survival at 18 months** (OS18) presented at SNO 2020 Annual Meeting:
  - Promoter Methylated OS18 of 70% (14/20)
  - MGMT Promoter Unmethylated OS18 of 50% (16/32)
- **Median overall survival in the unmethylated GBM patients was 17.9 months, which compares favorably to historical controls**
  - Median OS for methylated patients has not yet been reached and the study is ongoing
- This study shows that INO-5401+INO-9012 with cemiplimab and radiation/TMZ have an acceptable tolerability profile, are immunogenic, and may improve survival in newly diagnosed GBM
- *24-month OS data expected later this year, including correlative immunology and tissue data, as well as total study drug exposure and concomitant medication use*

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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Overall Survival at 18 Months

Median OS; unmethylated (Cohort A)	**17.9 mo. (14.5 - NR)**	*Historical 14.6-16 mo.***
Median OS; methylated (Cohort B)	**NR (18.4 – NR)**	*Historical 23.2-25 mo.***

Overall Survival at 12 Months	**n Alive/N Total**	**OS12% (95% CI)**
MGMT Unmethylated (Cohort A)	27/32	84.4 (67.2-94.7)
MGMT Methylated (Cohort B)	17/20	85.0 (62.1-96.8)
Combined	44/52	84.6 (71.9-93.1)

Overall Survival at 18 Months	**n Alive/N Total**	**OS18% (95% CI)**
MGMT Unmethylated (Cohort A)	16/32	**50** (31.9 - 68.1)
MGMT Methylated (Cohort B)	14/20*	**70** (45.7 – 88.1)
Combined	30/52	**57.7** (14.5 – 71.3)

NR: not reached
*Two patients in Cohort B withdrew consent for additional follow-up at Week 3 and were considered deceased
**Gilbert et al. J Clin Oncol 2013; Gilbert et al. N Eng J Med 2014. Comparison is limited due to differences in study population

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 at Intrexon and VIRxSYS

Board of Directors

Simon X. Benito
Chairman of the Board, Former SVP, Merck Vaccine Division

Roger Dansey, M.D.
Former Head of Late-Stage Oncology at Merck & Co.

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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Well-Balanced Pipeline of Milestones Supported by Strong Balance Sheet

NASDAQ:INO

$518.6M
Cash and short-term investments

As of March 31, 2021

209.3M
Common stock shares outstanding

As of March 31, 2021

INO-4800

- ✓ Dec. 2020: Published Phase 1 data from first cohort in The Lancet's EClinicalMedicine
- ✓ January 2021: Fully enrolled 640 patient Phase 2 clinical trial in China
- ✓ 1Q21: Completed enrollment for INNOVATE Phase 2 segment
- ✓ 2Q21: Report data from Phase 2 segment of INNOVATE (**IN**ovio I**NO**-4800 **VA**ccine **T**rial for **E**fficacy)
- ❑ 2Q21: Initiate Global Phase 3 segment of INNOVATE (*U.S. sites pending clinical hold lift by FDA for device)*

VGX-3100

- ✓ 1H21: REVEAL 1 Phase 3 top-line efficacy & tolerability data
- ❑ 2021: Initiate Phase 3 trials for VIN/AIN; attain orphan drug designation

INO-5401

- ✓ 4Q20: OS18 data from Phase 1/2 GBM clinical trial (INO-5401 plus Libtayo®)
- ❑ 2021: OS24 and additional immunology data

Platform Development

- ✓ 4Q20: Awarded two-year grant from DARPA to advance COVID-19 dMAb candidate
- ✓ 1Q21: Initiate Phase 2 field study for Lassa with INO-4500 funded by CEPI
- ❑ 2021: Initiate Phase 2 MERS study with INO-4700 funded by CEPI

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