NEWS RELEASE

# INOVIO to Develop DNA-encoded Monoclonal Antibody (dMAb®) Candidates to Treat COVID-19 with Funding from the Defense Advanced Research Projects Agency (DARPA) and the Department of Defense's (DoD) Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense (JPEO-CBRND)

12/15/2020

- DARPA to fund innovative public-private partnership between INOVIO, The Wistar Institute, AstraZeneca, the University of Pennsylvania and Indiana University
- $37.6 million grant from DARPA will leverage AstraZeneca's monoclonal antibody and INOVIO's DNA-encoded monoclonal antibody (dMAb®) technologies in the fight against COVID-19
- COVID-19 dMAbs offer a cost-effective treatment option, are fast to administer to subjects, and can be quickly manufactured and scaled up compared to traditional recombinant monoclonal antibody-based therapies
- dMAbs do not require cold chain transport/storage, and the overall approach can be applied beyond COVID-19 for any pathogen or disease that can be treated by recombinant monoclonal antibody-based therapies

PLYMOUTH MEETING, Pa., Dec. 15, 2020 /PRNewswire/ -- INOVIO (NASDAQ:INO), a biotechnology company focused on bringing to market precisely designed DNA medicines to treat and protect people from infectious diseases and cancer, today announced the company and a team of scientists from The Wistar Institute, AstraZeneca, the University of Pennsylvania, and Indiana University received a $37.6 million grant from the U.S. Defense Advanced Research Projects Agency (DARPA), a research and development agency of the U.S. Department of Defense (DoD) and the Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense (JPEO-CBRND), to use INOVIO's innovative DNA-encoded monoclonal antibody (dMAb®) technology to develop anti-SARS-CoV-2-specific dMAbs which could offer versatile capabilities to function as both a therapeutic and preventive treatment for COVID-19.

Dr. J. Joseph Kim, President and CEO of INOVIO, said, "INOVIO's anti-SARS-CoV-2 dMAbs present a unique complement to our DNA vaccine candidate for COVID-19 prevention, INO-4800, which currently is in the Phase 2 segment of our INNOVATE Phase 2/3 clinical trial with funding from the DoD/JPEO-CBRND, as well as our other candidates in our DNA medicines platform. This public-private partnership allows us to not only broaden the scope and application of our DNA medicines platform across the spectrum of needed COVID-19 treatment modalities, but also to open the door for better patient administration and more cost-effective, scalable production of monoclonal antibody products for other infectious diseases and cancers. We are excited about the potential this funding offers for both situations requiring immediate clinical response and benefit."

Dario C. Altieri, M.D., President and Chief Executive Officer of The Wistar Institute, said, ""DARPA has recognized the revolutionary potential of dMAb technology to positively impact lives around the world with the most cutting-edge scientific solutions. Having assembled an academic-industry collaboration with laser-focused vision, we are honored to work together and bring our expertise and innovation to the urgency of this worldwide global health crisis."

As part of DARPA's two-year grant, INOVIO and Wistar teams will construct COVID-19 dMAb candidates mirroring AstraZeneca's traditional recombinant monoclonal antibody candidates currently being tested in clinical trials to treat COVID-19. dMAb candidates can be quickly developed and produced in vivo, offering a cost-effective and scalable therapeutic and preventive option for treatment of SARS-CoV-2 virus infection. The dMAb candidates will then be advanced into preclinical studies and then into rigorous, first-in-human clinical trials within one year of funding.

Mark Esser, Vice President and Head of Microbial Sciences, AstraZeneca, said, "We are excited to combine capabilities with this world-class team to evaluate the potential of these DNA-delivered antibodies to impact the way we can respond to prevent and treat infection."

Recombinant monoclonal antibodies, which represent the largest segment of pharmaceutical markets today with more than $100 billion in sales, are designed to enhance the immune system's ability to regulate cell functions. However, the technology has some limitations, including long and costly laboratory development and large-scale production, limited duration of in vivo potency, and a pharmacokinetic profile that can result in toxicity. INOVIO's dMAb technology offers a disruptive and differentiated solution to the challenges and limitations associated with conventional recombinant monoclonal antibody-based treatments. The company can encode the DNA sequence for a specific monoclonal antibody in a DNA plasmid and deliver the plasmid directly into cells of the body using the company's proprietary smart device called CELLECTRA®. This specific DNA medicine serves as a genetic blueprint that instruct the patient's body to build its own highly specific antibodies in vivo.

INOVIO and its collaborators pioneered the development of dMAb® technology as a unique asset to not only

combat the COVID-19 pandemic, but also for any pathogen or disease that can be treated by an antibody therapy, including cancer. Empowered by more than $80 million in previous development funding from DARPA, as well as from the Bill and Melinda Gates Foundation and the National Institutes of Health, INOVIO's dMAb® technology offers a breadth of several unique advantages across disease and pathogen targets, including high specificity for the target, rapid injection in subjects requiring minimal clinical settings, rapid manufacturing, low cost of production, and temperature-stable storage and distribution. In animal studies, dMAbs have also been applied to both prevent infection as well as to treat infection, indicating the potential for bimodal application.

## About INOVIO's DNA-encoded Monoclonal Antibody Platform

dMAb technology has the potential to overcome the limitations typically associated with traditional monoclonal antibodies, primarily cost, large-scale manufacturing and post-production storage and formulation requirements. The simplified design of a DNA plasmid encoding for monoclonal antibodies facilitates rapid development, improved product stability, and cost-effective manufacturing and deployment.

The dMAb® platform provides potential new avenues for treating a range of diseases. The DNA plasmids are delivered directly into cells of the body and the encoded monoclonal antibody is then produced by the locally transfected cells. Previously published studies show that a single administration of a highly optimized DNA-encoded monoclonal antibody targeting Zika virus (INO-A002) produced a high level of expression of the antibody in the bloodstream of mice that was protective against lethal animal challenge. INOVIO initiated the first human study of INO-A002, marking a major step towards the development of a broad range of INOVIO's dMAb and DNA-encoded Bi-specific T Cell engagers (dBTE) programs. Additional studies similarly reported data showing that dMAbs® against Ebola, flu, chikungunya, Lyme, and dengue protected animals against lethal or pathogenic challenge. Anti-tumor dMAb candidates, including those for PD-1 and CTLA-4 checkpoint inhibitors, have demonstrated therapeutic effects against prostate, breast, and ovarian cancers in animal models.

## About INOVIO's DNA Medicines Platform

INOVIO has 15 DNA medicine clinical programs currently in development focused on HPV-associated diseases, cancer, and infectious diseases, including coronaviruses associated with MERS and COVID-19 diseases being developed under grants from the Coalition for Epidemic Preparedness Innovations (CEPI) and the U.S. Department of Defense. DNA medicines are composed of optimized DNA plasmids, which are small circles of double-stranded DNA that are synthesized or reorganized by a computer sequencing technology and designed to produce a specific immune response in the body.

INOVIO's DNA medicines deliver optimized plasmids directly into cells intramuscularly or intradermally using INOVIO's proprietary hand-held smart device called CELLECTRA®. The CELLECTRA® device uses a brief electrical

pulse to reversibly open small pores in the cell to allow the plasmids to enter, overcoming a key limitation of other DNA and other nucleic acid approaches, such as mRNA. Once inside the cell, the DNA plasmids enable the cell to produce the targeted antigen. The antigen is processed naturally in the cell and triggers the desired T cell and antibody mediated immune responses. Administration with the CELLECTRA® device ensures that the DNA medicine is efficiently delivered directly into the body's cells, where it can go to work to drive an immune response. INOVIO's DNA medicines do not interfere with or change in any way an individual's own DNA. The advantages of INOVIO's DNA medicine platform are how fast DNA medicines can be designed and manufactured; the stability of the products, which do not require freezing in storage and transport; and the robust immune response, safety profile, and tolerability that have been observed in clinical trials.

With more than 2,000 patients receiving INOVIO investigational DNA medicines in more than 7,000 applications across a range of clinical trials, INOVIO has a strong track record of rapidly generating DNA medicine candidates with potential to meet urgent global health needs.

## About INOVIO

INOVIO is a biotechnology company focused on rapidly bringing to market precisely designed DNA medicines to treat and protect people from infectious diseases, cancer, and diseases associated with HPV. INOVIO is the first and only company to have clinically demonstrated that a DNA medicine can be delivered directly into cells in the body via a proprietary smart device to produce a robust and tolerable immune response. Specifically, INOVIO's lead candidate VGX-3100, currently in Phase 3 trials for precancerous cervical dysplasia, destroyed and cleared high-risk HPV 16 and 18 in a Phase 2b clinical trial. High-risk HPV is responsible for 70% of cervical cancer, 91% of anal cancer, and 69% of vulvar cancer. Also in development are programs targeting HPV-related cancers and a rare HPV-related disease, recurrent respiratory papillomatosis (RRP); non-HPV-related cancers glioblastoma multiforme (GBM) and prostate cancer; as well as externally funded infectious disease DNA vaccine development programs in Zika, Lassa fever, Ebola, HIV, and coronaviruses associated with MERS and COVID-19 diseases. Partners and collaborators include Advaccine, ApolloBio Corporation, AstraZeneca, The Bill & Melinda Gates Foundation, Coalition for Epidemic Preparedness Innovations (CEPI), Defense Advanced Research Projects Agency (DARPA)/Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense (JPEO-CBRND)/Department of Defense (DOD), HIV Vaccines Trial Network, International Vaccine Institute (IVI), Kaneka Eurogentec, Medical CBRN Defense Consortium (MCDC), National Cancer Institute, National Institutes of Health, National Institute of Allergy and Infectious Diseases, Ology Bioservices, the Parker Institute for Cancer Immunotherapy, Plumbline Life Sciences, Regeneron, Richter-Helm BioLogics, Thermo Fisher Scientific, University of Pennsylvania, Walter Reed Army Institute of Research, and The Wistar Institute. INOVIO also is a proud recipient of 2020 Women on Boards "W" designation recognizing companies with more than 20% women on their board of directors. For more information, visit **www.inovio.com**.

CONTACTS:

Media: Jeff Richardson, 267-440-4211, **jrichardson@inovio.com**
Investors: Ben Matone, 484-362-0076, **ben.matone@inovio.com**

This press release contains certain forward-looking statements relating to our business, including our plans to develop and manufacture DNA medicines, our expectations regarding our research and development programs, and our ability to successfully manufacture and produce large quantities of our product candidates if they receive regulatory approval. Actual events or results may differ from the expectations set forth herein as a result of a number of factors, including uncertainties inherent in preclinical studies, clinical trials, product development programs and commercialization activities and outcomes, our ability to secure sufficient manufacturing capacity to mass produce our product candidates, the availability of funding to support continuing research and studies in an effort to prove safety and efficacy of electroporation technology as a delivery mechanism or develop viable DNA medicines, our ability to support our pipeline of DNA medicine products, the ability of our collaborators to attain development and commercial milestones for products we license and product sales that will enable us to receive future payments and royalties, the adequacy of our capital resources, the availability or potential availability of alternative therapies or treatments for the conditions targeted by us or our collaborators, including alternatives that may be more efficacious or cost effective than any therapy or treatment that we and our collaborators hope to develop, issues involving product liability, issues involving patents and whether they or licenses to them will provide us with meaningful protection from others using the covered technologies, whether such proprietary rights are enforceable or defensible or infringe or allegedly infringe on rights of others or can withstand claims of invalidity and whether we can finance or devote other significant resources that may be necessary to prosecute, protect or defend them, the level of corporate expenditures, assessments of our technology by potential corporate or other partners or collaborators, capital market conditions, the impact of government healthcare proposals and other factors set forth in our Annual Report on Form 10-K for the year ended December 31, 2019, our Quarterly Report on Form 10-Q for the quarter ended September 30, 2020 and other filings we make from time to time with the Securities and Exchange Commission. There can be no assurance that any product candidate in our pipeline will be successfully developed, manufactured or commercialized, that final results of clinical trials will be supportive of regulatory approvals required to market products, or that any of the forward-looking information provided herein will be proven accurate. Forward-looking statements speak only as of the date of this release, and we undertake no obligation to update or revise these statements, except as may be required by law.

View original content:**http://www.prnewswire.com/news-releases/inovio-to-develop-dna-encoded-monoclonal-antibody-dmab-candidates-to-treat-covid-19-with-funding-from-the-defense-advanced-research-projects-agency-darpa-and-the-department-of-defenses-dod-joint-program-executive-office-fo-301192706.html**

SOURCE INOVIO Pharmaceuticals, Inc.