NEWS RELEASE

# Inovio Announces First Subject Dosed with its DNA-Encoded Monoclonal Antibody (dMAb™) In First-Ever Human Trial

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PLYMOUTH MEETING, Pa., Feb. 20, 2019 /PRNewswire/ -- Inovio Pharmaceuticals, Inc. (NASDAQ: INO) in collaboration with The Wistar Institute and the University of Pennsylvania announced today that the first subject was dosed as part of the first-ever human study of Inovio's DNA-encoded monoclonal antibody (dMAb™) technology. Funded fully by the Bill & Melinda Gates Foundation, this trial's focus is on evaluating the dMAb's (INO-A002) ability to prevent or treat Zika virus infection. The clinical results will also help to broadly advance Inovio's dMAb programs in infectious diseases and cancer. When delivered directly into the body, the genetic codes provided by the synthetic dMAbs, instruct the body's cells to become the factory which manufactures the therapeutic antibody products, enabling a major leap forward in antibody technology.

Dr. J. Joseph Kim, Inovio's President and CEO, said, "This first-in-human study could provide important information about how DNA-encoded products may be used to make systemically-available complex therapeutic proteins in a consistent, dose-dependent fashion. This platform advancement, most importantly, could lead to production of other dMAb products targeting infectious diseases, cancer immunotherapy, inflammation, as well as therapies for cardiovascular disease – all with blockbuster market potential which we plan to develop with corporate partnerships, external funding and collaborations."

Inovio recently reported successful development of optimized dMAbs targeting the immune checkpoint molecule PD-1. This breakthrough preclinical data demonstrated that a single injection of synthetic designer dMAb versions of pembrolizumab or nivolumab sequences targeting PD-1 protein can be robustly redeveloped to be expressed directly in vivo in mice for up to several months. Furthermore, Inovio's proprietary sequence optimization of the molecular design of these therapeutics resulted in significantly improved expression compared to the original PD-1 inhibitor native sequences while maintaining identical binding capabilities.

For the Zika dMAb trial, Inovio is partnered with The Wistar Institute with grant funding from the Bill & Melinda Gates Foundation to support and advance this innovative program through clinical testing. This open-label trial is a single center, dose escalation trial that will enroll up to 24 healthy volunteers who will receive up to four doses of INO-A002. The trial is led by Pablo Tebas, M.D., Professor of Medicine at the Hospital of the University of Pennsylvania.

Traditional monoclonal antibodies represent the largest segment of pharmaceutical markets today, accounting for more than $100 billion in pharmaceutical sales each year, with treatments spanning cancer, infectious diseases, inflammation and cardiovascular diseases. With its synthetic design and in-patient production, dMAb products represent a disruptive entrant to this important class of pharmaceuticals. Inovio and its collaborators have already received over $60 million in non-dilutive grant funding to advance its dMAb platform in the last few years. There is a significant interest in dMAb's as an alternative entrant to a highly valuable overall monoclonal antibody market as well as its unique applicability for rapid responses against emerging global infectious disease threats and for addressing critical vaccine limitations.

In just the past few years, Inovio and collaborators have published multiple impactful papers consistently demonstrating potent preclinical data from the dMAb platform, with therapeutic displays spanning protection against deadly infections to eliminating cancers and lowering life-threatening levels of cholesterol. In this regard dMAbs offer unique features for rapid production, deployment and advancement of new MAb-like biologics, with much increased efficiency. In addition, the dMAb's produced in vivo likely may have additional advantages such as expression profiles, as well as glycosylation, and unlike traditional MAb approaches, there is no reliance on in vivo tissue culture and costly or time-consuming production systems.  Studies such as INO-002 are important to provide the initial data for expanding this valuable platform. In addition, Inovio collaborative studies have recently reported on the development of several dMAb checkpoint inhibitors which in animal studies reproduce faithfully the anti-cancer effects of the biologic molecules. Inovio directly and through their sponsored research has established a significant patent estate in this area.

## About Inovio's DNA-based Monoclonal Antibody Platform

Traditional monoclonal antibodies are manufactured outside the body in bioreactors, typically requiring costly large-scale manufacturing facility development and laborious production. Inovio's disruptive dMAb technology has the potential to overcome these limitations by virtue of their simplified design, rapidity of development, product stability, ease of manufacturing and deployability, and cost effectiveness, thereby providing potential new avenues for treating a range of diseases. Another significant advancement seen in Inovio dMAb technologies is that the optimized genes for a desired monoclonal antibody is encoded in a DNA plasmid, which is produced using very cost effective and highly scalable fermentation techniques. These plasmids are delivered directly into cells of the body using electroporation and the encoded monoclonal antibody is then directly produced by these cells. Previously published studies show that a single administration of a highly optimized DNA-based monoclonal antibody targeting HIV virus produced a high level of expression of the antibody in the bloodstream of mice; Inovio similarly reported data showing that dMAb products against flu, Ebola, chikungunya and dengue protected animals against lethal challenge.

## About Inovio Pharmaceuticals, Inc.

Inovio is a late-stage biotechnology company focused on the discovery, development, and commercialization of DNA-based immunotherapies and vaccines that transform the treatment and prevention of cancer and infectious disease. Inovio's proprietary

technology platform applies antigen sequencing and DNA delivery to activate potent immune responses to targeted diseases. The technology functions exclusively in vivo, and has been demonstrated to consistently activate robust and fully functional T cell and antibody responses against targeted cancers and pathogens. Inovio's most advanced clinical program, VGX-3100, is in Phase 3 for the treatment of HPV-related cervical pre-cancer. Also in development are Phase 2 immuno-oncology programs targeting HPV-related cancers, bladder cancer, and glioblastoma, as well as platform development programs in hepatitis B, Zika, Ebola, MERS, and HIV. Partners and collaborators include MedImmune, Regeneron, Roche/Genentech, ApolloBio Corporation, The Wistar Institute, The Bill & Melinda Gates Foundation, the University of Pennsylvania, Parker Institute for Cancer Immunotherapy, CEPI, DARPA, GeneOne Life Science, Plumbline Life Sciences, NIH, HIV Vaccines Trial Network, National Cancer Institute, U.S. Military HIV Research Program, Drexel University, and Laval University. For more information, visit **www.inovio.com**.

This press release contains certain forward-looking statements relating to our business, including our plans to develop electroporation-based drug and gene delivery technologies and DNA vaccines, our expectations regarding our research and development programs, including the planned initiation and conduct of clinical trials and the availability and timing of data from those trials. Actual events or results may differ from the expectations set forth herein as a result of a number of factors, including uncertainties inherent in pre-clinical studies, clinical trials and product development programs, 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 vaccines, our ability to support our pipeline of SynCon® active immunotherapy and vaccine 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, 2017, our Quarterly Report on Form 10-Q for the quarter ended September 30, 2018 and other regulatory filings we make from time to time. 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 licensed 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.

CONTACTS:

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


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