NEWS RELEASE

Inovio's DNA-Encoded Monoclonal Antibody (dMAb™) Platform Leaps Forward with First-in-Human Trial

2019-01-07

First Human dMAb Study Will Target Zika Infection

PLYMOUTH MEETING, Pa., Jan. 7, 2019 /PRNewswire/ -- Inovio Pharmaceuticals, Inc. (NASDAQ: INO) in collaboration with The Wistar Institute and the University of Pennsylvania announced today the initiation of the first human study of its DNA-encoded monoclonal antibody (dMAb™) technology to prevent Zika virus infection. In addition to demonstrating safety and tolerability, starting at lower and then increasing doses in this Phase 1 dose-escalation study of INO-A002. When delivered directly into the body, the genetic instructions provided by the designed synthetic dMAbs, instruct the body's cells to become the factory which manufactures the therapeutic antibody products, enabling a major leap in antibody technology.

Dr. J. Joseph Kim, Inovio's President and CEO, said, "Initiating this first human trial is a milestone for Inovio and a major potential advancement for a potentially breakthrough class of medicines – DNA-encoded monoclonal antibodies – produced directly in the human body via the dMAb technology, pioneered by Inovio and our collaborators. While this trial targets Zika virus infection, we will gain important data from this study towards development of a broad range of our dMAb programs targeting infectious diseases, cancer immunotherapy, inflammation, as well as therapies for cardiovascular disease. Our goal was to create a new improved approach to monoclonal antibody technology that results in a pipeline of high impact dMAb products, which can be developed with corporate partnerships, external funding and collaborations."

The Wistar Institute was awarded funding via a grant from the Bill & Melinda Gates Foundation to support and advance this innovative research into the clinic. David B. Weiner, Ph.D., executive vice president, director of Wistar's Vaccine & Immunotherapy Center, and the W.W. Smith Charitable Trust Professor in Cancer Research at Wistar, led the research efforts and is working with partners to advance this new generation of DNA-based technologies. This open-label trial is a single center, dose escalation trial will enroll up to 24 healthy volunteers who will receive up to four doses of INO-A002. The trial will be led by Pablo Tebas, M.D., Professor of Medicine at the Hospital of the University of Pennsylvania.

"Through detailed preclinical studies developing this new platform, the team has demonstrated the in vivo production by synthetic DNA technology of dMAbs using the CELLECTRA® delivery system," said Weiner. "These antibodies (produced in the body) can

display improved kinetics with simple stable formulations providing disease protection in animal challenge models. We are very excited to have contributed to the conception and development of this technology and to participate in this first human trial of a synthetic DNA-encoded monoclonal antibody. This approach represents the potential for major advancement over traditional MAb approaches and may broaden therapeutic strategies and open new patient markets to the benefits of antibody-based therapies for disease prevention or treatment."

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 a disruptive 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 constructed 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. In addition, post production storage and formulation stability limits the reach of some of these products. Inovio's disruptive dMAb technology has the potential to overcome these limitations by virtue of their simplified design using novel plasmid vectors and unique formulations allowing for rapidity of development, improved product stability, ease of manufacturing and deployability, ultimately all resulting in increases in cost effectiveness and reach, providing potential new avenues for treating a range of diseases. The dMAbs 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-based monoclonal antibody targeting Ebola virus produced a high level of expression of the antibody in the bloodstream of mice that was protective against lethal animal challenge; Additional studies similarly reported data showing that dMAb products against flu, chikungunya, Lyme, and dengue protected animals against lethal or pathogenic

challenge. In addition, the team has reported delivery of dMAbs that impact prostate as well as breast and ovarian cancers in animals.

About Inovio Pharmaceuticals, Inc.

Inovio is a biotechnology company focused on the discovery, development, and commercialization of DNA immunotherapies that transform the treatment of cancer and infectious diseases. Inovio's proprietary platform technology applies next-generation 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 is the only immunotherapy company that has reported generating T cells whose killing capacity correlates with relevant clinical outcomes. 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 head and neck cancer, bladder cancer, and glioblastoma, as well as platform development programs for hepatitis B, Zika, Ebola, MERS, and HIV. Partners and collaborators include MedImmune, Regeneron, Roche/Genentech, ApolloBio Corporation, The Bill & Melinda Gates Foundation, The Wistar Institute, University of Pennsylvania, Parker Institute for Cancer Immunotherapy, CEPI, DARPA, GeneOne Life Science, Plumbline Life Sciences, Drexel University, NIH, HIV Vaccines Trial Network, National Cancer Institute, U.S. Military HIV Research Program, 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 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.

View original content to download multimedia:**http://www.prnewswire.com/news-releases/inovios-dna-encoded-monoclonal-antibody-dmab-platform-leaps-forward-with-first-in-human-trial-300773512.html**

SOURCE Inovio Pharmaceuticals, Inc.