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## **Profectus and Vyriad Form Global Collaboration to Develop Oncolytic Recombinant VSV (rVSV) Vaccines for Cancer Immunotherapy**

- Broad strategic alliance creates dominant position for the development of  
oncolytic vaccines derived from rVSV and related viruses —
- Initial focus on advanced solid-tumor cancers —

*BALTIMORE, Md. and ROCHESTER, Minn., March 18, 2016* — Profectus BioSciences, Inc. and Vyriad announced today an exclusive global collaboration to develop oncolytic vesiculovirus vaccines for the treatment of advanced-stage cancers. The two companies will combine and leverage their respective recombinant vesicular stomatitis virus (rVSV)-derived oncolytic and vaccine platform technologies to develop novel cancer drugs that selectively destroy tumor cells while simultaneously boosting patients' immune systems to continue killing any residual cancer cells that may survive the initial virus attack.

The intellectual property licensed to Profectus and Vyriad that underlies the collaboration consolidates the platform technology first developed by John K. Rose, PhD, Professor of Pathology and Director of the Molecular Virology Program at Yale University. Dr. Rose's foundational technology established the use of recombinant vesiculoviruses in vaccine development, including the use of rVSV for the delivery of vaccine antigens as well as their use as oncolytic viruses.

"We consider Profectus BioSciences to be the world-leading company in the area of rVSV vaccines, with unmatched scientific depth and clinical experience," said Stephen J. Russell, MD, PhD, President and CEO of Vyriad. "We are confident that this critical alliance will allow us to unleash the full power of oncolytic immunovirotherapy as a new and highly versatile anticancer modality."

"Vyriad is an established leader in oncolytic virotherapy and is an ideal partner to enable the full potential of our platform to be realized in the area of immuno-oncology," said Jeffrey Meshulam, President of Profectus. "Vyriad was the first to develop and clinically test rVSV as an oncolytic agent. We look forward to working closely with the Vyriad team to advance innovative new vesiculovirus-based oncolytic vaccines that have clear potential to benefit cancer patients."

In nature, VSVs can be isolated from insects and livestock and are not considered human pathogens. However, VSVs can be engineered to selectively replicate in tumor cells and destroy them without harming healthy cells. Oncolytic vesiculoviruses have demonstrated potent ability to target and

destroy cancer cells while also stimulating the body's adaptive anti-tumor immune response that directs the immune system to continue killing cancer cells. This anti-tumor immune response is more powerfully stimulated when the virus has been further engineered to encode a tumor antigen.

The companies' innovative combination strategy is designed to generate powerful oncolytic vaccines that work by infecting, selectively replicating in, and destroying cancer cells. The oncolytic vesiculovirus vaccines will be engineered to produce specific tumor antigens tailored to specific types of cancer. Soon after the cancer cells are infected, they display a very high surface density of the virally encoded antigen to enable optimal recognition by anticancer T cells. Subsequently, as the cancer cells die, they release a broad spectrum of additional cancer antigens that trigger the patient's immune system to continue attacking all cancer cells in the body that contain the same antigens. The collaboration leverages:

- Vyriad's rVSV-derived oncolytic viruses that are engineered to infect, selectively replicate in, and destroy cancer cells with enhanced specificity, anti-tumor potency, and safety
- Profectus' rVSV-derived VesiculoVax™ vaccine vectors that are engineered to prime the immune system to generate a robust and durable cellular immune response to promote more sustained cancer cell-destroying activity, increasing drug effectiveness with enhanced safety and immunogenicity.

Under the terms of the exclusive agreement, the collaboration will be strategically managed by a joint development committee with equal representation from Profectus and Vyriad, and Vyriad assumes the primary responsibility for program implementation. The companies' strategy is to show efficacy of the combination approach for an initial selected tumor indication, then proceed to develop a portfolio of oncolytic vaccines targeting different cancer indications, potentially in combination with other cancer immunotherapies such as checkpoint inhibitors, or other forms of therapy such as chemotherapy and newer targeted therapies. The companies anticipate the first program initiating human clinical trials in 2017. Financial terms of the agreement were not disclosed.

#### **About the Vyriad VSV Platform**

Vyriad's Oncolytic VSV technology is exclusively licensed by Vyriad. VSV (vesicular stomatitis virus) naturally infects cattle in Central America. VSV grows very rapidly in cancer cells but not in healthy normal cells, and the oncolytic VSVs that Vyriad is developing have been engineered to further increase their cancer specificity. The VSV genome can be strategically engineered by Vyriad to increase its potency for specific treatment indications and to enable the use of imaging technology to track the spread of the virus in the body. Because human exposure to VSV is rare, most cancer patients do not have immunity to VSV, making it universally applicable as an intravenous cancer therapy.

#### **About the Profectus VesiculoVax™ Platform**

The Profectus VesiculoVax™ vaccine delivery technology is based on seminal discoveries made in the laboratory of Dr. John Rose and patented by Yale University. Building on these discoveries, Profectus scientists introduced multiple non-reversible genetic modifications into the prototype that synergistically attenuate the virus and provide vectors that are safe for human use. To extend the VesiculoVax™ platform, Profectus is conducting collaborative studies with scientists at the University of Texas Medical Branch (UTMB) that have identified additional vesiculoviruses with utility as vaccine vectors. The resulting VesiculoVax™ platform consists of a family of non-cross reactive vaccine

vectors that are constructed and attenuated so they do not cause illness in animal or humans using methods exemplified with rVSV. Profectus has demonstrated the safety and immunogenicity of its VesiculoVax™ rVSV-based vaccines against HIV in human clinical trials.

### **About Vyriad**

Vyriad is a clinical-stage biotechnology company developing novel oncolytic virus therapies for the treatment of cancers that have significant unmet need. Vyriad's oncolytic immunovirotherapy products are based on the company's engineered Oncolytic Vesicular Stomatitis Virus (VSV) and Oncolytic Measles Virus platforms that enable selective destruction of cancer cells without harming normal tissues. Vyriad's product development pipeline encompasses multiple clinical- and preclinical-stage programs that target a broad range of cancer indications as well as programs that pair the company's oncolytic viruses with other cancer immunotherapy modalities, traditional cancer therapy, and newer targeted therapies. In addition, Vyriad is developing novel diagnostic/ theranostic tests for more accurate prediction of immunovirotherapy response. Clinical trials using the company's oncolytic viruses are under way at Mayo Clinic and the University of Arkansas. For more information, please visit [www.vyriad.com](http://www.vyriad.com).

### **About Profectus BioSciences**

Profectus BioSciences is a clinical-stage vaccine development company developing preventive and therapeutic vaccines for infectious diseases and oncolytic vaccines for cancer immunotherapy. Profectus vaccines are based on the company's proprietary VesiculoVax™ and DNA vaccine delivery platforms. Used alone, first-in-class VesiculoVax™-vectored vaccines lead to rapid expansion of B cells to provide protection against emerging infectious diseases of public health and biodefense importance such as Ebola, Marburg, Chikungunya, and the Equine Encephalitis viruses. When used as a boost after priming the immune system with best-in-class pDNA vaccines, VesiculoVax™-vectored vaccines lead to the expansion of primed T cells into effector cells that are uniquely suited to killing virally infected cells and cancers.

Current programs using the Prime/Boost System of Vaccines (PBS Vax™) strategy include hepatitis B virus (HBV), human papilloma virus (HPV), herpes simplex virus type 2 (HSV-2), and human immunodeficiency virus (HIV). Partners and collaborators include Vyriad, the Galveston National Laboratory at UTMB, Yale University, the Institute of Human Virology, the Center for HIV/AIDS Vaccine Immunology, the National Cancer Institute, the NIH Division of AIDS, the Bill and Melinda Gates Foundation, the International AIDS Vaccine Initiative, the HIV Vaccines Trials Network, and the AIDS Clinical Trials Group. Profectus has been funded by Cross Atlantic Capital Partners ("XACP") of Radnor, Pennsylvania. XACP's primary investor is the Pennsylvania Public School Employees' Retirement System (PSERS). For more information, please visit [www.profectusbiosciences.com](http://www.profectusbiosciences.com).

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