

Press Release



BIONEER Corporation, New Drug R&D Center
Joo-Sung Yang, Ph.D., Director / Principal Investigator of Antiviral Therapeutics

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Bioneer Wins Grant to Develop SAMiRNA Drug for Dengue Fever

BIONEER Corporation (064550:KOSDAQ), a South Korea-based RNAi drug development company, announced today that it has been awarded a two year grant to develop a novel antiviral treatment. The grant was made by the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, South Korea. This award will support continued development and pre-clinical trials of a novel Dengue therapeutic, using Bioneer's SAMiRNA™ drug platform, for two years beginning October, 2014. The first \$0.5 million was awarded in October 2014, with the additional \$0.5 million coming in 2015 upon successful completion of the first stage of the project and the company's matching fund of \$0.3 million, which will be a \$1.3 million project in total. Bioneer has signed a research agreement with San Diego-based La Jolla Institute for Allergy and Immunology to conduct an in vivo mouse dengue virus (DENV) challenge experiment, which will be performed to assess the therapeutic efficacy of Bioneer's SAMiRNA™ drug.

"Bioneer's SAMiRNA™ (Self-Assembled Micelle inhibitory RNA) platform technology is a second generation of siRNA delivery system. Since SAMiRNA™ nano material itself is highly stable in body fluid and safe with no adverse effect in terms of any innate immune response induction, no toxicity from GLP certified toxicology study even with 28-day repeated doses, it is ideal for antiviral therapeutics," Han-Oh Park, Ph.D., founder and CEO of Bioneer, said in a statement. The siRNAs targeting the DENV genome are synthesized in a single molecule in the context of Bioneer's SAMiRNA™ nanoparticle, and developed into SAMiRNA™-DN, siRNA-based tetravalent dengue therapeutics, which down-regulate replication of all four serotypes of DENV. "Proof-of-concept development of SAMiRNA™-DN will be a rapid confrontational strategy against new/mutant emerging infectious viruses, including zoonoses. Our SAMiRNA™ platform technology is flexible to expand antiviral therapeutics pipelines, such as Ebola, another hemorrhagic viral disease," Joo-Sung Yang, Ph.D., Director and Principal Investigator of Antiviral Therapeutics of the company, added.

Bioneer has been collaborating with Sanofi S.A. since 2012 on cures for liver cancer. Bioneer has also been collaborating with Yale/Brown medical school and Korea Institute of Toxicology on IPF/COPD target gene discovery and preclinical testing using SAMiRNA™ – based drugs, in a project funded through a \$1.4M grant awarded by the Korea Drug Development Fund. Commercialization rights for these R&D collaborations belong to Bioneer.

About Dengue Hemorrhagic Fever (DHF) / Dengue Shock Syndrome (DSS)

Dengue Fever (DF), DHF and DSS are mosquito-borne viral infectious diseases, which affect about 390 million people per year, with 48% of the world's population (about 3 billion) living in dengue transmission risk areas. WHO estimates 22,000 deaths in 500,000 DHF cases, mostly among children. Dengue is caused by Dengue virus (DENV), a member of Flavivirus genus, *Flaviviridae* family, of which there are four serotypes, DENV-1, 2, 3, 4. The initial infection causes relatively minor illness (DF), but subsequent infections have been reported to cause severe diseases (DHF or DSS) in both children and adults due to

antibody-dependent enhancement. No commercialized vaccines or specific drugs are currently available to control dengue infection.

About SAMiRNA™ Technology

SAMiRNA™ (Self-Assembled Micelle inhibitory RNA) is a new paradigm of RNAi therapeutics with its novel delivery method and lack of toxicity. It is a single chemical entity which spontaneously assembles into nanoparticles with a protective PEG coat. SAMiRNA™ nanoparticles can incorporate siRNA, miRNA or even antisense DNA, and are ideally sized for selective localization to either vascularized tumors or targeted tissues. Targeting is achieved through incorporation of relevant moieties on the surface of SAMiRNA™. As a single solid-phase synthesized molecule, manufacturing and QC are far simpler than current lipid-based delivery methods, and is completely different from the conventional method that transfers siRNA (small interfering RNA) by using an efficient carrier to deliver it into the cells.

Bioneer's IP position associated with this technology is strong worldwide, and the company is very active in drug development, both autonomously and collaboratively, using proprietary equipment and reagents. These activities have resulted in technology transfers on a global scale. With a proprietary designing algorithm, the company has developed and been offering genome-wide siRNA libraries for human, mouse and rat.

About BIONEER Corporation

Bioneer (064550.KQ) was founded in 1992 as an R&D oriented biotechnology company in South Korea. As a vertically integrated corporation, Bioneer has core competencies in gene based therapeutics using proprietary DNA/RNA synthesis chemistry, novel molecular biology enzymes and reagents, and instrumentation. Its innovative culture enables the company to provide comprehensive solutions to academia and the molecular diagnostic industry, while the novel technologies it develops become strong foundations for new drug development. Bioneer (064550.KQ) is a public company being traded on KOSDAQ, a South Korea stock exchange market. www.bioneer.com

About La Jolla Institute

Founded in 1988, La Jolla Institute for Allergy and Immunology is a nonprofit, independent biomedical research institute focused on improving human health through increased understanding of the immune system. Its scientists carry out research seeking new knowledge leading to the prevention of disease through vaccines and the treatment and cure of infectious diseases, cancer, inflammatory, and autoimmune diseases such as rheumatoid arthritis, type 1 (juvenile) diabetes, Crohn's disease and asthma. La Jolla Institute's research staff includes more than 150 Ph.D.s and M.D.s. To learn more about the Institute's work, visit www.lji.org.