



## **Arcturus Therapeutics and Duke-NUS Medical School Partner to Develop a Coronavirus (COVID-19) Vaccine using STARR™ Technology**

March 4, 2020

### **Collaboration seeks to conduct pre-clinical testing followed by first-in-human clinical trials**

SAN DIEGO and SINGAPORE, March 04, 2020 (GLOBE NEWSWIRE) -- Arcturus Therapeutics (the "Company", NASDAQ: ARCT), a leading messenger RNA medicines company, and Duke-NUS Medical School (Duke-NUS), a research intensive, graduate entry medical school, today announced their partnership to develop a Coronavirus (COVID-19) vaccine for Singapore. The development of a COVID-19 vaccine will be based on the Company's STARR™ Technology and will take advantage of a unique platform developed at Duke-NUS allowing rapid screening of vaccines for effectiveness and safety.

The STARR™ Technology platform combines self-replicating RNA with LUNAR®, a leading nanoparticle non-viral delivery system, to produce proteins inside the human body. Due to superior immune response and sustained protein expression, Arcturus' STARR™ Technology is expected to produce a vaccine response at much lower doses compared to traditional mRNA vaccines. This could lead to the ability to treat many more people with a single GMP-manufactured production batch, thereby greatly increasing efficiency and reducing time required to produce sufficient quantities of vaccine for large populations.

"We have observed STARR™ Technology in pre-clinical models to be effective at extraordinarily low doses -- greater than 30-fold more efficient than traditional mRNA. The Arcturus manufacturing process has been applied in multiple large GMP batches of highly pure RNA in our LUNAR-OTC program. If successful, Arcturus could develop a vaccine capable of vaccinating millions of people for a fraction of the cost of traditional mRNA vaccines," said Joseph Payne, President & CEO of Arcturus Therapeutics.

"Duke-NUS has been on the front lines in the fight against COVID-19, developing the first serological tests for COVID-19 and was among the first groups to isolate and culture the virus. The partnership with Arcturus Therapeutics combines complementary strengths as we work together to fight this global outbreak," said Professor Thomas M. Coffman, Dean of Duke-NUS Medical School.

COVID-19 belongs to a family of coronaviruses that can cause serious respiratory disease. Arcturus plans to apply its STARR™ Technology toward the development of a vaccine to protect against COVID-19. The self-replicating RNA-based therapeutic vaccine triggers rapid and prolonged antigen expression within host cells resulting in protective immunity against infectious pathogens.

"There is a tremendous urgency to develop an effective prevention for the current Coronavirus crisis. The Duke-NUS and Arcturus partnership could expedite a solution to this urgent need as we utilize STARR™ Technology to bring a vaccine candidate for clinical testing in the shortest time possible," said Professor Ooi Eng Eong, Deputy Director of the Emerging Infectious Diseases programme at Duke-NUS.

Arcturus' [Corporate Deck](#) has been updated accordingly, and is available at [ArcturusRx.com](http://ArcturusRx.com)

For more information and potential collaboration opportunities regarding Arcturus' Coronavirus vaccine, please contact Arcturus by email at [Vax@ArcturusRx.com](mailto:Vax@ArcturusRx.com)

### **About STARR™ Technology**

The STARR™ Technology platform combines self-replicating RNA with LUNAR®, a leading nanoparticle delivery system, into a single solution to produce proteins inside the human body. The versatility of the STARR™ Technology affords its ability upon delivery into the cell to generate a protective immune response or drive therapeutic protein expression to potentially prevent against or treat a variety of diseases. The self-replicating RNA-based therapeutic vaccine triggers rapid and prolonged antigen expression within host cells resulting in protective immunity against infectious pathogens. This combination of the LUNAR® and STARR™ technology is expected to provide lower dose requirements due to superior immune response, sustained protein expression compared to non-self-replicating RNA-based vaccines and potentially enable us to produce vaccines more quickly and simply.

### **About Coronavirus**

Coronaviruses are a family of viruses that can lead to respiratory illness, including Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). Coronaviruses are transmitted between animals and people and can evolve into strains not previously identified in humans. On January 7, 2020, a novel coronavirus (2019-nCoV) was identified as the cause of pneumonia cases in Wuhan City, Hubei Province of China, and additional cases have been found in a growing number of countries.

### **About Duke-NUS Medical School**

Duke-NUS is Singapore's flagship graduate entry medical school, established in 2005 with a strategic, government-led partnership between two world-class institutions: Duke University School of Medicine and the National University of Singapore (NUS). Through an innovative curriculum, students at Duke-NUS are nurtured to become multi-faceted 'Clinicians Plus' poised to steer the healthcare and biomedical ecosystem in Singapore and beyond. A leader in ground-breaking research and translational innovation, Duke-NUS has gained international renown through its five signature research programmes and eight centres. The enduring impact of its discoveries is amplified by its successful Academic Medicine partnership with Singapore Health Services (SingHealth), Singapore's largest healthcare group. This strategic alliance has spawned 15 Academic Clinical Programmes, which harness multi-disciplinary research and education to transform medicine and improve lives.

For more information, please visit <https://www.duke-nus.edu.sg/>

### **About Arcturus Therapeutics**

Founded in 2013 and based in San Diego, California, Arcturus Therapeutics Holdings Inc. (Nasdaq: ARCT) is an RNA medicines company with enabling technologies – LUNAR® lipid-mediated delivery, Unlocked Nucleomonomer Analog (UNA) chemistry, STARR™ Technology – and mRNA drug substance along with drug product manufacturing. Arcturus' diverse pipeline of RNA therapeutics includes programs to potentially treat Ornithine Transcarbamylase (OTC) Deficiency, Cystic Fibrosis, Coronavirus (COVID-19), Glycogen Storage Disease Type 3, Hepatitis B, and non-alcoholic steatohepatitis (NASH). Arcturus' versatile RNA therapeutics platforms can be applied toward multiple types of nucleic acid medicines including messenger RNA, small interfering RNA, replicon RNA, antisense RNA, microRNA, DNA, and gene editing therapeutics. Arcturus' technologies are covered by its extensive patent portfolio (182 patents and patent applications, issued in the U.S., Europe, Japan, China and other countries). Arcturus' commitment to the development of novel RNA therapeutics has led to collaborations with Janssen Pharmaceuticals, Inc., part of the Janssen Pharmaceutical Companies of Johnson & Johnson, Ultragenyx Pharmaceutical, Inc., Takeda Pharmaceutical Company Limited, CureVac AG, Synthetic Genomics Inc., Duke-NUS, and the Cystic Fibrosis Foundation. For more information visit [www.Arcturusrx.com](http://www.Arcturusrx.com)

### **Forward Looking Statements**

This press release contains forward-looking statements that involve substantial risks and uncertainties for purposes of the safe harbor provided by the Private Securities Litigation Reform Act of 1995. Any statements, other than statements of historical fact included in this press release, including those regarding strategy, future operations, collaborations, the likelihood of success of the Company's Coronavirus (COVID-19) vaccine or other products, the status of preclinical and clinical development programs and the planned initiation of clinical trials are forward-looking statements. Arcturus may not actually achieve the plans, carry out the intentions or meet the expectations or projections disclosed in any forward-looking statements such as the foregoing and you should not place undue reliance on such forward-looking statements. Such statements are based on management's current expectations and involve risks and uncertainties, including those discussed under the heading "Risk Factors" in Arcturus' Annual Report on Form 10-K for the fiscal year ended December 31, 2018, filed with the SEC on March 18, 2019 and in subsequent filings with, or submissions to, the SEC. Except as otherwise required by law, Arcturus disclaims any intention or obligation to update or revise any forward-looking statements, which speak only as of the date they were made, whether as a result of new information, future events or circumstances or otherwise.

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