Delivery of Stem Cells into Heart Muscle After Heart Attack May Enhance Cardiac Repair and Reverse Injury

Study Findings by Icahn School of Medicine at Mount Sinai Presented at the American Heart Association Scientific Sessions 2014

New York, NY (PRWEB) November 19, 2014 -- Delivering stem cell factor directly into damaged heart muscle after a heart attack may help repair and regenerate injured tissue, according to a study led by researchers from Icahn School of Medicine at Mount Sinai presented November 18 at the American Heart Association Scientific Sessions 2014 in Chicago, IL.

“Our discoveries offer insight into the power of stem cells to regenerate damaged muscle after a heart attack,” says lead study author Kenneth Fish, PhD, Director of the Cardiology Laboratory for Translational Research, Cardiovascular Research Center, Mount Sinai Heart, Icahn School of Medicine at Mount Sinai.

In the study, Mount Sinai researchers administered stem cell factor (SCF) by gene transfer shortly after inducing heart attacks in pre-clinical models directly into damaged heart tissue to test its regenerative repair response. A novel SCF gene transfer delivery system induced the recruitment and expansion of adult c-Kit positive (cKit+) cardiac stem cells to injury sites that reversed heart attack damage. In addition, the gene therapy improved cardiac function, decreased heart muscle cell death, increased regeneration of heart tissue blood vessels, and reduced the formation of heart tissue scarring.

“It is clear that the expression of the stem cell factor gene results in the generation of specific signals to neighboring cells in the damaged heart resulting in improved outcomes at the molecular, cellular, and organ level,” says Roger J. Hajjar, MD, senior study author and Director of the Cardiovascular Research Center at Mount Sinai. “Thus, while still in the early stages of investigation, there is evidence that recruiting this small group of stem cells to the heart could be the basis of novel therapies for halting the clinical deterioration in patients with advanced heart failure.”

cKit+ cells are a critical cardiac cytokine, or protein receptor, that bond to stem cell factors. They naturally increase after myocardial infarction and through cell proliferation are involved in cardiac repair.

According to researchers there has been a need for the development of interventional strategies for cardiomyopathy and preventing its progression to heart failure. Heart disease is the number one cause of death in the United States, with cardiomyopathy or an enlarged heart from heart attack or poor blood supply due to clogged arteries being the most common causes of the condition. In addition, cardiomyopathy causes a loss of cardiomyocyte cells that control heartbeat, and changes in heart shape, which lead to the heart’s decreased pumping efficiency.

“Our study shows our SCF gene transfer strategy can mobilize a promising adult stem cell type to the damaged region of the heart to improve cardiac pumping function and reduce myocardial infarction sizes resulting in improved cardiac performance and potentially increase long-term survival and improve quality of life in patients at risk of progressing to heart failure,” says Dr. Fish.

“This study adds to the emerging evidence that a small population of adult stem cells can be recruited to the damaged areas of the heart and improve clinical outcomes,” says Dr. Hajjar.
Other study co-authors included Kiyotake Ishikawa, MD, Jaume Aguero, MD, Lisa Tilemann, MD, Dongtak Jeong, PhD, Lifan Liang, PhD, Lauren Fish, Elisa Yaniz-Galende, PhD, and Krisztina Zsebo, PhD.

This research study was performed in collaboration with the Celladon Corporation in San Diego, CA. Dr. Hajjar is the scientific cofounder of the company Celladon, which is developing his AAV1/SERCA2a gene therapy for the treatment of heart failure. He holds equity in Celladon and receives financial compensation as a member of its advisory board.

Abstract 17141 was presented at the AHA Scientific Sessions 2014 as: Stem Cell Factor Gene Transfer in a Swine Model of Ischemic Cardiomyopathy is accompanied by decreased apoptosis and proliferating cKit+ cells.

About the Mount Sinai Health System
The Mount Sinai Health System is an integrated health system committed to providing distinguished care, conducting transformative research, and advancing biomedical education. Structured around seven member hospital campuses and a single medical school, the Health System has an extensive ambulatory network and a range of inpatient and outpatient services—from community based facilities to tertiary and quaternary care.

The System includes approximately 6,600 primary and specialty care physicians, 12 minority owned free standing ambulatory surgery centers, over 45 ambulatory practices throughout the five boroughs of New York City, Westchester, and Long Island, as well as 31 affiliated community health centers. Physicians are affiliated with the Icahn School of Medicine at Mount Sinai, which is ranked among the top 20 medical schools both in National Institutes of Health funding and by U.S. News & World Report.

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