Cardiac stem cell trial seeks to treat some heart attack patients

September 30 2009

Researchers at UCSF Medical Center have begun enrollment for an early-stage clinical trial to evaluate the safety and efficacy of an adult stem cell therapy for patients who have just experienced their first acute myocardial infarction, or heart attack. The trial is part of a multi-center national study.

The cells used, known as mesenchymal stem cells, were obtained from the bone marrow of healthy adult donors. Depending on their location in the body, mesenchymal stem cells give rise to bone, cartilage, fat, muscle and connective tissue.

The experimental therapy is intended to combat the symptoms related to heart damage that continue to develop following a heart attack, including low pumping capacity, inflammation and increased scar tissue. Although the exact mechanisms of the stem cells' actions in this setting are not yet known, previous studies have suggested that they could reduce the amount of scar tissue and inflammation caused by heart attack.

A previous UCSF study on the impact of bone marrow-derived stem cells on heart attacks in mice provided evidence that stem cells work by assisting in tissue repair on the cellular level, resulting is less damage and improved function.

The new clinical trial is the first stem cell clinical trial in cardiology at UCSF.

"This is an important and exciting step for physicians and scientists seeking to translate research into beneficial treatments for patients," said Yerem Yeghiazarians, MD, co-director of the Adult Cardiac Catheterization Laboratory, director of the UCSF Translational Cardiac Stem Cell Program and lead investigator of the cardiac stem cell study.

"Many of us have been working for a long time to have a therapy for patients that could improve organ damage at the basic level," he added. "UCSF is one of the fastest hospitals in the nation at treating heart attack with angioplasty, according to the National Cardiovascular Data Registry. We are hoping that this stem cell therapy will prove successful in improving heart function and minimize the damage even more."

All patients arriving at UCSF's Emergency Department with heart attack will continue to be treated with standard measures. Patients who meet the medical criteria for the trial will be able to elect to receive the stem cell therapy within seven days after their heart attack.

To be eligible, male and female patients must be between the ages of 21 and 85, and have a baseline ejection fraction -- the measurement of blood pumped out of the ventricles per heart beat -- between 30 and 45 percent.

The stem cell therapy is delivered to patients via a one-time IV-infusion, performed on-site at UCSF. The infusion takes approximately half an hour. Patients will be followed for two years and progress will be assessed with MRI and ultrasound imaging in addition to the standard battery of cardiac measures, including electrocardiogram (ECG) and heart function monitoring.

The goal of the therapy is to prevent the permanent damage that heart attacks cause. According to the American Heart Association, more than half a million Americans will experience their first heart attack in 2009.

Up to six years after a first heart attack, 18 percent of men and 35 percent of women will have another heart attack.

The two-year, Phase II trial will test the safety and efficacy of a stem cell therapy called Prochymal, developed by Osiris Therapeutics, Inc. Results from a Phase I (safety) trial - which did not involve UCSF - were announced by the company in Feb., 2009.

Despite early promising cardiac stem cell studies conducted at academic medical centers nationally and internationally, researchers still have questions about how stem cells work in the body in order to benefit heart patients.

"This and future studies hope to answer some of these questions. For instance, how is the therapeutic benefit achieved? Do these cells differentiate into heart muscle cells? Do they minimize cell death after a heart attack or do they act by other mechanisms to improve the cardiac function?" said Yeghiazarians.

To seek answers to these questions, UCSF launched a Translational Cardiac Stem Cell Research Program in 2003. The program includes a multi-disciplinary team of practicing clinicians and basic and translational scientists with expertise in the various aspects of cardiac development and physiology. The program is dedicated to the study of adult stem cells and their role in treating diseases of the heart and circulatory system.

"The aim of our laboratory is to advance the basic science and to translate our findings from the lab bench to treat our patients at the bedside," said Yeghiazarians.

Source: University of California - San Francisco