Heart damage improves, reverses after stem cell injections in a preliminary human trial

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Researchers have shown for the first time that stem cells injected into enlarged hearts reduced heart size, reduced scar tissue and improved function to injured heart areas, according to a small trial published in *Circulation Research: Journal of the American Heart Association*.

Researchers said that while this research is in the early stages, the findings are promising for the more than five million Americans who have enlarged hearts due to damage sustained from heart attacks. These patients can suffer premature death, have major disability and experience frequent hospitalizations. Options for treatment are limited to lifelong medications and major medical interventions, such as heart transplantation, according to Joshua M. Hare, M.D., the study's senior author and professor of medicine and director of the Interdisciplinary Stem Cell Institute, University of Miami Miller School of Medicine, University of Miami in Miami, Fla.

Using catheters, researchers injected stem cells derived from the patient's own bone marrow into the hearts of eight men (average age 57) with chronically enlarged, low-functioning hearts.

"The injections first improved function in the damaged area of the heart and then led to a reduction in the size of the heart. This was associated with a reduction in scar size. The effects lasted for a year after the injections, which was the full duration of the study," Hare said.

Specifically, researchers found:

- Heart size decreased an average of 15 percent to 20 percent, which is about three times what is possible with current medical therapies.
- Scar tissue decreased by an average of 18.3 percent.
- And there was dramatic improvement in the function, or contraction, of specific heart areas that were damaged.

"This therapy improved even old cardiac injuries," Hare said. "Some of the patients had damage to their hearts from heart attacks as long as 11 years before treatment."

The researchers had used two different types of bone marrow stem cells in their study — mononuclear or mesenchymal stem cells. The study lacked the power to determine if one type of cell works better than the other. All patients in the study benefited from the therapy and tolerated the injections with no serious adverse events.

Hare's study assessed the effect of stem cell injections differently from other studies of post-heart attack stem cell treatment. His team measured contractility, scar size and structural changes of the heart.

"Studies of bone marrow cell therapy for ischemic heart disease in animals have shown improved ejection fraction (the amount of blood the heart can pump). However, this measurement has not reliably translated to early phase studies in humans," Hare said. "Ejection fraction may not be the best way to measure the success of stem cell therapy in the human heart."

Hare also said their findings suggest that patients' quality of life could

improve as the result of this therapy because the heart is a more normal size and is better functioning. "But, we have yet to prove this clinical benefit – this is an experimental therapy in phase one studies. These findings support further clinical trials and give us hope that we can help people with enlarged hearts."

Provided by American Heart Association