Genetically engineered cardiac stem cells repaired damaged mouse heart

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Genetically engineered human cardiac stem cells helped repair damaged heart tissue and improved function after a heart attack, in a new animal study.

Stem cells can potentially develop into multiple types of tissue and can also regenerate, unlike other kinds of cells.

Ten weeks after investigators implanted the genetically engineered human stem cells into mice, tissue repair and function, as measured by the heart's ability to pump blood, was twice that of controls. This improvement persisted for at least 20 weeks after implantation.

"This study brings us one step closer to a clinical application for stem-cell therapy," said Sadia Mohsin, Ph.D., lead author of the study and post-doctoral research scholar at San Diego State University in California. "Since patients with heart failure are normally elderly, their cardiac stem cells aren't very healthy. We were able to modify these stem cells, obtained from heart failure patients, to be healthier so that they could be transplanted into the heart and survive and thrive."

Researchers used cardiac stem cells from patients receiving mechanical assist device pumps to help their failing hearts. They then genetically engineered the cells to express a protein, known as Pim-1, which naturally occurs in response to heart damage. Using molecular technology, they attached this protein to another, derived from jellyfish, which glows fluorescent green so that Pim-1 expression was clearly

visible.

After implanting the genetically engineered Pim-1 and non-modified human cardiac cells into a mouse challenged with an experimentally-induced heart attack, the researchers compared heart function between the two groups.

Researchers said this application “has emerged as a viable option addressing current limitations associated with stem cell therapy.”

Provided by American Heart Association