

Aged, damaged hearts yield stem cells that could treat heart failure

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Cardiac stem cells — even in elderly and sick patients — could generate new heart muscle and vessel tissue and be used to treat heart failure, according to research presented at the American Heart Association's Scientific Sessions 2010.

Scientists surgically removed tissue from the muscular wall of the heart's chambers in 21 patients. They then isolated and multiplied the cardiac [stem cells](#) (CSCs) found there. Most of the patients had ischemic cardiomyopathy (enlarged and weakened muscle due to coronary artery disease). Eleven also had diabetes. The average age of patients was about 65.

"Regardless of the gender or age of the patient, or of diabetes, we were able to isolate in all of them a pool of functional cardiac stem cells that we can potentially use to rescue the decompensated human heart," said Domenico D'Amario, M.D., Ph.D., author of the study and a postdoctoral fellow at the Center for Regenerative Medicine at Harvard, Boston, Mass.

Among the 12 female and nine male patients, researchers obtained 20 percent more CSCs from the hearts of the women than the men. Age or diabetes status didn't affect the number of cells harvested.

Women have a longer life span than men, and even with [heart failure](#) their hearts generally show more resilience — possibly explaining the researchers' finding, D'Amario said.

The researchers also examined stem cells' biological properties that would influence their therapeutic value. They found that cells had long telomeres, or "caps," on their chromosomal ends indicating that expanded CSCs retained a significant growth reserve, although less so in older or diabetic patients.

On the same study, scientists also studied activation of a cell surface marker, insulin growth factor receptor 1 (IGF-1R), which recognizes stem cells that are most likely to thrive and have the potential to produce new cardiac tissue.

"Now you have a resident cardiac stem cell that is already programmed to form cardiac muscle, so this cell is already superior to any other cell you can take from other tissues," said Piero Anversa, M.D., senior author of the study and director of the Center for Regenerative Medicine.

CSCs are distributed throughout the cardiac muscle, but the atrial and apical regions of the heart contain niches, where the cells are protected from the physical stress of the heartbeat.

The heart's CSC reserve is present regardless of patient differences in ethnicity, background, diet and other factors. Research in more patients is needed to bolster the strength of the data, Anversa said.

Provided by American Heart Association

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