

Stem cell regeneration repairs congenital heart defect

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Mayo Clinic investigators have demonstrated that stem cells can be used to regenerate heart tissue to treat dilated cardiomyopathy, a congenital defect. Publication of the discovery was expedited by the editors of *Stem Cells* and appeared online in the "express" section of the journal's Web site at <http://stemcells.alphamedpress.org/>.

The study expands on the use of embryonic stem cells to regenerate tissue and repair damage after heart attacks and demonstrates that stem cells also can repair the inherited causes of heart failure.

"We've shown in this transgenic animal model that embryonic stem cells may offer an option in repairing genetic heart problems," says Satsuki Yamada, M.D., Ph.D., cardiovascular researcher and first author of the study. "Close evaluation of genetic variations among individuals to identify optimal disease targets and customize stem cells for therapy opens a new era of personalized regenerative medicine," adds Andre Terzic, M.D., Ph.D., Mayo Clinic cardiologist and senior author and principal investigator.

The team reproduced prominent features of human malignant heart failure in a series of genetically altered mice. Specifically, the "knockout" of a critical heart-protective protein known as the KATP channel compromised heart contractions and caused ventricular dilation or heart enlargement. The condition, including poor survival, is typical of patients with heritable dilated cardiomyopathy.

Researchers transplanted 200,000 embryonic stem cells into the wall of the left ventricle of the knockout mice. After one month the treatment improved heart performance, synchronized electrical impulses and stopped heart deterioration, ultimately saving the animal's life. Stem cells had grafted into the heart and formed new cardiac tissue. Additionally, the stem cell transplantation restarted cell cycle activity and halved the fibrosis that had been developing after the initial damage. Stem cell therapy also increased stamina and removed fluid buildup in the body, so characteristic in heart failure.

The researchers say their findings show that stem cells can achieve functional repair in non-ischemic (cases other than blood-flow blockages) genetic cardiomyopathy. Further testing is underway.

Source: Mayo Clinic

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