Mayo Clinic restores disrupted heartbeat with regenerative intervention

3 September 2013

Mayo Clinic researchers have found a way to resynchronize cardiac motion following a heart attack using stem cells. Scientists implanted engineered stem cells, also known as induced pluripotent stem (iPS) cells, into damaged regions of mouse hearts following a heart attack. This regenerative approach successfully targeted the origin of abnormal cardiac motion, preventing heart failure. The findings appear in the September issue of the *Journal of Physiology*.

"The discovery introduces—for the first time—stem cell-based 'biological resynchronization' as a novel means to treat cardiac dyssynchrony," says Andre Terzic, M.D., Ph.D., senior author of the study. Dr. Terzic is the Michael S. and Mary Sue Shannon Family Director, Center for Regenerative Medicine, and the Marriott Family Professor of Cardiovascular Diseases Research.

Muscle damage following a heart attack may disrupt normal heart conduction, resulting in a condition known as cardiac dyssynchrony. Current therapy uses pacing devices such as pacemakers; however, many patients with advanced heart failure do not respond favorably to these devices because heart tissue must be healthy for optimal outcome. Stem cell-based repair would offer a new solution to patients who would otherwise be resistant to device-based resynchronization.

"A high-resolution ultrasound revealed harmonized pumping where iPS cells were introduced to the previously damaged heart tissue," says Satsuki Yamada, M.D., Ph.D., first author of the study.

The study provides evidence that a stem cell-based intervention may be effective in synchronizing failing hearts. Additional studies will follow to validate the value of stem cell-based regenerative solutions in addressing abnormal cardiac motion in heart failure, ultimately leading to improved patient care.

"By harnessing the potential of regenerative medicine—repairing the injured heart, in this case—we will be increasingly able to provide more definitive solutions to our patients," adds Dr. Terzic.

Provided by Mayo Clinic