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How to mend a broken heart: Advances in parthenogenic stem cells

February 22 2013

Parthenogenesis is a form of asexual reproduction during which unfertilized eggs begin to develop as if they had been fertilized. It occurs naturally in many plants and a few invertebrate (some bees, scorpions, parasitic wasps) and vertebrate animals (some fish, reptiles, and amphibians), but does not occur naturally in mammals.

In 2007, researchers were able to chemically induce human egg cells to undergo parthenogenesis. The resulting parthenogenote has properties similar to an embryo, but cannot develop further.

In this issue of the Journal of Clinical Investigation, Wolfram Zimmerman and colleagues at Georg-August-Universität Göttingen in Göttingen, Germany, demonstrated that cells from the parthenogenote function as embryonic stem cells and maintain the capacity to develop into different types of tissue.

Further, they used parthenogenic stem cells to make cardiomyocytes and engineered heart muscle (myocardium) that exhibited the structural and functional properties of normal myocardium. The engineered myocardium could then be used to engraft the mice that had contributed the eggs for parthenogenesis.

These studies demonstrate that parthenogenic stem cells can be used for tissue engineering.

In a companion commentary, Michael Schneider of the Imperial College

of London discusses how these findings could impact the development of cell replacement therapies.

More information: Parthenogenetic stem cells for tissue engineered heart repair, *Journal of Clinical Investigation*, 2013. doi:10.1172/JCI66854
Virgin birth: engineered heart muscle from parthenogenic stem cells, *Journal of Clinical Investigation*, 2013. doi:10.1172/JCI67961

Provided by Journal of Clinical Investigation