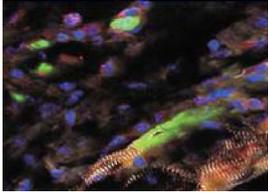


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CVM home > news > heart stem cells
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Collaborative research isolates and purifies mouse heart stem cells



Stem cells within the heart have proven to be an elusive and controversial population. Now research scientists from Cornell's College of Veterinary Medicine and collaborators from the University of Bonn have successfully isolated and purified mouse heart precursor cells (heart stem cells) from the developing heart, a key step in determining the specific processes that either maintain stemness or promote differentiation into vascular or cardiac fates. The demonstration that cardiovascular precursors expand and differentiate to all three heart cell types (cardiac, endothelial, and smooth muscle cells) follows recent advances by several groups who demonstrated that cardiac differentiation from embryonic stem cells occurs through the formation of a heart stem cell with the capacity to differentiate into the major cardiovascular lineages.

A team lead by Michael I. Kotlikoff, Austin O. Hoey dean of veterinary medicine, and Yvonne Tallini, research scientist with the Department of Biomedical Sciences, and their colleagues led by Bernd Fleischmann, Institute of Physiology at the University of Bonn, demonstrated the ability to isolate, purify, and expand cardiac precursor cells from developing hearts by labeling cardiac progenitors with green fluorescent protein.

"The existence of cardiac stem cells and the ability of adult stem cells to form new heart muscle has been the subject of much scientific disagreement, as there are so few of these cells in the adult heart," said Kotlikoff. "We have established a simple method to purify these cells from hearts still in a late stage of development, and show that they have all the attributes of heart stem cells, in that they are capable of differentiating into all of the cell types that make up the adult heart. We now have a way to identify these cells within the heart and to isolate and study the factors that control their fate."

The research, reported in the current issue of the Proceedings of the National Academy of Science, also reports that following cardiac injury, cells that express the marker of cardiovascular precursors are recruited to form vessels within dead heart tissue, but that these cells do not form new heart muscle cells. However, differentiated heart cells surrounding this area of dead tissue express the stem cell marker at low levels, suggesting that injury triggers the re-expression of genes that characterize cardiovascular precursor cells, but does not lead to the generation of new heart cells.