Newly discovered heart stem cells make muscle and bone

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Researchers have identified a new and relatively abundant pool of stem cells in the heart. The findings in the December issue of *Cell Stem Cell*, a Cell Press publication, show that these heart cells have the capacity for long-term expansion and can form a variety of cell types, including muscle, bone, neural and heart cells.

The researchers say the discovery may lay a foundation for much needed regenerative therapies aimed to enhance tissue repair in the heart. The damaged heart often doesn't repair itself well because of the incredibly hostile environment and wide-scale loss of cells, including stem cells, after a heart attack.

"In the end, we want to know how to preserve the stem cells that are there and to circumvent their loss," says Richard Harvey of the Victor Chang Cardiac Research Institute in Australia.

The newly described cardiac stem cells can be found in both developing and adult hearts, the evidence shows. As in the bone marrow and other organs, the colony-forming cells are found in the vicinity of blood vessels.

Harvey says despite the cells' ability to form those other cell types (a characteristic known as multipotency), he nevertheless suspects they have a bias toward heart tissue for a simple reason: "In an evolutionary sense, they've been dedicated to the heart for a long time." He suspects their flexibility is a byproduct of the need to remain responsive to the

environment and to many types of injury.

The findings come at an important time, as stem cells harvested from human hearts during surgery are just beginning to show promise for reversing heart attack damage, Harvey noted. "If we are serious about organ regeneration, we need to understand the biology," he says.

Igor Slukvin of the University of Wisconsin echoes that point in an accompanying commentary. "Understanding the developmental biology of the heart is instrumental in developing novel technologies for heart regeneration and cellular therapies," he writes. "It is critical to identify the type and origin of cells capable of reconstituting a heart."

While cell-based therapies do have potential for repairing damaged heart tissue, Harvey ultimately favors the notion of regenerative therapies designed to tap into the natural ability of the heart and other organs to repair themselves. And there is more work to do to understand exactly what role these stem cells play in that repair process. His team is now exploring some of the factors that bring those cardiac stem cells out of their dormant state in response to injury and protect their "stemness."

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