Cardiac cells might help fix heart attack damage

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(AP) -- Scientists say they've found cells in the hearts of mice that can make new muscle after a heart attack, raising hopes that doctors can one day help the human heart repair itself.

In an embryo the cells help build the heart, but in adulthood they generally go dormant, said researcher Paul Riley of the Institute of Child Health in London. The new study found a way to reactivate them, he said.

The findings suggest that someday it might be possible to develop a drug for at-risk people to keep those dormant cells ready in case of a heart attack, said Riley, an author of the report in Thursday's issue of the journal *Nature*. But that would be at least 10 years away, he stressed.

The cells are found in the outer layer of the mouse heart. Researchers found that if they injected mice with a particular substance and gave the animals a heart attack, the cells migrated to the site of injury and made new muscle. They also found several indicators that the heart then worked better, although they said it's not clear whether that's due to the new muscle or other known effects of the injected substance.

Steve Houser, director of the Cardiovascular Research Center at Temple University, who wasn't involved in the study, said other teams have also reported potential repair cells in the heart, including some cells being tested in humans.

He also cautioned that "very little in the cardiac world has translated from mice to man."

Yet, he said the new research was well done and will "stir the field" of heart regeneration studies.

More information: De novo cardiomyocytes from within the activated adult heart after injury. Smart, N. et al. *Nature* doi:10.1038/nature10188 (2011).

Abstract
A significant bottleneck in cardiovascular regenerative medicine is the identification of a viable source of stem/progenitor cells that could contribute new muscle after ischaemic heart disease and acute myocardial infarction1. A therapeutic ideal—relative to cell transplantation—would be to stimulate a resident source, thus avoiding the caveats of limited graft survival, restricted homing to the site of injury and host immune rejection. Here we demonstrate in mice that the adult heart contains a resident stem or progenitor cell population, which has the potential to contribute bona fide terminally differentiated cardiomyocytes after myocardial infarction. We reveal a novel genetic label of the activated adult progenitors via re-expression of a key embryonic epicardial gene, Wilm's tumour 1 (Wt1), through priming by thymosin β4, a peptide previously shown to restore vascular potential to adult epicardium-derived progenitor cells2 with injury. Cumulative evidence indicates an epicardial origin of the progenitor population, and embryonic reprogramming results in the mobilization of this population and concomitant differentiation to give rise to de novo cardiomyocytes. Cell transplantation confirmed a progenitor source and chromosome painting of labelled donor cells revealed transdifferentiation to a myocyte fate in the absence of cell fusion. Derived cardiomyocytes are shown here to structurally and functionally integrate with resident muscle; as such, stimulation of this adult progenitor pool represents a

significant step towards resident-cell-based therapy in human ischaemic heart disease.