

Article: How old cells can regain youth

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How old cells can regain youth

Researchers find a youthful environment invigorates regeneration in old tissue

By Laura M Hrstar

Old cells may regain a youthful phenotype when exposed to a young cell environment, say researchers in *Nature* this week. The results, say the authors, indicate that aged satellite cells have an intrinsic ability to regenerate.

"We know old tissue repairs poorly, but it's not because there aren't stem cells ready to do the repair," coauthor Thomas Rando told *The Scientist*. "The problem is, with age, the environment the stem cells hit changes, [and] it makes them less responsive."

To study how systemic factors affect satellite cell regeneration, researchers from Stanford University and VA Palo Alto Health Care System in California created fusions of the circulatory systems of old mice and young mice—a technique known as parabiosis. The young mice were transgenic, expressing either green fluorescent protein or a distinct CD45 allele.

Five days after injuring the mice's hindlimbs, researchers found nucleated embryonic myosin heavy chain, a specific marker seen in regenerating myotubes—nascent myofibers—in the old parabiotic animals. Because these cells did not contain transgenic markers, researchers determined that activation of resident progenitor cells—not engraftment of younger cells onto old tissue—was the cause of new growth.

Satellite cells in old parabiotic mice also showed similar upregulation as young mice controls of Notch ligand Delta, the binding protein necessary to activate the Notch signaling pathway for cell regeneration. The young parabiotic mice showed inhibition of Delta when compared with young mouse controls.

The new findings support the groups' previous work that showed the diminished expression of Delta related to age decreases Notch signaling, which reduces stem cell proliferation and impairs cell regeneration.

In the current study, researchers also found that culturing old satellite cells in young mouse serum restored upregulation of Notch ligand and Notch activation, whereas adding old mouse serum to young satellite cells inhibited the effect.

The results were a clear demonstration of how cell environment affects muscle regeneration, said University of Michigan professor of cell biology Bruce Carlson, who did not participate in the study. "It [shows] that muscle has a much greater potential to regenerate than you would think if you just looked at it in the context of the old animal," Carlson told The Scientist.

Full Text at TheScientist

<http://www.biomedcentral.com/news/20050217/01>

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