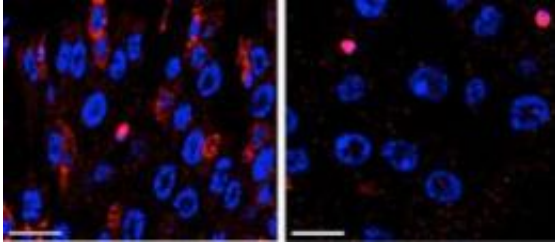


'Scrawny' gene keeps stem cells healthy

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Red-stained intestinal stem cells are visible in the tissue of a 7-day old adult fruit fly with a normal copy of the scrawny gene (left), but have been prematurely lost in a mutant fly without a functioning copy of scrawny (right). Scale bar is 10 microns.

(PhysOrg.com) -- Stem cells are the body's primal cells, retaining the youthful ability to develop into more specialized types of cells over many cycles of cell division. How do they do it? Scientists at the Carnegie Institution have identified a gene, named scrawny, that appears to be a key factor in keeping a variety of stem cells in their undifferentiated state. Understanding how stem cells maintain their potency has implications both for our knowledge of basic biology and also for medical applications. The results will be published in the January 9, 2009 print edition of *Science*.

"Our tissues and indeed our very lives depend on the continuous functioning of stem cells," says Allan C. Spradling, director of the Carnegie Institution's Department of Embryology. "Yet we know little about the genes and molecular pathways that keep stem cells from

turning into regular tissue cells—a process known as differentiation."

In the study, Spradling, with colleagues Michael Buszczak and Shelley Paterno, determined that the fruit fly gene *scrawny* (so named because of the appearance of mutant adult flies) modifies a specific chromosomal protein, histone H2B, used by cells to package DNA into chromosomes. By controlling the proteins that wrap the genes, *scrawny* can silence genes that would otherwise cause a generalized cell to differentiate into a specific type of cell, such as a skin or intestinal cell.

The researchers observed the effects of *scrawny* on every major type of stem cell found in fruit flies. In the experiments, mutant flies without functioning copies of the *scrawny* prematurely lost their stem cells in reproductive tissue, skin, and intestinal tissue.

Stem cells function as a repair system for the body. They maintain healthy tissues and organs by producing new cells to replenish dying cells and rebuild damaged tissues. "Losing stem cells represents the cellular equivalent of eating the seed corn," says Spradling.

While the *scrawny* gene has so far only been identified in fruit flies, very similar genes that may carry out the same function are known to be present in all multicellular organisms, including humans. The results of this study are an important step forward in stem cell research. "This new understanding of the role played by *scrawny* may make it easier to expand stem cell populations in culture, and to direct stem cell differentiation in desired directions," says Spradling.

Provided by Carnegie Institution

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