Gene Scrawny keeps stem cells healthy

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 appe 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*.

How scrawny works

"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 know as differentiation."

In the study, Spradling, with colleagues Michael Buszczak and Shelley Paterno, determined that the fruit fl gene scrawny (so named because of the appearance of mutant adult flies) modifies a specific chromosor protein, histone H2B, used by cells to package DNA into chromosomes. By controlling the proteins that wr 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 th experiments, mutant flies without functioning copies of the scrawny prematurely lost their stem cells in reproductive tissue, skin, and intestinal tissue.

Our repair system

Stem cells function as a repair system for the body. They maintain healthy tissues and organs by producin 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 th 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 differentiatic in desired directions," says Spradling.

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