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## Embryonic Pathways Induce Stem Cell Traits

*Regenerative ability holds promise for development of target-specific cancer drugs*

Scientists have found that normal cells and cancer cells that acquire the ability to use long dormant pathways to migrate through the body may gain properties of adult stem cells, including the ability to self-renew.

The finding helps researchers better understand adult stem cell creation -- knowledge they hope will lead to developing healthy stem cells for regenerative medicine and target-specific cancer drugs.

Research published online May 15 in *Cell* shows that cells that undergo an "epithelial-to-mesenchymal" (EMT) transition, in mice or humans, acquire many important stem cell characteristics. The study also shows that normal, naturally existing stem cells and tumor-seeding cancer stem cells share characteristics with these post-EMT cells.

"This for us is a very exciting discovery, not only because of its unexpectedness, but because it offers a route by which one could in principle generate unlimited numbers of stem cells committed to create a specific cell type," researcher Robert Weinberg, a professor of biology at Massachusetts Institute of Technology, said in a prepared statement. "One could imagine, for example, that if one takes skin cells and induces them to undergo an EMT, they could become skin stem cells."

Epithelial cells, which make up most of the human body, bind in sheet-like structures. In embryonic development, the EMT process disrupts this adhesion and changes the cells into more loosely associated mesenchymal cells. In the context of cancer development, some cancer cells within a primary cancer may undergo EMT, migrate through the body to their end destination, and then undergo a reverse conversion back to their original epithelial form.

Inducing the EMT process can produce cells with many characteristics of cancer stem cells, the researchers discovered. This finding could help solve why tumor cells spread into different sites and multiply enough to form a new tumor.

"If you take a population of human cancer cells that normally form a tumor very inefficiently and induce an EMT, their tumor-initiating abilities increase by about a hundredfold, so that it takes about 10,000 cells, rather than a million cells, to form a tumor," co-lead author Wenjun Guo, a postdoctoral researcher in Weinberg's lab, said in a prepared statement. "This suggests cancer stem cells are using preexisting normal stem cell machinery to propagate their own self-renewal and therefore their tumor-initiating ability."