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Researchers discover important tool in understanding differentiation in human embryonic stem cells

October 24 2007

Researchers at the University of Minnesota's Stem Cell Institute have described how an existing genetic tool can be used to study how human embryonic stem cells differentiate. The research appears in the November 2007 issue of *Experimental Biology and Medicine*.

Researchers know very little about how human embryonic stem cells (hESC) self-renew. To fully understand these cells' self renewal capacity and pluripotency, and their regulation, it is necessary to efficiently generate genetically modified cells and analyze the consequences of elevated and reduced expression of genes.

The research team, led by the University of Minnesota's Meri Firpo, Ph.D., included gene therapy researchers at Los Angeles Children's Hospital, and developmental biologists at the University of Michigan.

The researchers used "knockdown" technology to reduce the expression of oct4, a gene known to be necessary for self renewal of mouse and human embryonic stem cells. As seen in work done with mouse cells by knockdown and other genetic means, they showed that reducing the amount of oct4 in human ES cells induced differentiation.

The researchers then used a plasmid vector to transiently increase levels of oct4 in hESC. This also resulted in differentiation as expected, but with differentiation patterns similar to those seen with the knockdown.

This was an unexpected result, because when expression of oct4 is up-regulated in mouse ES cells, they differentiate into a different type of cell than if the expression of oct4 is down-regulated.

Source: Society for Experimental Biology and Medicine