Stanford scientists turn adult skin cells into muscle and vice versa

April 30 2009

In a study featured on the cover of the May issue of The *FASEB Journal*, researchers describe how they are able to reprogram human adult skin cells into other cell types in order to decipher the elusive mechanisms underlying reprogramming. To demonstrate their point, they transformed human skin cells into mouse muscle cells and vice versa. This research shows that by understanding the regulation of cell specialization it may be possible to convert one cell type into another, eventually bypassing stem cells.

"Regenerative medicine provides hope of novel and powerful treatments for many diseases, but depends on the availability of cells with specific characteristics to replace those that are lost or dysfunctional," said Helen M. Blau, Ph.D., the senior scientist involved in the study, Associate Editor of The *FASEB Journal*, Member of the Stem Cell Institute, and Director of the Baxter Laboratory in Genetic Pharmacology at Stanford. "We show here that mature cells can be directly reprogrammed to generate those necessary cells, providing another way besides embryonic stem cells or induced pluripotent stem cells of overcoming this important bottleneck to restoring tissue function."

The Stanford scientists sought to transform one specialized adult cell from one species into a different specialized adult cell of another species. To do this, they first used a chemical treatment to fuse skin and muscle cells together, producing cells that had nuclei from human skin cells and mouse muscle cells. By being encapsulated within the same cell wall, the human skin cells and mouse muscle nuclei could now "talk" to

one another via chemical signals. Then, the scientists looked at the genes expressed from the human skin nuclei and mouse muscle nuclei. (This was possible because one cell type was human and the other was mouse, so the genes could be distinguished based on species differences.) After several experiments, they were able to induce the human skin nuclei to produce mouse muscle genes and induce the muscle nuclei to produce human skin genes—effectively transforming the cell from one type to the other.

"Reprogramming mature cells will likely complement the use of embryonic stem cells in regenerating tissues," said Gerald Weissmann, M.D., Editor-in-Chief of The *FASEB Journal*. "By elucidating the regulators of reprogramming, as the Stanford group is doing, it may be possible to generate replacement cells in cases where stem cells are not present or not appropriate."

Source: Federation of American Societies for Experimental Biology (news : web)