Researchers Stimulate Growth of Neural Stem Cells in Adult Brain for Treatment of Neurological Disorders

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In a development that could potentially benefit victims of degenerative neurological diseases, researchers have succeeded in stimulating the growth of neural stem cells in the adult brain. Such cells could then be directed towards repairing one's own brain.

In the November 15 issue of the *Journal of Neuroscience*, California Institute of Technology neuroscientists report that they have discovered a way to stimulate an area of the brain where adult stem cells normally exist. As a result, there is a significant increase in stem cell production--up to six times the normal amount of adult neural stem cells found there.

According to Paul Patterson, the Biaggini Professor of Biological Sciences at Caltech and senior author of the paper, the good news is that these stem cells represent a large pool of precursor cells that future work may direct into pathways for replacement of dying cells in disorders such as Parkinson's and Alzhiemer's diseases and multiple sclerosis.

"Basically, what my colleague Sylvian Bauer has done is take a natural protein in the body called leukemia inhibitory factor, or LIF, and inject it into the brains of adult mice," Patterson explains. "The results show that you can stimulate the subventricular zone to produce a much larger pool of adult neural stem cells."

The idea then is to direct the stem cells to form the necessary specialized neurons or glia in the part of the brain that is damaged by disease or injury, Patterson says.

"Neuroscientists have known for some time that the adult brain possesses neural stem cells that could be used to regenerate neurons, and in fact, the brains of neurodegenerative disease patients show evidence that their neural stem cells do attempt to replace dying cells.

"However, the contribution of these cells to brain repair is currently very limited," he says. "Our approach may overcome the limitation of cell numbers, and the approach of using one's own cells offers the further advantage of avoiding the transplantation of immunologically foreign stem cells, thereby eliminating the problems of rejection."

This development in no way renders the use of embryonic stem cells obsolete, or argues against further research with embryonic stem cells, Patterson says. Embryonic stem cells have the potential to become any cell in the body, whereas his process uses adult neural stem cells for brain disorders only.

Although this stimulation of neural stem cell growth has been done in laboratory mice, Patterson says that humans also have neural stem cells in the adult brain.

The next step is to see if the adult neural stem cells can be directed to replace cells in mice with brains that are damaged in ways similar to humans with Parkinson's, Alzheimer's, and multiple sclerosis.

Bauer, the lead author of the paper, is a former postdoctoral researcher in Patterson's lab who recently moved to the Université Paul Cézanne, Aix-Marseille III, in France.

Source: California Institute of Technology