Medical Xpress

Stem cells cultured from human bone marrow behave like those derived from brain tissue

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Stem cells taken from adult human bone marrow have been manipulated by scientists at the Maxine Dunitz Neurosurgical Institute at Cedars-Sinai Medical Center to generate aggregates of cells called spheres that are similar to those derived from neural stem cells of the brain.

In addition, the bone marrow-derived stem cells, which could be differentiated into neurons and other cells making up the central nervous system, spread far and wide and behaved like neural stem cells when transplanted into the brain tissue of chicken embryos.

Results of the experiments, described in the February 2007 of the *Journal of Neuroscience Research*, support the concept of using bone marrow-derived stem cells to create therapies to treat brain tumors, strokes and neurodegenerative diseases. A similar study using bone marrow-derived stem cells of rats appeared as the cover article of the December 2002 issue of *Experimental Neurology*.

"These findings reinforce the data that came from our study of rat bone marrow-derived stem cells," said John S. Yu, M.D., neurosurgeon, co-director of the Comprehensive Brain Tumor Program, and senior author of both articles. "Using two methods, we show evidence for the bone marrow-derived stem cells being neural cells, and we demonstrate that it is feasible to grow the cells in large numbers. We also document that these cells function electrophysiologically as neurons, using similar

voltage-regulating mechanisms."

Progressing from the rat study to experiments with human cells and transplantation into mammal brain tissue, the research team continues to build a foundation for translating laboratory research into human clinical trials.

"Based on our studies to date, a patient's own bone marrow appears to offer a viable and renewable source of neural stem cells, allowing us to avoid many of the issues related to other types of stem cells," said Keith L. Black, M.D., director of the Maxine Dunitz Neurosurgical Institute and chairman of Cedars-Sinai's Department of Neurosurgery.

The replacement of damaged brain cells with healthy cells cultured from stem cells is considered to potentially be a promising therapy for the treatment of stroke, neurodegenerative disorders and even brain tumors, but finding a reliable source for generating neural cells for transplantation has been a challenge. The use of embryonic and fetal tissue has raised ethical questions among some, and brings with it the possibility of immune rejection. And while neural stem cells can be taken from brain tissue, the removal of healthy tissue from a patient's brain introduces a new set of safety, practicality and ethical issues.

In their recent work, the Cedars-Sinai researchers documented that several genes that speed up and control the proliferation process could be used to rapidly expand the supply of marrow-derived neural stem cells, writing in the article that "this novel method of expansion … may prove to be useful in the design of novel therapeutics for the treatment of brain disorders, including tumors."

Source: Cedars-Sinai Medical Center