Study Indicates Benefits of Stem Cells in Treating MS Declines With Donor’s Age

As stem cell clinical trials for multiple sclerosis (MS) patients become more common, it is crucial for researchers to understand the biologic changes and therapeutic effects of older donor stem cells. A new study appearing in the latest issue of STEM CELLS Translational Medicine is the first to demonstrate that, in fact, adipose-derived stem cells donated by older people are less effective than cells from their younger counterparts.

Durham, NC (PRWEB) September 09, 2013 -- As stem cell clinical trials for multiple sclerosis (MS) patients become more common, it is crucial for researchers to understand the biologic changes and therapeutic effects of older donor stem cells. A new study appearing in the latest issue of STEM CELLS Translational Medicine is the first to demonstrate that, in fact, adipose-derived stem cells donated by older people are less effective than cells from their younger counterparts.

MS is a neurodegenerative disease characterized by inflammation and scar-like lesions throughout the central nervous system (CNS). There is no cure and no treatment eases the severe forms of MS. But previous studies on animals have shown that transplantation of mesenchymal stem cells (MSCs) holds promise as a therapy for all forms of MS. The MSCs migrate to areas of damage, release trophic (cell growth) factors and exert neuroprotective and immunomodulatory effects to inhibit T cell proliferation.

MS-related clinical trials have all confirmed the safety of autologous MSC therapy. However what is unclear is whether MSCs derived from older donors have the same therapeutic potential as those from younger ones.

"Aging is known to have a negative impact on the regenerative capacity of most tissues, and human MSCs are susceptible to biologic aging including changes in differentiation potential, proliferation ability and gene expression. These age-related differences may affect the ability of older donor cells to migrate extensively, provide trophic support, persist long-term and promote repair mechanisms," said Bruce Bunnell, Ph.D., of Tulane University’s Center for Stem Cell Research and Regenerative Medicine. He served as lead author of the study, conducted by a team composed of his colleagues at Tulane.

In their study, mice were induced with chronic experimental autoimmune encephalomyelitis (EAE) and treated before disease onset with human adipose-derived MSCs derived from younger (less than 35 years) or older (over age 60) donors. The results corroborated previous studies suggesting that older donors are less effective than their younger counterparts.

"We found that, in vitro, the stem cells from the older donors failed to ameliorate the neurodegeneration associated with EAE. Mice treated with older donor cells had increased inflammation of the central nervous system, demyelination leading to an impairment in movement, cognition and other functions dependent on nerves, and a proliferation of splenocytes [white blood cells in the spleen], compared to the mice receiving cells from younger donors," Dr. Bunnell noted.

In fact, the T cell proliferation assay results in the study indicated that older MSCs might actually stimulate the proliferation of the T cells, while younger stem cells are capable of inhibiting the proliferation of T cells. (T cells are a type of white blood cell in the body’s immune system that help fight off disease and harmful
As such, Dr. Bunnell said, "A decrease in T cell proliferation would result in a decreased number of T cells available to attack the CNS in the mice, which directly supports the results showing that the CNS damage and inflammation is less severe in the young MSC-treated mice than in the old MSC-treated mice."

"This study in an animal model of MS is the first to demonstrate that fat-derived stem cells from older human donors have less therapeutic effectiveness than cells from young donors," said Anthony Atala, M.D., editor of STEM CELLS Translational Medicine and director of the Wake Forest Institute for Regenerative Medicine. "The results point to a potential need to evaluate cell therapy protocols for late-onset multiple sclerosis patients."

The full article, "Age of the donor reduces the ability of human adipose-derived stem cells to alleviate symptoms in the experimental autoimmune encephalomyelitis mouse model," can be accessed at: http://www.stemcellstm.com/content/.

About STEM CELLS Translational Medicine:

STEM CELLS TRANSLATIONAL MEDICINE (SCTM), published by AlphaMed Press, is a monthly peer-reviewed publication dedicated to significantly advancing the clinical utilization of stem cell molecular and cellular biology. By bridging stem cell research and clinical trials, SCTM will help move applications of these critical investigations closer to accepted best practices.

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