Stem cell transplantation may offer viable treatment for Alzheimer's disease patients

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Alzheimer's disease (AD), affecting millions worldwide, is the leading cause of dementia. The prevalence of AD is rapidly increasing, and will possibly affect over 100 million people by 2050, yet there are no effective therapies for the disease.

Stem cell transplantation may offer a viable AD treatment, and a research team in Tampa, Florida has injected human umbilical blood cells (HUCBCs) into mice modeled with AD to investigate how the cells are distributed and retained in tissues, including the brain. Their study, a preliminary investigation to better understand the bioavailability, safety, and feasibility of using human umbilical cord blood cells (HUCBCs) to treat AD, found that the transplanted cells migrated to brain tissue, were retained there for up to 30 days, and did not promote the growth of tumors.

The study will be published in a future issue of *Cell Transplantation* and is currently freely available on-line as an unedited, early epub at: http://ingentaconnect.com/content/cog/ct/pre-prints/content-CT-1129_Ehrhart_et_al

Although previous in vivo studies in which stem cell transplantation was used to treat symptoms associated with AD in test animals revealed a reduction in cognitive deficits, it is important to determine whether the transplanted cells successfully migrate to the target tissue and are retained there without promoting tumor growth.

"Our previous studies with AD modeled mice demonstrated that multiple intravenous injections of HUCBCs can reduce behavioral impairment, mitigate amyloid-β plaque formation, and modulate the immune response," said the study's lead author, Dr. Jared Ehrhart of Saneron CCEL Therapeutics Inc. in Tampa, FL. "In this study, we attempted to ascertain the distribution of HUCBCs in multiple organs, tumorigenic potential of the cells, and ability of the cells to infiltrate the brain parenchyma."

While the researchers were able to determine that HUCBCs were distributed widely throughout the bodies of the test animals within 24 hours following a single dose of cells, the HUCBCs also appeared to persist in the central nervous system for at least one month after transplantation. Additionally, researchers did not find any tumors in the animals that were transplanted with HUCBCs. Tumor formation is a serious drawback to stem cell transplantation that often occurs with other varieties of cells.

Their study results showed that even after 30 days the HUCBCs were "broadly detected both in the brain and several peripheral organs, including the liver, kidneys and bone marrow." Their findings indicated that a minimally invasive procedure, such as intravenous injection, can be implemented and yield significant therapeutic effects.

"HUCBCs may confer therapeutic effects through modulation of the inflammatory response that becomes up-regulated after the onset of AD," said the researchers. "However, delivering the cells presents a challenge due to the need for an invasive procedure, such as intracerebroventricular injection, and concerns about accumulation of the cells in peripheral organs. We found that while some HUCBCs were detectable in peripheral organs, a significant amount were also found in the brain, suggesting that cells were able to cross the blood-brain barrier (BBB)."

"HUCBCs are a very prolific source of non-embryonic stem cells, making them attractive candidates for future transplantation studies for neurological diseases or injuries," said Dr. John R. Sladek, Jr., professor of Neurology, Pediatrics, and Neuroscience, Department of Neurology at the University of Colorado School of Medicine and section editor for *Cell Transplantation*. "Since the study co-authors used a mixed population of mononuclear cells isolated from whole cord-blood, their subsequent studies should focus on pinpointing which subpopulation of cells are responsible for the observed improvement in disease pathology. Regardless of the remaining questions, data reported in this study put forth the exciting notion that therapeutic effects can be attained after a single low dose of cells and has set the stage for more in-depth analyses."

Source:
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