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Mar 26 2008, 5:26 PM EST

Umbilical cord blood cell therapy may reduce signs and symptoms of Alzheimer's disease

EUREKALERT

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Tampa, FL (March 26, 2008) Targeted immune suppression using human umbilical cord blood cells may improve the pathology associated with Alzheimers disease, a new study in a mouse model of this currently untreatable neurodegenerative condition reports. The study, led by researchers at the University of South Florida, is published online in the peer-reviewed journal Stem Cells and Development (www.liebertpub.com/scd).

Following a series of low-dose infusions of human umbilical cord blood cells into mice with Alzheimers-like disease, the amount of amyloid- and -amyloid plaques -- hallmarks of Alzheimers pathology in the brain -- was reduced 62 percent. Amyloid- induces an inflammatory response in the brain associated with the interaction of CD40 and CD40L, two pro-inflammatory molecules. Researchers also reported an astonishing 86-percent improvement in cerebral amyloid angiopathy (CAA), another hallmark of Alzheimers disease. CAA compromises the integrity of the blood-brain barrier, disrupting normal trafficking of various molecules and cells from and to the brain and is believed to be the main culprit for the brain inflammation observed in Alzheimers.

Human umbilical cord blood cell therapy appeared to suppress CD40-CD40L activity, suggesting that this therapeutic approach offers the potential to target the pathogenic inflammatory response that contributes to Alzheimers disease and other degenerative conditions.

Jun Tan, PhD, MD, and colleagues from USF (Tampa), Yale University (New Haven, CT), Cedars-Sinai Medical Center (Los Angeles, CA), Saneron CCEL Therapeutics (Tampa, FL), and Saitama Medical School (Japan), concluded that human umbilical cord blood cell-induced disruption of the CD40-CD40L interaction may alleviate the key pathologic changes in the brain associated with Alzheimers disease.

It has been well documented that altered immune functioning, characterized by the presence of molecules and cells that promote inflammation, can accelerate the progression of Alzheimers disease, said senior study author Dr. Tan, Robert A. Silver Chair, Rashid Laboratory for Developmental Neurobiology at Silver Child Development Center, USF Department of Psychiatry. Our study is the first to report that the potential therapeutic mechanism of umbilical cord blood cells is more through targeting and fixing this malevolent peripheral immune functioning rather than through direct interaction with neurons. We believe restoring the balance between molecules that promote and inhibit inflammation could play a big role in future treatment strategies against Alzheimers disease.

Our previous studies have shown HUCBC can provide protection to other organs as well as the brain. Their multifunctional capabilities have excited scientists who have identified a significant presence of stem cells among umbilical cord blood cells, said co-author Paul R. Sanberg, PhD, DSc, director of the USF Center for Aging and Brain Repair. This study may open a door to a new field focusing on studying these molecular mechanisms in detail, and hopefully use them in the future not just for Alzheimers disease, but for other neurological or systemic chronic diseases.

Previously, challenging observations have reported phenomena suggesting the non-hematologic therapeutic potential of blood stem cells, said Graham C. Parker, Ph.D., editor-in-chief of Stem Cells and Development, and a research professor in at Wayne State University School of Medicine, Children's Hospital of Michigan. What is novel about this paper is its application to Alzheimers disease, and a significant advance in characterizing the ameliorative mechanism of action.

###

William Nikolic, a PhD candidate of the USF Department of Molecular Medicine, and Huayan Hou, MD, were co-first authors of the study. Other study authors were Terrence Town, PhD, Yuyan Zhu, PhD, MD, Brian Giunta, MD, Cyndy D. Sanberg, PhD, Jin Zeng, MS, Deyan Luo, PhD, MD, Jared Ehrhart, MS, and Takashi Mori, PhD.

The study was supported by the National Institutes of Health Small Business Technology Transfer program, the Florida Hi-Tech Corridor, the Johnnie B. Byrd Sr. Alzheimers Center & Research Institute, and Saneron CCEL Therapeutics, Inc.

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