Researchers find additional benefits of cord blood cells in mice modeling ALS

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Repeated, low-dose injections of mononuclear cells derived from human umbilical cord blood (MNC hUCB, tradename: U-CORD-CELL) have been found effective in protecting motor neuron cells, delaying disease progression and increasing lifespan for mice modeling amyotrophic lateral sclerosis, or ALS, also referred to as Lou Gehrig's disease, report University of South Florida researchers and colleagues from Saneron CCEL Therapeutics, Inc., and the Ribeirao Preto School of Medicine at the University of Sao Paulo, Brazil.

Their study was published online Feb. 3, 2012 in the journal PLoS ONE.

ALS is a neurodegenerative disorder characterized by loss of motor neurons leading to progressive paralysis and death. To date, there are no reliable treatments available for ALS, although cell transplantation therapies are promising. The researchers considered MNC hUBC preferable to other potential cell sources for injection because the hUBC cells are rich in primitive stem cells and can develop into various kinds of cells, including neural cells.

Although previous studies found single high doses of MNC hUBC administered to pre-symptomatic ALS-modeled mice effective, the USF researchers considered a single high dose for clinical purposes "impractical."

"Our present pre-clinical, translational study evaluated the effects of multiple low-dose, systemic injections of MNC hUBC into G93A mice

modeling ALS," said study lead author Svitlana Garbuzova-Davis, PhD, DSc, assistant professor in the USF Center of Excellence for Aging and Brain Repair. "The study included symptomatic mice, asymptomatic mice and a control group."

According to Dr. Garbuzova-Davis, a "modulatory effect" of the MNC hUCB cells was determined on the inflammatory environment of the spinal cord.

"We hypothesized that the effect of the multiple MNC hUCB cell administrations decreased neuroinflammation in the spinal cord, even when administered into symptomatic mice, resulting in neuroprotection that promoted motor neuron survival," said co-author Maria C. O. Rodrigues, MD, PhD, associated with both USF and the University of Sao Paulo.

Additionally, the researchers found that although the number of grafted cells identified in the spinal cord was low, the treatment was effective, suggesting that various factors secreted by the cells accounted for the therapeutic impact.

Functional improvement in the test mice was determined through several tests.

"Because functional improvement was detected in the mice shortly after MNC hUCB administration, a neuroprotective function of the factors secreted by the administered cells is likely, along with some degree of motor neuron repair," Dr. Garbuzova-Davis said.

The study results should provide essential information and the impetus for future clinical trials of low-dose MNC hUBC, said co-author Nicole Kuzmin-Nichols, MBA, president and COO of Saneron CCEL Therapeutics, Inc.

"Most important for translational purposes was proving the effectiveness of cell administration initiated once the symptomatic disease stage had begun," Kuzmin-Nichols said. "This study illustrated how the practical application of multiple low doses commencing at the beginning of the symptomatic disease stage could ultimately benefit disease outcomes."

The findings provide new insights and may be key to future treatment in patients with ALS, said Clifton L. Gooch, MD, FAAN, professor and chair of the USF Department of Neurology, director of the USF Neuroscience Collaborative, and founder of the USF ALS Center.

"Many therapies have shown benefit when given to ALS mice at a time before they develop symptoms of the disease," Dr. Gooch said. "Unfortunately, in humans we have no clear way to identify who is going to get ALS in advance of symptoms in the vast majority of patients. Consequently, the fact that MNC hUCB therapy works -- even when given after symptom onset - is very important and makes it more likely that this approach may also work in humans. Additionally, this study underscores the importance of the cells and factors that act to support the deteriorating motor nerves, knowledge critical to our understanding and treatment of ALS."

More information: Garbuzova-Davis S, Rodrigues MCO, Mirtyl S, Turner S, Mitha S, Sodhi J, Suthakaran S, Eve DJ, Sanberg CD, Kuzmin-Nichols N, Sanberg PR. Multiple Intravenous Administrations of Human Umbilical Cord Blood Cells Benefit in a Mouse Model of ALS, *PLoS ONE*, February 3, 2012.

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