Human umbilical cord blood cells aid lab animal brain cell survival after simulated stroke

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Human umbilical cord blood cells (HUCB) used to treat cultured rat brain cells (astrocytes) deprived of oxygen appear to protect astrocytes from cell death after stroke-like damage, reports a team of researchers from the University of South Florida (USF) Department of Neurosurgery and Brain Repair.

Their study was published in the August, 2010 issue of *Stem Cell Review and Reports*.

The USF study was carried out with astrocytes cultured in the laboratory (in vitro) and then subjected to oxygen deprivation (hypoxia) and glucose deprivation to model what happens in the human brain during a stroke.

Astrocytes, star-shaped cells in the brain and spinal cord, perform several functions, including support of cells that make up the blood-brain barrier separating circulating blood and spinal fluid.

"When we compared survival of astrocytes grown with and without human umbilical cord blood cells during a period of hypoxia and reduced nutrients, we found that the cord blood cells stabilized the brain cell environment and aided astrocyte survival," said lead author and professor Alison Willing, PhD. "However, the cord blood cells also had an impact on cytokines - small proteins secreted by cells of the immune

system - and also on glial cells that carry signals between cells."

The researchers discovered that the HUCBs changed cytokine "expression" - sometimes suppressing inflammation and other times enhancing it.

"The effects of cord blood cells on astrocytes are not clear and more research is needed to clarify the issue," said Dr. Willing. "HUCBs are composed of different types of immune cells and have the ability to secrete both pro- and anti-inflammatory cytokines. This suggests that the cells may promote recovery following stroke by regulating inflammatory responses and providing support for neural cells, such as astrocytes."

"Our data demonstrated that the different types of HUCBs alone do not enhance astrocyte survival," concluded Dr. Willing. "This result suggests that either another cell component is neuroprotective, or the interaction of all cell types within the entire HUCB population aids protection."

More information:
http://www.springerlink.com/content/e512750113k17j07/fulltext.pdf

Provided by University of South Florida