Transplanted human placenta-derived stem cells show therapeutic potential in stroke models

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Human amniotic epithelial cells, stem cells derived from human placenta left over from live births and generally discarded, proliferated and differentiated when they interacted with one kind of melatonin receptor, MT1. This potentially therapeutic response occurred when the stem cells were transplanted into laboratory test tube and animal models of stroke. The same cells did not perform similarly when interacting with melatonin receptor MT2.

Researchers from the University of South Florida's Department of Neurosurgery and Brain Repair, and co-researchers in Brescia, Italy, concluded that the placenta-derived stem cells and their interaction with MT1 promoted functional recovery in the laboratory mice with modeled stroke.

Their study is published in the current issue of the *Journal of Pineal Research*.

"Along with increasing cell proliferation and survival rate, MT1 also enhanced the differentiation of placenta-derived stem cells into neuronal cells," said the study's lead author, Yuji Kaneko, PhD, a researcher with the USF Center of Excellence for Aging and Brain Repair. "Targeting the MT1 receptor could be beneficial as MT1 appears to enhance cell proliferation."

According to Dr. Kaneko, placenta-derived stem cells are pluripotent - able to differentiate into many types of cells - and current research is geared toward investigating their ability to differentiate into neuronal cells for the purpose of brain repair. Dr. Kaneko and colleagues examined how stem cells "express" specific melatonin receptors. MT1 is one of two kinds of melatonin found in humans, the primary hormone secreted by the pineal gland. The MT1 receptor is a membrane protein located in specific regions of the brain.

Although their research focused on models of stroke, the researchers concluded that human amniotic epithelial cell-melatonin treatment could also be useful in treating oxidative stress. Additionally, and consistent with past studies, they found high levels of vascular endothelial growth factor acting in concert with melatonin. They suggest that MT1's "solicitation' of this growth factor might have contributed to how amniotic epithelial cells and MT1 worked together to produce a neuroprotective effect while the placenta-derived stem cells and MT2 did not.

"This 'cross-talk' between melatonin and stem cells is an under explored research area," Dr. Kaneko said.

Their results, said Dr. Kaneko, advance the concept of melatonin receptor technology in stem cell therapy by which stem cells can be switched on with melatonin treatment, or switched off by withholding melatonin.

"This melatonin receptor technology can facilitate the regulation of stem cell growth and differentiation as well as the stimulation of the cell's growth factor secretory capacity," he concluded.

Provided by University of South Florida