Study Pinpoints Best Stage of Stem Cell Differentiation for Use in Treating Parkinson’s Disease

Studies indicate that replacing damaged brain cells with those derived from human embryonic stem cells might lead to an effective treatment for Parkinson’s disease. A new study coming out of Singapore, recently published in STEM CELLS Translational Medicine journal addresses the optimal stage that the transplantation of differentiation of stem cells should take place in order to gain the best results.

Durham, NC (PRWEB) June 28, 2017 -- Studies indicate that replacing damaged brain cells with those derived from human embryonic stem cells might lead to an effective treatment for Parkinson’s disease. But what has not been determined is the optimal stage during differentiation of the stem cells that the transplantation should take place to gain the best results.

A new study coming out of Singapore, recently published in STEM CELLS Translational Medicine journal may provide the answer. The study is co-led by the National Neuroscience Institute, Singapore (NNI) and the Agency for Science, Technology and Research (A*STAR).

Parkinson’s disease is a progressive degeneration of the nervous system, characterized by the loss of dopaminergic (DA) neurons — the cells in the midbrain that help regulate movement and emotional responses. While medications may slow or improve Parkinson’s symptoms, there currently is no cure.

However, cell replacement therapy designed to restore the loss of the DA neurons is one of the more promising potential therapies looming on the horizon. "Yet no systematic comparison analysis has been conducted to identify which differentiation stages of the DA cells are most suitable for this," said Eng King Tan, MBBS, research director at the NNI and a co-leader of the SCTM-published study. “It is essential that we determine this before proceeding to clinical trials in human patients."

Professor Tan and his team focused on three stages of DA cells that were transplanted into mice models with Parkinson’s. They included DA progenitors, which were differentiated in vitro for just 16 days (referred to as D16); immature DA neurons, differentiated for 25 days (D25); and DA neurons, differentiated for 35 days (D35).

“Of these, we identified D25 neurons as the most suitable cell source for future Parkinson’s disease cell therapy," said co-lead investigator Steve Oh, Ph.D., director of stem cell bioprocessing at the Bioprocessing Technology Institute, A*STAR. "Cell types at earlier or later stages of differentiation were not suitable due to their immaturity and reduced ability to survive in vivo."

“In particular, the D16 progenitor cells were less capable of producing functional recovery,” he noted.

Li Zeng, Ph.D., a senior research scientist at the NNI, also helped lead the study. “Our findings show the importance of identifying the most suitable cells at an appropriate differentiation stage for achieving safe and efficacious DA neuron engraftment,” she said. “It also provides a valuable guideline for standardizing the differentiation stage of the transplantable cells used in treating Parkinson’s disease.
"The next step is to conduct studies to develop a more scalable production method tailored for this DA cell population to ensure consistency, efficacy and safety of the therapy."

“This study answers an important question about the potential use of cell replacement therapy as a treatment for Parkinson’s disease and brings researchers one step closer to being able to evaluate the therapy in patients,” said Anthony Atala, M.D., Editor-in-Chief of STEM CELLS Translational Medicine and director of the Wake Forest Institute for Regenerative Medicine.

Click to access the full article, “Immature midbrain dopaminergic neurons derived from floor-plate method improve cell transplantation therapy efficacy for Parkinson’s disease.”

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