Perspective
Volume 8:3, 2021
DOI: 10.37421/ijn.2021.08.397

International
Journal of Neurorehabilitation

ISSN: 2376-0281 Open Access

Stem Cell Therapy for Stroke

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Under the particular conditions in the body or in laboratory, these stem cells divide to form new more cells called daughter cells. These daughter cells either become new stem cells (self-renewal) or may become specialized cells (differentiation) with more specific function like heart muscle cells, blood cells, brain cells, or bone cells. No other cell in the body has the ability to generate as new cell types.

Stroke is the leading cause of long-term disability or death in the individuals world-wide. Few procedures of treatment and medical treatment have been recommended. However, the stem cell therapy may perhaps arrange an alternative intermediation for disease and in modifying therapy [1].

There are two strategies to diminish on-going degenerative process or immunological attack is presented. One of the strategies is the transplantation of stem cells to supply new neurons into the infracted brain by the activation of NSCs (Intrinsic Neural Stem Cells) or delivery of extrinsic stem cells like ESCs (Embryonic Stem Cells) and IPS (Induce Pluripotent Stem) cells derived as neural cells. The other strategy or approach is usage of stem cells by preparing immunomodulatory and neuroprotective support in transplanted graft [2,3].

NSCs (Neural Stem Cells) are one of the sub-types of adult stem cells, which are found in the brain of foetal and adult mammals with the ability of differentiation to three major CNS (central nervous system) cell types: Neurons, astrocytes and oligodendrocytes. Unlike ESCs (Embryonic Stem Cells) and foetal NSCs (Intrinsic Neural Stem Cells), adult NSCs (Intrinsic Neural Stem Cells) can be used without any ethical problem. However, there are few major obstacles in the clinical application. The source of NSCs (Intrinsic Neural Stem Cells) is one of the major problems and appropriate source of human NSCs (Intrinsic Neural Stem Cells) has to be determined. NSCs (Intrinsic Neural Stem Cells) are separated from the adult brain as neurospheres and create neurons under in vitro conditions. It is indicated as delivery of intravenously or intraparenchymal NSCs (Intrinsic Neural Stem Cells) can improve the functional recovery in rodent models.

There are two stem cells populations with distinct progenies within adult BM, HSCs (Hematopoietic Stem Cells) and MSCs (Mesenchymal Stem Cells). MSC (Mesenchymal Stem Cells) can differentiate into fat, muscle, cartilage, bone and few studies revealed differentiation capacity for transformation to neural-like cells in vitro and in vivo (in spite of the evidences that this trans-differentiation is rare) There are many advantages of clinical application of MSCs (Mesenchymal Stem Cells) includes easily obtained from BM, the potential of autologous transplantation, no need for immunosuppressive regimes, lack of ethical issues associated with embryonic and foetal derived cells and less susceptible to the malignant changes and genetic abnormalities.

The other important point in stem cell transplantation is the method of cell implantation. However, it is a challenging method to find an optimum time for transplantation. Many studies used distinct models of stroke, cell types, methods of cell delivery, and outcome measurements to evaluate the efficacy of cell. Transplantation time was optimized based on the use of cell type and their mechanism of action [4,5].

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How to cite this article: Nguyen, Paul. Stem Cell Therapy for Stroke. Int J Neurorehabilitation Eng 8 (2021) doi: 10.37421/ijn.2021.8.397

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Received 10 March 2021; **Accepted** 25 March 2021; **Published** 31 March 2021