Stem cells for Neurological Disorders

Loss of neurons and/or oligodendrocytes in the central nervous system (CNS) is a major pathogenesis of neurological diseases such as chronic stage of multiple sclerosis (MS), Alzheimer’s disease (AD), Parkinson’s disease and stroke. While restoration of these damaged neural cells remains a major clinical challenge, recent advances in stem cell transplantation have provided an attractive therapeutic option for this purpose. Indeed, transplantation of different types of stem cells has generated promising neurodegenerative effects not only in animal models, but also in certain clinical studies, through mechanisms of immunomodulation, cell repopulation, and the production of neurotrophic factors. In vitro manipulation of stem cells can not only guide stem cells to differentiate into specific type(s) of mature neural cells, but can also greatly enhance the function of these cells. Further, stem cells generated from the patients’ own tissues (e.g., iPS, bone marrow-derived mesenchymal stem cells, or neural stem cells) make autologous cell therapy a reality. In this talk, I will summarize the recent progress in stem cell-based therapies in animal models and clinical studies of the above-mentioned neurological diseases, and the potential for future clinical application.

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