Cell Therapy for Traumatic Brain Injury: Opportunities and Pitfalls

Author(s): Sara Ramezani, Zoheir Reihanian, Mohammad-Taghi Joghataei, Shahrokh Yousefzadeh

Neuroscience Department, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran; s.ramezanislp@gmail.com

Today, stem cell transplantation is a hot topic in scientific circles as a novel therapeutic approach to repair the structure and function of central nervous system. The safe and neuroprotective effects of cell therapy in models and traumatic brain injury patients were evaluated in many experimental and clinical studies in recent decade and somewhat promising results were provided to the scientific community. Nevertheless, there are still obstacles in translating experimental studies in the laboratory into clinical practice that should not be overlooked. In this review study, a brief explanation is provided about biological events and endogenic neurogenesis and angiogenesis after TBI; the performance of transplanted cells in restoration of damaged neurons; the role and potential use of mesenchymal stem cells as adult stem cells preferred in cell transplantation and clinical trials ever conducted in this area; features of cell transplant candidates who will most benefit from transplantation, the type of and proper time for cell transplantation, optimal method for conducting transplant to deliver cells to the brain, and the best dose for effectiveness of transplantation. Finally, the various neuroimaging techniques are discussed, which are used to track and evaluate the survival and implantation of transplanted cells.

Keywords: Trauma, Nervous System, Brain Injuries, Neurogenesis, Angiogenesis, Mesenchymal Stem Cells, Cell Grafting, Cell Tracking,