

STEM CELL THERAPY IN TREATING SPINAL
CORD INJURY (SCI)

DR BJINDER SINGH A/L JAGJIT SINGH

1001231099

MASTER OF SCIENCE (ANTI-AGEING REGENERATIVE
MEDICINE AND MEDICAL AESTHETICS)

FACULTY OF MEDICINE AND HEALTH
SCIENCES

UCSI UNIVERSITY

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ABSTRACT

Spinal cord injury (SCI) results in significant damage to nervous tissue and consequently loss of motor and sensory functions. There are hundreds of thousands of new SCI cases annually worldwide. SCI leads to severe disability in these patients adding to the social and financial burdens of the family and community. Current treatments are conservative and do not restore sensori-neural functions. Recent advances in stem cell transplantation into the spinal cord lesions has been shown to improve regeneration of damaged neural tissue and improve spinal cord function. Studies on the animal model have shown significant improvements in SCI after stem cells implantation. Stem cells have the ability to renew and differentiate into other cell types and restore function to damaged tissues. The objective of this study is to review the outcomes of clinical trials on the transplantation of autologous hematopoietic and mesenchymal stem cells for the treatment of spinal cord injuries. A literature search was conducted on online databases Medline, Pubmed and Science Direct. Studies from the year 2009 to 2013 were selected. The studies selected included two randomised controlled trials (RCTs) and three clinical trials. The key words used for the search were 'Spinal cord injury', 'stem cells', 'transplantation', 'umbilical' and 'mesenchymal stem cells'. Two of the studies focused on the transplantation of bone marrow derived mesenchymal stem cells (BMMSCs), two focused on Peripheral hematopoietic stem cells (PHSCs) and one on umbilical mesenchymal stem cells (UMSCs). The findings in these studies showed that infused or injected stem cells harvested from bone marrow and hemapoietic systems have the ability to spread within the spinal cord and participate in the neuro-restoration process. The patients in the studies underwent preoperative and follow-up neurological assessments to determine functional improvements. The baseline parameters and outcomes were measured by somatosensory evoked potentials (SSEPs) and motor evoked potentials (MEPs) methods and nerve stimulation tests. Neurological assessment for baseline and outcomes was based on the American Spinal Injury Association scale (AIS) and electrophysiological monitoring and magnetic resonance imaging (MRI). In all treatment groups, the studies showed significant ($p < 0.05$) clinical improvements in the neurological scale assessments in patients with chronic and complete SCI. The control groups in the case-control studies showed no improvements. Adverse effects and complications reported were minimal and transient. In conclusion it was seen that transplantation of stem cells in SCI is a feasible and safe technique and has the potential to improve neurologic functions and the quality of life in patients with SCI.