Abstract

As previously shown, transplantation of Wharton’s jelly-derived mesenchymal stem cells in the experimental model of spinal cord injury leads to the motor and sensory functions improvement, supports neuroregeneration, angiogenesis and provides immunomodulation. On the other hand, these cells have limited migration and survival capacity, and their therapeutic effect is mediated mostly by their secretome. Therefore, application of mesenchymal stem cells derived conditioned medium is studied as an alternative option for cell therapy. In this thesis, therapeutic effect of repeated intrathecal delivery of human Wharton’s jelly-derived mesenchymal stem cells and their conditioned media in the treatment of spinal cord injury was compared. After induction of a balloon ischemic compression lesion, stem cells or conditioned media were administered weekly in three doses. Behavioral analyses were carried out up to nine weeks after spinal cord injury and revealed significant improvement of both treated groups compared to the untreated saline control. Application of stem cells and conditioned media also resulted in a higher amount of spared tissue and enhanced expression of genes related to neuroregeneration, although the size of glial scar was not reduced. Compared to application of stem cells, application of conditioned media led to a decrease in the number of reactive astrocytes. Treatment with conditioned media was also more efficient in axonal sprouting improvement. These results confirmed that application of conditioned media represents a suitable alternative to direct stem cells transplantation for the treatment of spinal cord injury.

Keywords: spinal cord injury, mesenchymal stem cells, Wharton’s jelly, secretome, conditioned medium, rat model