Title: **Human adipose tissue- and umbilical cord-derived stem cells: which is a better alternative to treat spinal cord injury?**

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Abstract

Multiple types of stem cells have been proposed for the treatment of spinal cord injury, but their comparative information remains elusive. In this study, a rat model of T10 contusion spinal cord injury was established by the impactor method. Human umbilical cord-derived mesen- chymal stem cells (UCMSCs) or human adipose tissue-derived mesenchymal stem cells (ADMSCs) (2.5 μL/injection site, 1 × 105 cells/μL) was injected on rostral and caudal of the injury segment on the ninth day after injury. Rats injected with mesenchymal stem cell culture medium were used as controls. Our results show that although transplanted UCMSCs and ADMSCs failed to differentiate into neurons or glial cells in vivo, both significantly improved motor and sensory function. After spinal cord injury, UCMSCs and ADMSCs similarly promoted spinal neuron survival and axonal regeneration, decreased glial scar and lesion cavity formation, and reduced numbers of active macrophages. Bio- Plex analysis of spinal samples showed a specific increase of interleukin-10 and decrease of tumor necrosis factor α in the ADMSC group, as well as a downregulation of macrophage inflammatory protein 3α in both UCMSC and ADMSC groups at 3 days after cell transplantation. Upregulation of interleukin-10 and interleukin-13 was observed in both UCMSC and ADMSC groups at 7 days after cell transplantation. Isobaric tagging for relative and absolute quantitation proteomics analyses showed that UCMSCs and ADMSCs induced changes of multiple genes related to axonal regeneration, neurotrophy, and cell apoptosis in common and specific manners. In conclusion, UCMSC and ADMSC transplants yielded quite similar contributions to motor and sensory recovery after spinal cord injury via anti-inflammation and improved axonal growth. However, there were some differences in cytokine and gene expression induced by these two types of transplanted cells.