



Human adipose-derived stem cell transplantation in rats subjected to spinal cord injury with or without corticoid treatment

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Abstract

Trauma is a major cause of mortality and often leads to disabling sequelae. Conventional treatment after trauma is the use of corticosteroids. Stem cells have been used in several preclinical trials for spinal cord injury and are considered to be a promising alternative in the treatment of trauma. The aim of this study was to evaluate the effects of human adipose-derived stem cell (hADSC) transplantation in rats with spinal cord compression. Spinal cord injury (SCI) in rats after laminectomy was performed at T10 and the introduction of the Fogarty catheter n° 3 in the epidural space located on the cuff in T8 was inflated with 80µL of saline for 5 minutes. The animals were randomly divided into three groups: Group A received two injections of culture medium (50µL) (control group); group B received two applications of 1.2x10⁶ hADSC, seven and 14 days post-lesion; group C was treated with 30mg/kg of methylprednisolone sodium succinate (MPSS) three hours after injury and two applications of 1.2x10⁶ hADSC, seven and 14 days post-injury. The location of hADSC and survival were assessed by *in vivo* bioluminescence images of animals in groups B and C (IVIS Lumina II). The emptying of the bladder was performed daily on average every 6h for 3 months. Assessments motor started 24h after SCI, and repeated daily until 3 months post-injury using the Basso-Beattie-Bresneham scale. After this period, the animals were euthanized and then samples were taken from the spinal cord and urinary bladder for histopathological analysis. Bioluminescence analysis revealed large number of hADSC at the site of spinal cord injury, with no cumulative effect from the first to the second transplant. Regarding urinary incontinence and motility, all animals in group A remained the state of enuresis and paraplegia after spinal cord compression, while part of the animals in groups B and C partially recovered urinary continence and motor function. Groups B and C showed statistical differences in urinary continence and mobility when compared to group A. The urinary bladder samples from groups A, B and C showed normal histological appearance with statistical difference in the degree of collagen, which is higher in groups B and C. Histological analysis revealed a higher percentage of medullary tissue preserved and largest concentration of neuropils in the spinal cords of animals in groups B and C when compared to group A. The use of hADSC with or without the MPSS contributed positively to clinical improvement and preservation of nervous tissue after spinal cord compression in rats. The

manual emptying prevented histological changes in the urinary bladder. No statistically significant differences occurred between the groups B and C. The use of corticosteroids (MPSS) did not influenced on the results.

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