

Allogenic adipose derived stem cells transplantation improved sciatic nerve regeneration in rats: Autologous nerve graft model

Margarita Z., Gilazieva Z., Syromiatnikova V., Mullakhmetova A., Kadyrova G., Nigmatzyanova M., Mikhail S., Igor P., Yagudin R., Rizvanov A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2018 Masgutov, Masgutova, Mukhametova, Garanina, Arkhipova, Zakirova, Mukhamedshina, Margarita, Gilazieva, Syromiatnikova, Mullakhmetova, Kadyrova, Nigmatzyanova, Mikhail, Igor, Yagudin and Rizvanov. We examined the effect of transplantation of allogenic adipose-derived stem cells (ADSCs) with properties of mesenchymal stem cells (MSCs) on posttraumatic sciatic nerve regeneration in rats. We suggested an approach to rat sciatic nerve reconstruction using the nerve from the other leg as a graft. The comparison was that of a critical 10 mm nerve defect repaired by means of autologous nerve grafting versus an identical lesion on the contralateral side. In this experimental model, the same animal acts simultaneously as a test model, and control. Regeneration of the left nerve was enhanced by the use of ADSCs, whereas the right nerve healed under natural conditions. Thus the effects of individual differences were excluded and a result closer to clinical practice obtained. We observed significant destructive changes in the sciatic nerve tissue after surgery which resulted in the formation of combined contractures in knee and ankle joints of both limbs and neurotrophic ulcers only on the right limb. The stimulation of regeneration by ADSCs increased the survival of spinal L5 ganglia neurons by 26.4%, improved sciatic nerve vascularization by 35.68% and increased the number of myelin fibers in the distal nerve by 41.87%. Moreover, we have demonstrated that S100, PMP2, and PMP22 gene expression levels are suppressed in response to trauma as compared to intact animals. We have shown that ADSC-based therapy contributes to significant improvement in the regeneration.

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Keywords

Autologous nerve graft, DRG, IVIS Spectrum, Myelin fibers, PCR, PNI

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