

Mesenchymal stem cells from basic to applied sciences: their effect on treatment of stenosis in a rat model of vascular injury

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Restenosis following vascular injury remains a pressing clinical problem, despite continuous improvements of medical strategies. The possible therapeutic role of mesenchymal stem cells (MSCs) in a model of vascular injury *in vivo* has not been determined so far. We tested the homing and the effectiveness of MSCs in reduction of (re)stenosis in a model of arteriotomy of rat common carotid.

Results: MSCs expanded *in vitro* were able to differentiate into mesenchymal lineage cells, were mainly in the G₁/S phase of cell cycle and showed limited senescence. Histological analysis of rat carotids 3 and 7 days after arteriotomy revealed the specific homing of Dil-labeled MSCs in the adventitia and in the media of injured carotids but not in contralateral uninjured carotids.

Morphometric analysis of rat carotids 30 days after arteriotomy revealed that stenosis was mainly due to adventitial constrictive remodelling. Analysis of differential expression of inflammation-related genes 3 and 7 days after arteriotomy revealed that the treatment with MSCs has a local immunomodulatory effect, thus revealing at least one of the mechanisms of positive action of MSCs on surgically-induced vascular stenosis.

Conclusion: The effectiveness of MSCs in limitation of arteriotomy-induced stenosis further supports the great therapeutic potentiality of MSCs in a large number of chronic degenerative and acute diseases.