Adipose-derived stromal cell

Recent literature has highlighted the therapeutic implication of exosomes (Exos) released by adipose tissue-originated stromal cells (ADSCs) in regenerative medicine.

Wang et al. sought to examine the potential protective effects of ADSC-Exos on neuronal injury following subarachnoid hemorrhage (SAH) by delivering miR-140-5p. Firstly, isolated primary neurons were co-cultured together with well-identified ADSC-Exos. TAR DNA-binding protein 43 (TDP-43)-treated neurons were subsequently treated with PKH67-ADSC-Exos and Cy3-miR-140-5p to assess whether ADSC-Exos could transmit miR-140-5p to the recipient neurons to affect their behaviors. Moreover, a luciferase assay was carried out to identify the presumable binding of miR-140-5p to IGFBP5. IGFBP5 rescue experimentation was also performed to testify whether IGFBP5 conferred the impact of miR-140-5p on neuronal damage. The role of PI3K/AKT signaling pathway was further analyzed with the application of its inhibitor miltefosine. Lastly, SAH rat models were developed for in vivo validation. It was found that ADSC-Exos conferred protection against TDP-43-caused neuronal injury by augmenting viability and suppressing cell apoptosis. In addition, miR-140-5p was transmitted from ADSC-Exos to neurons and post-transcriptionally downregulated the expression of IGFBP5. As a result, by means of suppressing IGFBP5 and activating the PI3K/AKT signaling pathway, miR-140-5p from ADSC-Exos induced a neuroprotective effect. Furthermore, in vivo findings substantiated the aforementioned protective role of ADSC-Exos-miR-140-5p, contributing to protection against SAH-caused neurological dysfunction. Collectively, our findings indicated that ADSC-Exos-miR-140-5p could inhibit TDP-43-induced neuronal injury and attenuate neurological dysfunction of SAH rats by inhibiting IGFBP5 and activating the PI3K/Akt signaling pathway [1].

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Wang P, Xue Y, Zuo Y, Xue Y, Zhang JH, Duan J, Liu F, Liu A. Exosome-Encapsulated microRNA-140-5p Alleviates Neuronal Injury Following Subarachnoid Hemorrhage by Regulating IGFBP5-Mediated PI3K/AKT Signaling Pathway. Mol Neurobiol. 2022 Sep 21. doi: 10.1007/s12035-022-03007-x. Epub ahead of print. PMID: 36129637.