

International Conference on
Molecular Biology, Tissue Science and Regenerative Medicine
&
4th World Heart Congress

November 19-20, 2018 | Paris, France

Beneficial effects of adipose-derived-mesenchymal stem cells (ad-mscs) versus anti-parkinson drug in a rat model of parkinson's disease: Relationship to the molecular genetic expressions, ultrastructural and physiological responses

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Backgrounds: Parkinson's disease is the most common chronic progressive neurodegenerative disorder after Alzheimer's disease. The effectiveness of anti-Parkinson treatments gradually diminished by the progressive degeneration of the dopaminergic terminals. The current research investigated the effect of adipose-derived mesenchymal stem cells (AD-MSCs) versus anti-Parkinson drug in a Parkinsonism rat model.

Methods: Forty adult rats divided into 4 equal groups; Group I; Control group received the vehicle. Group II; Parkinson's disease group, received rotenone 2mg/kg daily intraperitoneally for one month. Group III received rotenone at the same previous dose then received isolated AD-MSCs on day 14. Group IV received rotenone at the same previous dose then received carbidopa/levodopa on day 14. Behavioral tests were carried out and midbrain specimens were processed for light and electron microscopy. Genetic expression of glial fibrillary acidic protein (GFAP) and nestin mRNA were assessed by real

time-PCR. Lamin-B1 and vimentin genes were detected by gel electrophoresis and plasma levels of angiotensin-2 and dopamine were measured by ELISA.

Results: Rotenone induced pronounced motor deficits, neuronal and glial alterations AD-MSCs group showed improvements in the motor function and microscopic picture. Fold change of both genes (GFAP and Nestin) were decreased significantly in AD-MSC and carbidopa/levodopa group compared to parkinson's disease. Lamin-B1 and vimentin genes were highly expressed in parkinson's disease. Plasma levels of angiotensin-2 and dopamine were significantly increased after treatment ($P < 0.001$) compared to parkinson's disease.

Conclusions: Adipose-derived-mesenchymal stem cells reduced neuronal degeneration more efficiently than the anti-parkinson drug did in a parkinsonism rat model.

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