Testing alternatives: the use of adipose-derived mesenchymal stem cells to slow neurodegeneration in a rat model of Parkinson’s disease

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Abstract:

Abstract Parkinson’s disease (PD) is a chronic neurodegenerative disease. Unfortunately, the effectiveness of anti-Parkinson treatments gradually diminishes owing to the progressive degeneration of the dopaminergic terminals. The research described here investigated the effect of adipose-derived mesenchymal stem cells (AD-MSC) versus that of an anti-Parkinson drug in a rat model of Parkinsonism. Forty adult rats were divided into four equal groups, each group receiving a different treatment: vehicle, rotenone, rotenone + AD-MSC, or rotenone + carbidopa/levodopa. Behavioral tests were carried out before and at the end of the treatment and specimens harvested from the midbrain were processed for light and electron microscopy. Genetic expression of glial fibrillary acidic protein (GFAP) and Nestin mRNA was assessed. Expression of the Lamin-B1 and Vimentin genes was measured, along with plasma levels of Angiopoietin-2 and dopamine. Treatment with rotenone induced pronounced motor deficits, as well as neuronal and glial alterations. The AD-MSC group showed improvements in motor function in the live animals and in the microscopic picture presented by their tissues. The fold change of both genes (GFAP and Nestin) decreased significantly in the AD-MSC and carbidopa/levodopa groups compared to the group with Parkinson’s disease. Plasma levels of Angiopoietin-2 and dopamine were significantly increased after treatment (P

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