Original Paper

Comparison of the intranasal and intraperitoneal injection of MPTP on density of dark neurons in pars compacta of substantia nigra in animal model of Parkinson's disease

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Abstract

Background and Objective: Parkinson disease (PD) is the second most common neurologic disorder that results following degeneration of dopaminergic neurons in the pars compacta of substantia nigra (SNc). The 1-methyl-1,2,3,6-tetrahydropiridine (MPTP) is a chemical neurotoxin that widely used in animal models of PD. This study was carried out to evaluate the numerical density of dark neurons (DNs) in the SNc in mice subjected to intraperitoneal and intranasal injection of different doses of MPTP.

Methods: In this experimental study, 90 male adult BALB/c mice were randomly allocated into four experimental groups including: group 1 (MPTP was injected via i.p. at the dose of 20mg/kg per 2 hours for 4 times), group 2 (MPTP was injected via i.p. at the dose of 30mg/kg for 5 consecutive days), group 3 (MPTP was injected via i.n. at a single dose of 1mg/kg), group 4 (MPTP was injected via i.n. at a single dose of 1mg/kg), four sham and one normal groups. 20 days after the final injection, the animal's brain were removed and stained by toluidine blue. Numerical density of DNs was counted.

Results: Intranasal injection of MPTP significantly increased density of dark neurons in the pars compacta of substantia nigra in compare to intraperitoneal injection of MPTP (P<0.05).

Conclusion: Intranasal injection of MPTP is more effective manner to induce degeneration of neurons in substantia nigra in animal model of Parkinson's disease.

Keywords: Parkinson disease, MPTP, Dark neuron, Substantia Nigra, Intraperitoneal injection, Intranasal injection

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