SUBCUTANEOUS INJECTION OF CYTOKINE MIXTURE IL-3 AND GM-CSF PREVENT 6-OHDA-INDUCED DEGENERATION OF DOPAMINERGIC NEURONS IN THE SUBSTANTIA NIGRA

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Introduction: Although various dopamine agonists are served for the treatment of Parkinson disease, the medicines cannot prevent the progressive degeneration of dopamine-producing neurons in the substantia nigra. In our previous study, subcutaneous injection of the cytokine mixture elicited strong ameliorative effects on severe rat brain injuries. In this study, subcutaneous injection of mixture of IL-3 and GM-CSF was tried to 6-OHDA-treated rats to prevent dopaminergic neuron loss.

Materials and methods: 6-OHDA was administered into the striatum in both sides, leading to degeneration of neurons expressing tyrosine-hydroxylase (TH) and poor motor activity that was evaluated by rota-rod test. Contents of dopamine and its metabolites in the striatum were determined by HPLC. To evaluate viability of dopamine-neurons, the immunohistochemical staining and immunoblotting using antibodies to tyrosine-hydroxylase (TH) and real-time PCR for TH mRNA were performed. The cytokine mixture was subcutaneously injected once per day from the one day post 6-OHDA administration (dpa) until 7 days of post-treatment.

Results: 6-OHDA administrations caused degeneration of TH-neurons accompanying poor motor activity. When the cytokine mixture was injected, degeneration of TH-neurons was almost completely suppressed. Although the motor activity and dopamine content at 7 dpa were in the similar level to 6-OHDA-treated saline-injected group, they gradually ameliorated to the normal level later.

Conclusion: The cytokine injection markedly prevented degeneration of dopaminergic neurons and therefore it may be used for treatment of Parkinson disease.