Potential neuroprotective effect of ibuprofen, insights from the mice model of Parkinson’s disease

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Abstract:
Background: Parkinson’s disease (PD) is one of the most common neurodegenerative diseases. An inflammatory reaction seems to be involved in the pathological process in PD. Prospective clinical studies with various nonsteroidal anti-inflammatory drugs (NSAIDs) have shown that ibuprofen decreases the risk of PD. In the present study we investigated the influence of ibuprofen on dopaminergic neuron injury in the mice model of PD.

Methods: Twelve-month-old male C57Bl mice were injected with MPTP together with various doses of ibuprofen (10, 30 or 50 mg/kg), administered 1 h before MPTP injection for 7 consecutive days. Evaluation concerned dopamine content in the striatum, tyrosine hydroxylase (TH) protein and α-synuclein expression measured 7 and 21 days post MPTP administration (dpa).

Results: MPTP caused injury to dopaminergic neuron endings in the striatum: dopamine content decreased by about 90% 7 dpa and by 85% 21 dpa; TH protein expression diminished by 21% 7 dpa; α-synuclein level decreased by 10 and 26% 7 and 21 dpa, respectively. Ibuprofen administration to mice treated with MPTP significantly increased the level of dopamine in the striatum 7 and 21 dpa. It also prevented TH protein decrease and increased α-synuclein level 21 dpa.

Conclusions: Ibuprofen was shown to protect neurons against MPTP-induced injury in the striatum. The possible mechanism of the neuroprotective effect of ibuprofen might be associated with decreased dopamine turnover and cyclooxygenases inhibition resulting in lower reactive oxygen species formation.

Key words: MPTP, neuroinflammation, neurodegeneration, ibuprofen, α-synuclein, Parkinson’s disease