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The effect of diol on behavior in a MPTP-induced model of Parkinson's disease in mice

Gild E.-Y.V.[1, 2]*, Tenditnik M.V.[1], Dubrovina N.I.[1], Volcho K.P.[3], Salakhutdinov N.F.[3], Amstislavskaya T.G.[1], Tikhonova M.A.[1]

[1] *Scientific Research Institute of Neurosciences and Medicine, Novosibirsk, Russia*

[2] *Novosibirsk State University, Novosibirsk, Russia*

[3] *N.N. Vorozhtsov Novosibirsk Institute of Organic Chemistry, SB RAS, Novosibirsk, Russia*

* *emmagild@gmail.com*

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Motivation and Aim: According to recently published data, with the progression of the disease almost all patients with Parkinson's disease (PD) develop cognitive deficits. Moreover, cognitive impairment can occur earlier than motor symptoms of PD and includes impaired attention and working memory. Thus, experimental therapy for cognitive deficits in PD is area of high priority in current research. Recently synthesized monoterpenoid (1R,2R,6S)-3-methyl-6-(prop-1-en-2-yl)cyclohex-3-ene-1,2-diol 1 (Diol) alleviates motor manifestations of PD in animal models. This study was aimed at evaluating cognitive function using behavioral tests in mice with MPTP-induced PD-like disturbances treated with Diol.

Methods and Algorithms: C57BL6 mice were injected with a single dose of MPTP (30 mg/kg) or saline intraperitoneally; Diol was given orally one time (20 mg/kg) on the next day of the experiment; L-DOPA was given orally one time (100 mg/kg) on the same day as a control to Diol. Behavioral testing started 5 days after. Open field test and Rotarod were performed to assess general locomotor and exploratory activity. To evaluate cognitive function, the mice were tested using the passive avoidance learning paradigm; additional tests were made for 12 days to assess memory extinction and reconsolidation.

Results: In MPTP-treated mice, an increase in motor activity was observed, as well as a weakening of learning and accelerated extinction of the conditioned response of passive avoidance. Mice treated with Diol did not differ in locomotor activity from MPTP-treated mice, nor did they demonstrate signs of motor disturbances. Compared to mice treated with MPTP, those treated with MPTP and Diol showed a recovery in learning and enhanced memory reconsolidation. L-DOPA had similar to Diol positive effect on learning while the dynamics of memory extinction was similar to that in control group in mice treated with MPTP and L-DOPA. Thus, the beneficial effect of Diol on MPTP-induced cognitive deficits in mice has been demonstrated.

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