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Does enriched environment have a neuroprotective effect on Parkinson's disease?

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Introduction: Environmental enrichment is a popular strategy of neuroprotection. The protective effects of enriched environment have already been shown in traumatic, ischemic and toxic nervous system lesions. The aim of our study was to investigate the effects of early postnatal environmental enrichment in a rat model of Parkinson's disease in adulthood.

Methods: We used adult Wistar rats in our experiment. The animals of the standard group were placed under regular conditions. For environmental enrichment, we placed rats in larger cages, supplemented with toys of different shape and material during the first five postnatal weeks. Three months later the rats were treated with unilateral injections of 2 µl 6-OHDA (5 µg/ 1 µl) into the left substantia nigra, control animals received 2 µl physiological saline. Behavioral experiments were done before the injury, and 1, 10 days after the operation. After the behavioral testing tyrosine-hydroxylase immunohistochemistry was performed to label dopaminergic cells of the substantia nigra.

Results We observed, that animals kept under regular conditions showed more severe acute neurological symptoms 1 day after the injury compared to enriched animals. The 6-OHDA treatment made significant cell loss in the standard group: 40% of dopaminergic cells died, while in rats which were kept in enriched environment the cell loss was significantly lower, only 23%.

Conclusion: Our experiments provided evidence for the protective effect of early postnatal environmental enrichment in adulthood, because rats under regular circumstances showed more severe acute neurological signs and dopaminergic cell loss after 6-OHDA lesion of the substantia nigra compared to animals grew up in environmental enrichment.

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