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MANGANESE-INDUCED PARKINSONISM: IS SUBSTANTIA NIGRA INNOCENT OR GUILTY?

Jong Min Kim, Chang Won Park, Jeong Ja O, Bo Kyung Lee, Kyung Won Seo, Soo Kyung Seo, Kwang Jin Kim, Kyu Bong Kim, Jong Won Kim, Beom Suk Jeon, and Sun Hee Lee

Pharmacology Dept., National Institute of Toxicological Research, Korea Food & Drug Administration, 5 Nokbundong, Eunpyunggu, Seoul, Korea

Manganese (Mn) intoxication causes a parkinsonian syndrome. It may be difficult to distinguish Mn-induced parkinsonism from idiopathic Parkinson disease (IPD). Neuropathological descriptions on the brains with Mn intoxication showed the preferential damage in the globus pallidus and substantia nigra pars reticularis. Pathological reports on the substantia nigra pars compacta (SNpc), a major focus of pathologic changes in IPD, are discordant and controversial. The SNpc involvement is of critical importance for the elucidation of pathogenesis of IPD. Therefore, the neurodegeneration in SNpc was investigated in the experimental model of Mn neurotoxicity. Sprague-Dawley rats were administered with manganese chloride (1, 2, 5, 10 mg/kg/day, i.p.) for 30 days. Treated animals showed low levels of distance-traveled from locomotor activity tests. Ion chromatography revealed that Mn accumulation was significant in SN and basal ganglia from Mn-treated animals. The degree of neurodegeneration was determined by immunohistochemical staining of tyrosine hydroxylase (TH). The numbers of TH-positive cells on nigral sections were not different from each groups ($P > 0.05$). The densities of glial fibrillary acidic protein immunoreactivity from SN were similar between groups. In conclusion, the SNpc remains intact in Mn intoxication, and parkinsonism may be caused by damages of output pathways downstream to the nigrostriatal dopaminergic system.