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Metallothionein III Attenuates 6-Hydroxydopamine Induced Neuronal Cell Death.

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Neurotoxicity induced by 6-hydroxydopamine (6-OHDA) is believed to be due, in part, to the production if reactive oxygen species(ROS) and/or an inhibiton of mitochondrial function. Metallothioneins (MTs) are low molecular weight, metal-binding proteins with established antioxidant capabilities. MT-III, a number of MT family, is expressed in brain in contrast to MT-I and MT-II, those are found in most tissue. In the brain, MT-III exhibits a free radical scavenging activity. Enhanced oxidative stress is implicated in the pathogenesis of neurodegenerative diseases such as Parkinson's disease. The catecholaminergic neurotoxin 6-OHDA induces the production of ROS, leading to neuronal cell death. In the present study, we investigated the effects of MT-III on 6-OHDA-induced apoptotic cell death using the human dopaminergic neuroblastoma cell line, SH-SY5Y. The co-treatments of cells with MT-III significantly attenuated 6-OHDA-induced ROS generation and subsequent apoptotic cell death. We also demonstrated that pretreatment alone with MT-III for 24 h prior to the exposure confers resistance against 6-OHDA-induced cell toxicity. These finding suggested that the MT-III acts principally as a radical scavenger to suppress the level of ROS, whereas the other mechanisms might be involved in the protective effects.

Keyword: Metallothioneins, 6-hydroxydopamine, reactive oxygen species, apoptosis