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Protective effects of Mito-TEMPO against rotenone-induced neurotoxicity in SH-SY5Y neuroblastoma cells

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The effects of mitochondria-targeted treatments have great promise in prevention of Parkinson Disease (PD). This study aimed to explore the possible protective effects of Mito-TEMPO, a mitochondria-targeted chemical against neurotoxic damage induced by rotenone in SH-SY5Y cells. SH-SY5Y cells were exposed to varying concentrations of rotenone (10 nM, 50 nM, 125 nM, 250 nM, 500 nM, 1000 nM) for 24 and 48 h. Mito-TEMPO (10, 100, and 1000 μm) was administered to the cultures at concentrations of 10, 100, and 1000 μM 2 h prior to rotenone exposure. Cell viability across groups was measured using the MTT assay. Apoptosis was analyzed through Hoechst 33258 staining and Western blot techniques, and reactive oxygen species (ROS) levels were quantified via the DCFH-DA method. Mitochondrial activation was examined with MitoTracker Green staining.All concentrations of Mito-TEMPO significantly protected cells against rotenone toxicity. There were significant apoptotic marks such as nuclear fragmentation and bax/bcl-2 & cleaved caspase-3 increase in rotenone group. Mito-TEMPO exhibited protective effects by reducing apoptotic alterations and decreasing ROS levels significantly. The alterations of mitochondria density and localization in rotenone-treated cells were prominent while there was no difference observed in Mito-TEMPO group. Overall, Mito-TEMPO exhibited protective effects against rotenone-induced toxicity.

Keywords: Mitochondria-targeted treatment, Apoptosis, Parkinson's disease, ROS, MitoTracker