Diphenyl diselenide increases methylmercury-induced neurotoxicity in rats

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Methylmercury (MeHg) is an important environmental contaminant that leads to long-lasting neurological and developmental deficits in animals and humans. Three major mechanisms have been identified as critical in methylmercury-induced neurotoxicity including alteration of glutamate homeostasis, mitochondrial dysfunction and overproduction of ROS. Diphenyl diselenide (DPDS) is an organic form of selenium that has been extensively studied for its potential antioxidant, pharmacological and neuroprotective activities. In this study we attempted to investigate the efficacy of DPDS in attenuating MeHg toxicity in rats. Adult Wistar rats were treated with MeHg (5 mg/ kg/day, intragastrically) and/ or DPDS (1 mg/ kg/day), intraperitoneally during 21 days. Body weight gain, locomotor activity (open-field test) and motor coordination skills (rotarod test) were evaluated during the treatment. In addition, mercury (Hg) levels, and thioredoxin reductase (TrxR) activity were evaluated in brain of rats treated with MeHg and/ or DPDS. MeHg caused a decrease in body weight and induced motor deficits in rats verified by the open-field and rotarod tests. MeHg also induced the inhibition of TrxR activity in brain of rats. The co-treatment with DPDS did not recover cerebral TrxR activity inhibited by MeHg. Additionally, the co-treatment with MeHg and DPDS increased Hg accumulation in brain, and increased motor deficits and body weight lost induced by MeHg. In conclusion, the results of the current study indicate that DPDS, at a low dose, can increase Hg deposition in brain and exacerbate the neurotoxic effects induced by MeHg exposure in rats.

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