

Effects of Ergothioneine on neuronal injury induced by cisplatin in vitro and in vivo and its possible mechanism(s)

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ABSTRACT

This study evaluated the protective effects of ergothioneine (EGT) on neuronal injury induced by treatment of cisplatin, a chemotherapeutic drug that can cause neuropathy in patients within prolonged treatment. We also studied the mechanisms of cisplatin-induced cell damage and EGT protection in vitro. Two types of cells were used in this study including primary cortical neuron (PCN) cells and rat pheochromocytoma (PC12) cells. The protective effects of EGT treatments in mice were evaluated by active shuttle and passive avoidance tests. For animal studies, CBA mice were orally administered with EGT for 57 consecutive days, and on the 7th day after EGT feeding, the mice were treated i.p. with cisplatin for 3 times with two days interval. We found that EGT treatment significantly improved the learning and memory deficits caused by cisplatin, because mice with EGT treatment show decreases in active avoidance times and increases in the successful numbers of passive and active avoidance tests when compared with mice treated with cisplatin only. EGT treatment also significantly decreased the levels of brain lipid peroxidation, restored brain acetylcholinesterase activities and maintained brain ratio of glutathione to glutathione disulfide. From the results of in vitro cell assays, EGT treatment can restore the decrease of cell proliferations caused by cisplatin and protect PCN cells from damages in their axons and dendrites induced by cisplatin. Furthermore, EGT can decrease the numbers of apoptotic cells and decrease activities of caspase-3 and -9 in cisplatin-treated PC12 cells. These results suggested that EGT can protect neuronal cells from cisplatin's damages and ameliorate of memory and learning abilities in cisplatin-treated mice. Therefore, EGT has the potential to protect cancer patients from damages of a chemotherapeutic drug, cisplatin, treatment.

Keywords : Ergothioneine、Cisplatin、active and passive avoidance tests、neurons、apoptosis

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