

Abstract

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Radiation-induced cognitive dysfunction and cerebellar oxidative stress in mice: protective effect of alpha-lipoic acid.

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OBJECTIVE: Reactive oxygen species are implicated in neurodegeneration and cognitive disorders due to higher vulnerability of neuronal tissues. The cerebellum is recently reported to be involved in cognitive function. Therefore, present study aimed at investigating the role alpha-lipoic acid against radiation-induced oxidative stress and antioxidant status in cerebellum and its correlation with cognitive dysfunction.

RESULTS: We observed spontaneous motor activities and spatial memory task of mice using pyroelectric infrared sensor and programmed video tracking system, respectively. Whole body X-irradiation (6 Gy) of mice substantially impaired the reference memory and motor activities of mice. However, acute intraperitoneal treatment of mice with alpha-lipoic acid prior to irradiation significantly attenuated such cognitive dysfunction. Alpha-lipoic acid pretreatment exerted a very high magnitude of protection against radiation-induced augmentation of protein carbonyls and thiobarbituric acid reactive substance (TBARS) in mice cerebellum. Further, radiation-induced deficit of total, nonprotein and protein-bound sulfhydryl (T-SH, NP-SH, PB-SH) contents of cerebellum and plasma ferric reducing power (FRAP) was also inhibited by alpha-lipoic acid pretreatment. Moreover, alpha-lipoic acid treated mice showed an intact cytoarchitecture of cerebellum, higher counts of intact Purkinje cells and granular cells in comparison to untreated irradiated mice.

CONCLUSION: Results clearly indicate that alpha-lipoic acid is potent neuroprotective antioxidant.

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