Effects of Chronic Administration of Melatonin on Spatial Learning Ability and Long-term Potentiation in Lead-exposed and Control Rats

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Objective To explore the changes in spatial learning performance and long-term potentiation (LTP) which is recognized as a component of the cellular basis of learning and memory in normal and lead-exposed rats after administration of melatonin (MT) for two months. Methods Experiment was performed in adult male Wistar rats (12 controls, 12 exposed to melatonin treatment, 10 exposed to lead and 10 exposed to lead and melatonin treatment). The lead-exposed rats received 0.2% lead acetate solution from their birth day while the control rats drank tap water. Melatonin (3 mg/kg) or vehicle was administered to the control and lead-exposed rats from the time of their weaning by gastric gavage each day for 60 days, depending on their groups. At the age of 81-90 days, all the animals were subjected to Morris water maze test and then used for extracellular recording of LTP in the dentate gyrus (DG) area of the hippocampus in vivo. Results Low dose of melatonin given from weaning for two months impaired LTP in the DG area of hippocampus and induced learning and memory deficit in the control rats. When melatonin was administered over a prolonged period to the lead-exposed rats, it exacerbated LTP impairment, learning and memory deficit induced by lead. Conclusion Melatonin is not suitable for normal and lead-exposed children.

Key words: Melatonin; Lead; Learning; Memory; Long-term potentiation (LTP)

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