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Activation of MIP-2 and MCP-5 Expression in Methylmercury-Exposed Mice and Their Suppression by N-Acetyl-L-Cysteine

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Abstract

Methylmercury (MeHg) is a well-known neurotoxin of the central nervous system (CNS). Neuroinflammation is one of the main pathways of MeHg-induced CNS impairment. This study aims to investigate the expressions of IL-6, MIP-2, and MCP-5, as biomarkers in relation with MeHg-induced CNS impairment and N-acetyl-L-cysteine (NAC) treatment in mice, as well as histopathological changes of brain tissue and clinical symptom such as ataxia. Twenty male Balb/c mice, aged 8-9 weeks, were divided into 4 groups and treated with saline (control), NAC [150 mg/kg body weight (BW) day], MeHg (4 mg Hg/kg BW), or a combination of MeHg and NAC for 17 days. MeHg induced the expression of IL-6, MIP-2, and MCP-5 in the serum, with median values (those in controls) of 55.06 (9.44), 15.94 (9.30), and 458.91 (239.91) mg/dl, respectively, and a statistical significance was observed only in IL-6 expression ($p < 0.05$). MIP-2 and MCP-5 expressions tended to increase in the cerebrum of MeHg-treated group compared with controls; however, the difference was not statistically significant. MeHg treatment also increased IL-6 expression in the cerebellum (7.73 and 4.81 mg/dl in MeHg-treated group and controls, respectively), with a marginal significance. NAC significantly suppressed MeHg-induced IL-6 and MIP-2 expressions in the serum ($p < 0.05$ for both), and slightly reduced MCP-5 expression in the

cerebrum. Ataxia was observed in all MeHg-treated mice after 9-day exposure as well as the decrease of intact Purkinje cells in brain tissue ($p < 0.05$). These findings suggest that MeHg induced neurotoxicity by elevating the expression of IL-6, MIP-2, and MCP-5 and causing ataxia symptoms, and NAC reduced MeHg-mediated effects on the CNS.

Keywords: Ataxia; IL-6; MCP-5; MIP-2; Methylmercury; N-acetyl-L-cysteine