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Differential immunotoxic effects of inorganic and organic mercury species *in vitro*

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Abstract

Despite the fact that humans are exposed to multiple forms of mercury (elemental, inorganic, and organic), most research on mercury toxicity has focused on methylmercury (MeHg) and on neurotoxic outcomes and mechanisms. Recent work has indicated that the immunotoxic effects of mercury compounds may be significant contributors to human disease as well as mechanistically relevant to other target organ toxicities. In this study, we compared the effects of inorganic Hg (iHg) to organic Hg species (MeHg and ethylmercury, EtHg) in human peripheral blood mononuclear cells (PBMCs) *in vitro* at sub-cytotoxic concentrations, using methods developed to characterize response of human PBMCs to iHg *in vitro*. PBMCs were isolated from six volunteer blood donors (3 males, 3 females) and cultured in the presence and absence of lipopolysaccharide (LPS) and low levels (up to 200 nM of each Hg species, separately) for 24 hours in culture. Cell culture supernatants were analyzed for cytokine concentrations with a bead-based multiplex assay.

We report that iHg and MeHg both increase pro-inflammatory cytokine release in LPS-stimulated PBMCs, while EtHg decreases IFN- γ release as well pro-inflammatory cytokine release. IL-17 release is significantly increased only in response to iHg treatment. Levels of anti-inflammatory cytokines (IL-1Ra and IL-10) were not significantly altered by any Hg treatment. These results indicate that both organic and inorganic species of Hg can affect the human immune system, but that they may exert different effects on immune function.

Keywords

mercury; immunotoxicity; humans; *in vitro*; cytokines

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Conflict of interest

The authors declare that there are not conflicts of interest.