



## Review

## Mercury as an environmental stimulus in the development of autoimmunity – A systematic review



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## ABSTRACT

Autoimmune diseases result from an interplay of genetic predisposition and factors which stimulate the onset of disease. Mercury (Hg), a well-established toxicant, is an environmental factor reported to be linked with autoimmunity. Hg exists in several chemical forms and is encountered by humans in dental amalgams, certain vaccines, occupational exposure, atmospheric pollution and seafood. Several studies have investigated the effect of the various forms of Hg, including elemental (Hg<sup>0</sup>), inorganic (iHg) and organic mercury (oHg) and their association with autoimmunity. *In vitro* studies using peripheral blood mononuclear cells (PBMC) from healthy participants have shown that methylmercury (MeHg) causes cell death at lower concentrations than iHg albeit exposure to iHg results in a more enhanced pro-inflammatory profile in comparison to MeHg. *In vivo* research utilising murine models susceptible to the development of metal-induced autoimmunity report that exposure to iHg results in a lupus-like syndrome, whilst mice exposed to MeHg develop autoimmunity without the formation of immune complexes. Furthermore, lower concentrations of IgE are detected in MeHg-treated animals in comparison with those treated with iHg. It appears that, oHg has a negative impact on animal models with existing autoimmunity. The research conducted on humans in this area is diverse in study design and the results are conflicting. There is currently no evidence to implicate a role for Hg<sup>0</sup> exposure from dental amalgams in the development or perpetuation of autoimmune disease, apart from some suggestion of individual sensitivity. Several studies have consistently shown a positive correlation between iHg exposure and serum autoantibody concentrations in gold miners, although the clinical impact of iHg remains unknown. Furthermore, a limited number of studies have reported individuals with autoimmune disease have higher concentrations of blood Hg compared to healthy controls. In summary, it appears that iHg perpetuates markers of autoimmunity to a greater extent than oHg, albeit the impact on clinical outcomes in humans is yet to be elucidated.

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