

The Influence of Genetic Polymorphism on Low Levels of Mercury Metabolism in a MDA Cohort

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Abstract

Mercury is a potent neurotoxic substance of concern to both the general public and occupationally exposed workers. While the adverse health effects of mercury are well characterized at high doses, little is known about mercury's effects following chronic exposures to environmentally relevant levels. As such, the true health risks and socioeconomic costs of mercury pollution are unclear. Recent studies suggest that several genes mediating the metabolism and neurotoxicity of mercury are polymorphic in humans. We hypothesize that single nucleotide polymorphisms (SNPs) in these genes underlie inter-individual differences in mercury susceptibility. In a recent study involving 3,989 paired observations from 2,974 American Dental Association (ADA) members, we found that changes in peripheral nerve latency are related to low urine mercury concentrations. We propose to carry out with the Michigan Dental Association (MDA) a gene-environment study to determine how genetic SNPs relate to inter-individual variations in mercury exposure and peripheral responses. To our knowledge, this proposed scientific study will be the most comprehensive epidemiological trial to relate mercury exposure and neurological health with genetic polymorphisms. The outcome of this work is expected to significantly enhance our ability to assess the human health risks of mercury to both the general public and to occupationally exposed workers.