

MERCURY LEVELS IN URINE AND HAIR, PERIPHERAL NERVE FUNCTION AND SINGLE NUCLEOTIDE POLYMORPHISMS RELATED TO MERCURY METABOLISM

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Background and Aims: Mercury (Hg) is a potent neurotoxicant. We investigated the impact of Hg exposure on peripheral nerve function. We also hypothesized that single nucleotide polymorphisms (SNPs) in genes coding glutathione-related proteins, selenoproteins and metallothioneins may modify the relationship of Hg exposure with changes in peripheral nerve function.

Methods: Dental professionals (n=515) were recruited in 2009 and 2010. Samples and measurements included: sensory nerve conduction measurements (onset latency, peak latency and amplitude) of the median, ulnar and sural nerves; buccal swabs for DNA; hair; and urine.

Results: The subjects included 244 dentists (47.4%), 269 non-dentists (52.2%; mostly dental hygienists and dental assistants), and 2 of unknown occupation (0.4%). All participants completed a questionnaire for demographics and factors related to elemental and methyl- Hg exposure. The mean Hg levels in urine (1.06 µg/L) and hair (0.51 µg/g) were not significantly different from the US general population (0.95 µg/L and 0.47 µg/g, respectively) (NHANES 1999-2000, 2003-2004). In multivariate linear regression models adjusting for demographics, there was a consistent, though mostly not statistically significant, relationship of increased hair Hg levels with improved nerve function for all nerves measurements. A similar relationship was found between increased methylmercury exposure via fish consumption (as measured in daily intake of polyunsaturated fatty acid, eicosapentaenoic acid and docosahexaenoic acid) and improved nerve function. No consistent relationship was observed in covariate-adjusted urine Hg models predicting nerve function. Only 3 out of a total of 504 multivariate models that investigated effect modification of SNPs on the relationship of Hg biomarkers with nerve function had stable and statistically significant interaction terms.

Conclusions: Overall, there might be a beneficial effect of fish consumption on peripheral nerve function. There was little evidence of effect modification of the studied SNPs on the relationship of mercury exposure and biomarkers, respectively with peripheral nerve function given the possibility of false positives.