

# Predicted Mercury Concentrations in Hair From Infant Immunizations: Cause for Concern<sup>☆</sup>

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## Abstract

Mercury (Hg) is considered one of the world's most toxic metals. Current thinking suggests that exposure to mercury occurs primarily from seafood contamination and rare catastrophic events. Recently, another common source of exposure has been identified. Thimerosal (TMS), a preservative found in many infant vaccines, contains 49.6% ethyl mercury (EtHg) by weight and typically contributes 25 µg of EtHg per dose of infant vaccine. As part of an ongoing review, the Food and Drug Administration (FDA) announced in 1999 that infants who received multiple TMS-preserved vaccines may have been exposed to cumulative Hg in excess of Federal safety guidelines. According to the Centers for Disease Control (CDC) recommended immunization schedule, infants may have been exposed to 12.5 µg Hg at birth, 62.5 µg EtHg at 2 months, 50 µg EtHg at 4 months, 62.5 µg EtHg at 6 months, and 50 µg EtHg at approximately 18 months, for a total of 237.5 µg EtHg during the first 18 months of life, if all TMS-containing vaccines were administered. Neurobehavioral alterations, especially to the more susceptible fetus and infant, are known to occur after relatively low dose exposures to organic mercury compounds. In effort, to further elucidate the levels of ethyl mercury resulting from exposure to vaccinal TMS, we estimated hair Hg concentrations expected to result from the recommended CDC schedule utilizing a one compartment pharmacokinetic model. This model was developed to predict hair concentrations from acute exposure to methylmercury (MeHg) in fish. Modeled hair Hg concentrations in infants exposed to vaccinal TMS are in excess of the Environmental Protection Agency (EPA) safety guidelines of 1 ppm for up to 365 days, with several peak concentrations within this period. More sensitive individuals and those with additional sources of exposure would have higher Hg concentrations. Given that exposure to low levels of mercury during critical stages of development has been associated with neurological disorders in children, including ADD, learning difficulties, and speech delays, the predicted hair Hg concentration resulting from childhood immunizations is cause for concern. Based on these findings, the impact which vaccinal mercury has had on the health of American children warrants further investigation. © 2001 Published by Elsevier Science Inc.

**Keywords:** Mercury; Vaccine; Neurotoxicity; Thimerosal; Learning disabilities

## INTRODUCTION

Mercury is a potent human toxicant that has long been the source of serious health problems. Toxicologic

manifestations of mercury exposure have become known through hundreds of years of medicinal applications, industrial uses, and environmental tragedies. After exposure to mercury, deposition has been found in all body tissue. Therefore, it is not surprising that the clinical manifestations of mercury toxicity involve multiple organ systems with variable features and intensity. These manifestations vary by the route of exposure, the chemical form of mercury involved, the acuity of the intoxication, and the age at exposure (Goldfrank et al., 1998). Also, a mercury dose given acutely may produce toxic effects whereas the same dose distributed over a period of time may give no evidence of toxicity (Koos and Longo, 1976).

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<sup>☆</sup> Modeled hair mercury concentrations arising from exposure to mercury-containing infant vaccines show elevations in excess of Federal safety guidelines for extended periods and with several peaks. Elevations over guidelines occur during critical stages of infant development. Predicted Hg levels are cause for concern, and further research is warranted.

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