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Abstract Title:
Tracing the fate of mercury from vaccines in organisms: methods for the determination of ethylmercury, methylmercury, and total mercury in biological tissues

Authors:
A. Carter, J.E. Creswell, M. Briscoe, M. Kennard-Mayer – Brooks Rand Labs, Seattle, Washington, USA

Abstract:

The ethylmercury-containing preservative thimersoal is an ingredient of many vaccines and inoculations used in humans and animals around the world. Although many countries have taken steps to phase it out and replace it with safer alternatives, it is still widely used. The disposition of mercury from vaccines in the body is not well understood, because the topic has received relatively little study. There is significant interest in better understanding the metabolism and accumulation of mercury in humans and various animal species and in evaluating the safety of thimerosal in currently approved vaccines. To do this, analytical methods that reliably measure ethylmercury, methylmercury, and inorganic mercury in tissues are required. Ethylmercury is the form of mercury in the vaccine, and it has been shown to break down rapidly to inorganic mercury in the body. Although methylmercury in tissues is not linked to vaccines, it is important to measure this toxic species, along with ethylmercury and inorganic mercury, in order to perform thorough risk assessments.

We applied a method of simultaneous determination of ethylmercury and methylmercury to swine and fish tissue samples. Designed to be compatible with the analytical apparatus used to measure methylmercury in many laboratories, this method relied on aqueous phase propylation, purge & trap, gas chromatographic separation, pyrolytic decomposition, and atomic fluorescence spectrometry. We analyzed total mercury separately by digesting the tissues in acid and using standard purge and trap, dual gold amalgamation atomic fluorescence analysis. We will present method validation details, including assessments of species interconversion and certified reference material, blank spike, and matrix spike recoveries. We will also present the results of a study on the stability of the sodium(tetra-n-propyl)borate derivatizing reagent used. This reagent is a common substitute for sodium(tetra-ethyl)borate and is required to analyze ethylmercury. Although the multi-day stability of a sodium(tetra-n-propyl)borate reagent for methylmercury analysis has been previously presented, to our knowledge, this is the first test of its stability for ethylmercury analysis.