

# Neonate Exposure to Thimerosal Mercury from Hepatitis B Vaccines

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## ABSTRACT

Infant exposure to ethylmercury (EtHg) has not only increased but is starting earlier as a result of the current immunization schedule that uses thimerosal-containing vaccines (TCVs). Although vaccination schedule varies considerably between countries, infants in less-developed countries continue to be exposed to EtHg derived from more affordable TCVs. We studied the exposure of newborns to EtHg from hepatitis B vaccines; hospital records (21,685) were summarized for the years 2001 to 2005 regarding date of birth, vaccination date, and birth weight. Most of the vaccinations occurred in the first 24 hours postdelivery; over the 5 years, there was an increase in vaccinations within hours of birth (same day), from 7.4% (2001) to 87.8% (2005). Nearly 94.6% of infants are now being vaccinated within the first 24 hours. Range of mercury exposure spread from 4.2 to 21.1  $\mu\text{g}$  mercury/kg body weight for those receiving TCVs with the highest thimerosal concentration; these exposure levels are conservative for 2% of children receiving vaccines within 2 to 3 postnatal days, when they are still going through physiological postnatal weight loss. Because of the particular timing (transitioning from in utero to ex utero metabolism) and specific aspects of exposure (i.e., parenteral mode, bypassing gastroenteric barriers) and dose (related to vaccine manufacturer and with variation in birth weight), this study reveals critical issues that can modulate toxicokinetics and toxicodynamics of organomercurials in neonates.

**KEYWORDS:** Thimerosal, hepatitis B, ethylmercury, newborns, immunization

Mercury (Hg) is a widely recognized neurotoxic element, and fetus and infants are especially vulnerable to its effects. The developing brains of newborns are susceptible to all forms of Hg, and thimerosal in vaccines is still the first line of exposure to infants in less-developed countries.<sup>1</sup> Because of differences in vaccination policies, the overall exposure to thimerosal has always varied between countries.<sup>2</sup> Despite low doses in vaccines, it is plausible that fetuses and young infants may be susceptible to untoward effects of thimerosal.<sup>2</sup> Although the United States and the EU countries reduced or eliminated thimerosal from most vaccines

and immunoglobulins in 1999, thimerosal-containing vaccines (TCVs) continued to be used in less-developed and developing countries. However, still in the United States, it is recommended that all pregnant women, infants, and children (until 18 years old) receive annual influenza vaccination, of which more than 90% still contain thimerosal. Because of the low concentration of thimerosal used as preservative, the World Health Organization considers it safe in TCVs.

Animal studies have established differential neurotoxicity of ethylmercury (EtHg) and methylmercury (MeHg).<sup>3,4</sup> However, public health concern about

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