



## Editorial

## United Nations mercury treaty jeopardizes vaccine protection of the world's most vulnerable children

Thiomersal (also known as thimerosal in the United States) is a bacteriostatic preservative used in vaccines and other biologic products since the 1930s for several specific reasons: as a broad bacteriostatic agent; as a preservative; and to inactivate specific moieties. Its concentration in most vaccines results in delivery of about 25 µg of thiomersal in each dose administered. Importantly, thiomersal is only 50% ethylmercury by weight. Many regulators, including the United States Code of Federal Regulations, require the addition of a preservative to multi-dose vaccine vials. Multi-dose vials have several advantages. They are cheaper than single dose formulations, and because more doses can be stored in a smaller space, they allow for decreased storage costs across the cold chain from production to final administration. These costs can be quite substantial for large immunization programs.

Infants in 120 countries rely on multi-dose vaccines containing thiomersal to protect them against life-threatening diseases [1]. Thiomersal in these settings has been essential for ensuring vaccine safety for more than five decades by preventing bacterial and fungal growth in multi-dose vials. Initial allegations of ecological links between thiomersal and purported adverse health outcomes threatened the availability of affordable multi-dose vaccines to these infants, but rigorous and careful ongoing review of well conducted epidemiological studies led the Global Advisory Committee on Vaccine Safety to conclude that “no additional studies of the safety of thiomersal in vaccines are warranted and that available evidence strongly supports the safety of the use of thiomersal as a preservative for inactivated vaccines [2].” In addition, the Institute of Medicine’s (IOM) Immunization Safety Review Committee also examined the issue of safety concerns in regard to thiomersal-containing vaccines. As reported by the U.S. Food and Drug Administration: “In 2004, the IOM’s Immunization Safety Review Committee issued its final report, examining the hypothesis that vaccines, specifically the MMR vaccines and thiomersal-containing vaccines, are causally associated with autism. In this report, the committee incorporated new epidemiological evidence from the U.S., Denmark, Sweden, and the United Kingdom, and studies of biologic mechanisms related to vaccines and autism since its report in 2001. The committee concluded that this body of evidence favors rejection of a causal relationship between thiomersal-containing vaccines and autism, and that hypotheses generated to date concerning a biological mechanism for such causality are theoretical only. Further, the committee stated that the benefits of vaccination are proven and the hypothesis of susceptible populations is presently speculative, and that widespread rejection of vaccines would lead to increases in incidences of serious infectious diseases

like measles, whooping cough and *Haemophilus influenzae* type b bacterial meningitis [3].” The American College of Medical Toxicology concurred with this assessment, and stated that children do not receive a sufficient dose of ethyl mercury to cause neurologic injury [4].

A new threat to the ongoing availability of safe and affordable vaccines for children in developing countries has come from an unexpected quarter. At its 25th session in 2009, the Governing Council of the United Nations Environment Programme requested an Intergovernmental Negotiating Committee (INC) to prepare a global legally binding instrument to reduce the risk from mercury to human health and the environment [5]. The treaty negotiations aim to limit the production, importing and exporting of mercury-containing products. This includes the fractional quantity of ethyl mercury in multi-dose vaccines.

Despite advocacy from both the World Health Organization and the independent Strategic Advisory Group of Experts (SAGE) on immunization, negotiations have progressed through four rounds of the INC without successful exclusion of thiomersal from the treaty negotiations. In addition to reaffirming the safety of thiomersal-containing vaccines, SAGE noted that they were “essential and irreplaceable components of immunization programmes, especially in developing countries [6].”

Multi-dose vaccines are the only affordable option for many developing countries. Currently available multi-dose vaccines include those against pertussis, tetanus, diphtheria and *Haemophilus influenzae* type b. It has been estimated that these vaccines prevent approximately 1.4 million child deaths each year [5]. Equally effective alternative preservatives are not currently available and, as the use of alternatives may unpredictably affect the quality, safety and efficacy of vaccines, re-formulation, testing, and re-registration of such products would be necessary, tremendously affecting both availability and price [7].

While we endorse efforts to reduce/eliminate mercury exposure in the population, this will require time and research in order to maximize benefits while minimizing harms. Because acceptable alternatives to thiomersal do not currently exist, we believe that unless thiomersal is excluded from the treaty, the lives of children in developing countries will be placed at great risk of contracting vaccine-preventable diseases that they are currently protected against. Such a ban will result in real, not theoretical, harm—and increased expense that could be used for the provision of additional vaccines. It is unacceptable to allow the fears of a few to trump the science of many, and result in entirely preventable morbidity and mortality to those most vulnerable among us.

## References

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20 November 2012