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REVIEW PAPER

Abating Mercury Exposure in Young Children Should Include Thimerosal-Free Vaccines

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Abstract Pediatric immunization is essential to prevent, control and eradicate children`s infectious diseases. Newborns and infants in less developed countries have a concentrated schedule of Thimerosal-containing vaccines (TCVs); pregnant mothers are also immunized with TCVs. Metabolic changes during early development are demonstrably an important risk factor for ethylmercury (EtHg) effects on neurodevelopment, while exposure to Thimerosal sensitizes susceptible individuals to life-long contact dermatitis. Concerns regarding toxicity of Hg have moved rich nations to withdraw it from medicines and, in particular, Thimerosal from pediatric vaccines; it has been more than 20 years since rich countries started using Thimerosal-free vaccines. TCVs and Thimerosal-free vaccines show dissimilar profiles of adverse effects. Thimerosal-free vaccines have shown a decrease in contact dermatitis, while TCVs showed a significant association with increased risk of tic disorders; in some circumstances, EtHg in combination with other neurotoxic substances negatively impacted neurobehavioral tests. In studies that explored vaccines and risk of tics, Thimerosal was a necessary factor. However, when the binary exposure to organic Hg forms (TCV–EtHg and fish-MeHg) was considered, effects on neurobehavioral tests were inconsistent. Conclusions: (a) The indiscriminate use of pediatric-TCVs in less developed countries carries an unjustifiable and excessive EtHg exposure with an unnecessary risk of neurotoxicity to the developing brain; (b) measurable benefits (of Thimerosal-free) and measurable risks of tic disorders have been associated with the (Thimerosal-containing) type of vaccine; (c) Thimerosal-free vaccines are clinically and toxicologically justifiable and they should be available to children in less developed countries.

Keywords Thimerosal-free vaccines · Ethylmercury · Infants · Contact dermatitis · Tic disorders

Introduction

The pathogenesis of Hg toxicity has received input from a wide range of in vitro and in vivo experimental studies. These have identified molecular and genetic factors driving the heterogeneity of immunological and neurobehavioral outcomes and the respective risks of exposure to all chemical-Hg forms [1]. Biochemical, clinical and epidemiologic studies indicate that small amounts of Thimerosal can lead to adverse effects [2]. Thimerosal, a preservative/adjuvant commonly used in vaccines is associated with an increased toxicological risk from pediatric Thimerosal-containing vaccines (TCVs). Therefore, concerns regarding the toxicity of Hg have found different solutions in regards to pediatric vaccines. Compared to the USA, which had Thimerosal in approximately 30 different childhood vaccines, France only had it in two (in 1999), and these two were also available in a Thimerosal-free formulation [3]. Nevertheless, the most developed nations have withdrawn Hg from medicines and, in particular Thimerosal from pediatric vaccines; it has been more than 20 years since developed countries started using Thimerosal-free vaccines [4].

Thimerosal has a limited role in immunogenicity (of intended antigens) but has a use in some vaccine manufacturing processes [4]. Thimerosal is a very active compound with a potential to act on the immunological and

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