



# Public Health Mōno-Gram



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## **Thimerosal/Mercury Vaccines and Autism, 2009**

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In 2004, a panel of respected scientists—none of whom had worked with vaccines—was convened by the Institute of Medicine of the National Academy of Sciences to review all of the available data about any possible association between vaccines and autism. They concluded that there was no evidence that vaccines were associated with the development of autism. (1) Since that time, the evidence has become even more robust that there is no link between measles vaccines or thimerosal-containing vaccines and autism. The scientific evidence is outlined in detail in Chapter 8 of the book [Do Vaccines Cause That?! A Guide for Evaluating Vaccine Safety Concerns](#), from which this essay was adapted.

### **Vaccines and autism**

The causes of autism are unknown. Most evidence, however, suggests that genetic factors are among the main causes of autism. In addition to genetic predispositions, there could be some as yet unknown environmental factors contributing to the development of autism. However, except for congenital rubella infections, (2) epidemiological studies have failed to find a link between specific environmental exposures and increased risks of autism.

Is autism more common now than it was two or three decades ago? It is clear from many studies that changes in the diagnostic criteria for autism have greatly expanded the recognition of autism by broadening the definition of what is considered autism. Some think that better diagnosis alone cannot account for the entire increase in the prevalence of autism.



Autism symptoms are usually first noticed between the ages of 12 months and 4 years of age. Of course, these are about the same ages when children receive a number of vaccines. In addition, we give many more vaccines to infants and toddlers now than we did in the past. Although the vaccine-preventable diseases have decreased remarkably as new vaccines have been introduced, the timing of their administration has led some to believe that one or more of the immunizations could have caused their child's autism.

What the media has continued to describe for the past 5 years as a “controversy” between parents who believe their child's autism was caused by vaccines and the scientific evidence is misinformation. And what pervasive misinformation it has been.

Aggressive misinformation about vaccines causing autism—presented as fact by prominent individuals—has been featured in publications and by the news media, discussed on popular TV and radio talk shows, and been the subject of TV dramas and docudramas. Because these articles feature compelling stories often by prominent people, it is little wonder that parents have become confused.

On February 12, 2009, the US Court of Federal Claims [also found the evidence “overwhelmingly contrary” to the theories that measles vaccines, thimerosal-containing vaccines or some combination of these caused autism.](#)

## **Measles vaccines and autism concerns**

This is now a thoroughly discredited theory. Unfortunately, media coverage of the misinformation about measles vaccine frightened many parents. As a consequence, measles, mumps, and rubella (MMR) vaccination rates fell in Great Britain and many other countries. Outbreaks of measles in Great Britain, the Netherlands, Germany, Switzerland, and the United States—and mumps in Great Britain, the United States and Canada—almost assuredly were a consequence of this misinformation. Misinformation about vaccine safety has global consequences.

## **Mercury in vaccines and autism concerns**

In 1999, the U.S. Public Health Service and the American Academy of Pediatrics issued a special statement about thimerosal-containing vaccines. Why?

**Methylmercury.** Methylmercury is not present in vaccines or drugs but it is in some of the food we eat. It is well known to be a neurotoxin—that is, it can damage the brain and cause developmental disabilities. It can cause developmental problems in infants born to mothers who have been eating contaminated foods; the greatest risk for brain injury is exposure to methylmercury before birth. After too much exposure over time, methylmercury can cause a number of neurologic symptoms including tremors, emotional lability (emotionally unstable), memory loss, weakness, sleeplessness, odd sensations, changes in the tendon reflexes, performance deficits (poor performance on cognitive and motor function testing), sensitivity to light,



hearing and visual problems, and other problems. However, exposure to methylmercury has never been associated with a constellation of signs and symptoms similar to autism. The theory that children with autism had symptoms similar to methylmercury poisoning did not stand up to the scrutiny by the Institute of Medicine (3) nor to side-by-side comparisons by neuroscientists. (4) In their 2004 report (1) the IOM said "... autism has never been documented as a consequence of high-dose mercury exposure ..."

**Ethylmercury.** Thimerosal does not contain methylmercury, it contains ethylmercury. When all the discussion about thimerosal began in 1999, there was not much information about ethylmercury toxicity or its metabolism. We now know that the differences between ethyl- and methylmercury are very important—just as are the differences between methyl alcohol (wood alcohol, a poison used in antifreeze) and ethyl alcohol (found in wine and beer). Thus, assessing risk for thimerosal based on methylmercury would significantly overstate any possible risk. However, in 1999, and for the next several years, much of what we now know was "missing information" about these critically important issues.

In 1999, the Food and Drug Administration (FDA) determined in a review that, depending on which combination of vaccines an infant received for each of his or her recommended vaccines, an infant could potentially be exposed on one day to total levels of ethylmercury that would exceed the Environmental Protection Agency (EPA) safe intake level of 0.1 micrograms for methylmercury per kilogram of infant body weight per day. We now recognize that this was comparing apples to oranges.

Because in 1999 it was not known if ethylmercury was as toxic, or less toxic, than methylmercury, public health authorities "assumed a worst case scenario." Although most vaccine experts at the time did not believe that there was any problem, they decided to assume that the two compounds could have similar toxicities, metabolisms, and safe intake levels. Under those assumptions, they worried that some young infants, at their most vulnerable time of development, might theoretically be close to the safe intake level of mercury—even though they realized that the "safe intake level" was established to be well below the level of any actual health risk. Then—as is often the case when not all the data are available—they needed to make recommendations, balancing what was known and what was not known, weighing the potential risk of thimerosal against the actual known risk of vaccine-preventable diseases.

National leaders in public health and vaccinology tried to develop recommendations that would provide the greatest protection for children. They also decided to inform the public about the reasons for their decisions and about the scientific uncertainties that they had because of the lack of some information. The decision of the experts was to err on the side of caution. The U.S. Public Health Service and the American Academy of Pediatrics issued a joint statement in July 1999. The statement outlined the lack of evidence but stressed the need to take a prudent course of action. It



requested that thimerosal be removed as a preservative from U.S. vaccines intended for infants less than 6 months of age.

Some people didn't understand the joint statement, and some of them assumed there was something being hidden. One year after the joint statement, two mothers of autistic children published a hypothesis based on a faulty understanding of what was known about methylmercury poisoning; they were certain that mercury in vaccines caused autism.

The misinformation storm built over the years to hurricane proportions.

However, by 2003, no vaccines in the routine immunization schedule for infants under six months of age contained thimerosal as a preservative. Indeed, if any doses had remained, all the doses would have expired and would have had to have been replaced by vaccines without the preservative no later than January 14, 2003. Some vaccines given to these young children could still contain "trace amounts" of thimerosal from the manufacturing process but this is much, much less than when used as a preservative. Other vaccines (for example, inactivated influenza vaccine and tetanus and diphtheria vaccines for use in older children, adults, and infants who cannot receive pertussis vaccine) continue to be manufactured with thimerosal as a preservative—although influenza vaccine without thimerosal preservative is available as an option.

By 2004, there was sufficient evidence for the IOM to "favor rejection" of an association between vaccines and autism. (1) Since then the data has continued to show no association.

## References

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