

Dispelling Myths Regarding the Use of Thimerosal in Vaccines

Lyn Redwood, RN, MSN
Executive Director
World Mercury Project

Earlier this week, entertainer John Oliver discussed vaccines on his weekly HBO program *Last Week with John Oliver*. In doing so, he exposed viewers to several inaccuracies about vaccine safety, including those regarding the use and toxicity of the mercury-based preservative thimerosal. In developing his monologue, it appears that Mr. Oliver—like numerous other news outlets who promote vaccines as universally safe and effective—relied solely on information from the [Centers for Disease Control and Prevention](#) (CDC) which continues efforts to persuade the American public that injecting mercury into pregnant women and children with thimerosal-containing flu vaccines is safe.

The talking points reviewed below were derived from a recently published article by CNN titled [Thimerosal: Everything You Need To Know About This Vaccine Preservative](#). These talking points are at best misleading, and at worse, patently false. The World Mercury Project has responded to each of the CNN/CDC talking points with factual information in our effort to educate consumers to avoid this completely unnecessary and dangerous neurotoxin.



POWERFUL POISON—Exposure to ethylmercury can cause irreversible damage to the central nervous system.

CNN Statement: Thimerosal is best known as a preservative used in some vaccines to keep them from becoming contaminated. The preservative has gotten a lot of attention over the years, particularly since it was removed from childhood vaccines in 2001. Several studies have shown that the preservative is safe, but not everyone has been convinced. (Note, there is no link provided to the to support the statement thimerosal is safe)

WMP Fact: Although thimerosal was slated for removal from childhood vaccines in 1999, the reformulation process took several years. Products containing thimerosal were not recalled and the manufacturers were allowed to continue to distribute thimerosal containing vaccines well into 2001 that had a two year expiration date. [In 2003](#) when all the residual stock of thimerosal containing vaccines was almost distributed, the CDC Advisory Committee



for Immunization Practices (ACIP) made the [new recommendation](#) that all pregnant women, infants starting at six months of age and children receive flu vaccines annually.

This recommendation was contradictory to the fact that the prestigious [Institute of Medicine](#) made the recommendation in 2001 that pregnant women, infants and children NOT receive thimerosal preserved vaccines. At the time, the vast majority of flu vaccines contained thimerosal. Pregnant women are especially vulnerable to mercury exposure because the fetus accumulates mercury at a higher rate than the mother. This flu season approximately [48 million doses of flu vaccine containing thimerosal](#) were distributed and administered to pregnant women, infants and children in the U.S.

Here's what you need to know about what it is (and what it isn't).

CNN Statement: Thimerosal is the most widely used preservative in vials of vaccines used multiple times, a mercury-based organic compound that can prevent bacteria and fungus from growing.

WMP Fact: While it is true that thimerosal is a widely used preservative, it is not necessarily an effective preservative. In 1975 the FDA convened a panel of experts to review the use of thimerosal as a preservative. The agency issued a report of the panel's findings in the [Federal Register](#) where they concluded that "some mercury-containing preparations are not effective and others are not safe and effective" for antimicrobial use.

With respect to thimerosal in particular, the panel found evidence from 1950 which concluded that "thimerosal was no better than water in protecting mice from potential fatal streptococcal infections." and "35.3 times more toxic for embryonic chick heart tissue than for *Staphylococcus aureus*." The panel concluded that "thimerosal was not safe for OTC topical use and not effective as a topical antimicrobial because its bacteriostatic action can be reversed."

Most of the literature reviewed addressed mercury's lack of antibacterial properties. One study reviewed published in 1970 titled, "Three thousand years of mercury. A plea for abandonment of a dangerous, unproven therapy," addressed mercury's lack of effectiveness regarding anti-fungal properties.

Why do vaccines need preservatives?

CNN Statement: Vaccine makers started using preservatives in the 1930s after they found that contamination could become a problem with multi-dose vaccines. Doctors learned that the hard way in 1928, when 12 children died after getting vaccinated for diphtheria. An investigation found that the multi-dose vaccine had been contaminated with living staphylococci. The children had been injected with the diphtheria vaccine and a staph infection.

WMP Fact: While it is true that preservatives are used to prevent bacterial contamination in multi-dose vials of vaccines, there is ample evidence provided by federal agencies and independent scientists that spans the last 80 years which documents that thimerosal is not an effective or safe vaccine preservative.

In a [study published](#) in the *Journal of the American Medical Association* in 1948 titled "The bacteriostatic and bactericidal actions of some mercurial compounds on

...thimerosal was
no better than
water in protecting
mice from potential
fatal streptococcal
infections



and 35.3 times
more toxic for
embryonic chick
heart tissue than
for *Staphylococcus
aureus*.

hemolytic streptococci,” the authors vigorously argued that thimerosal was ineffective as a “disinfectant, germicide and antiseptic.” In the review of the literature in this paper, the authors cited eight studies from 1928, 1935, 1937, 1938, and 1944 all of which drew similar conclusions.

There are several recent reports of thimerosal’s failure as a preservative as well. Clusters of disease from *Group A streptococcus* infections were traced back to multi-dose vials of diphtheria toxoid, pertussis, and tetanus toxoid (DPT) vaccine which were contaminated after being opened. Additionally, in 2004, a Chiron plant that manufactured Fluvirin was forced to close because its vaccine was contaminated with *Serratia marcescens*. This vaccine used thimerosal as a preservative in its product. In this case and others, thimerosal failed to prevent bacterial growth which resulted in dangerous infections.

What happens to the preservative in your body?

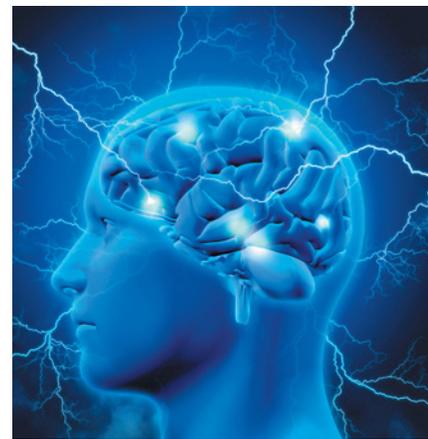
CNN Statement: Your body easily [eliminates the thimerosal](#). Unlike chemicals that might stay in your body for a long time, it is quickly removed from the blood and excreted in your waste. Thimerosal does not build up in your system like other mercury-based compounds can. (Note, this link takes you to the CDC website where this statement is repeated, but with no references or resources to support the claim)

WMP Fact: This statement is patently false. Thimerosal does leave the blood stream faster than methylmercury, but that is because it more quickly moves into the tissue and organs in the body than methylmercury. A [2005 study](#) funded by the National Institutes of Health compared brain mercury levels in infant monkeys exposed to injected ethylmercury (thimerosal) and equal amounts of ingested methylmercury. In this study, ethylmercury exposure resulted in twice as much inorganic mercury in the brains of the infant monkeys compared to those exposed to methylmercury. Specifically, the relative concentrations in monkeys with detectable levels of inorganic mercury were 16 ng/g in thimerosal-treated monkeys and 7 ng/g in the methylmercury-treated monkeys in which inorganic mercury levels were detectable. Inorganic mercury was below detectable levels in 8 out of 17 of the methylmercury-treated monkeys. [Inorganic mercury has an estimated half-life in the brain of 27 years](#). Exposures to mercury during these critical periods of development disrupt the growth and migration of neurons, with the potential to cause irreversible damage to the central nervous system.

Is it safe?

CNN Statement: [Hundreds of studies](#) have shown that it is extremely safe for humans. Several comprehensive reviews have shown there is no evidence of harm caused by low doses. (This links to the CDC website, but there is no data to support this claim on the site) In animals, some studies have shown central nervous problems, coma and death, although the same has not been found in humans.

WMP Fact: There are several reports of deaths in the medical literature from exposure to thimerosal. In April of 2001 thimerosal was nominated by the FDA to be reviewed by the National Toxicology Program (NTP) due to the lack of toxicity and safety data. In the nomination, several cases of acute mercury poisoning from thimerosal-containing products were documented. These reports included the



TOXIC PATHWAY—Ethylmercury is more persistent in the brain than methylmercury.

exposure to thimerosal from immune globulin (Matheson 1980) hepatitis B immune globulin (Lowell 1996), thimerosal ear irrigations in a children with tympanostomy tubes (Royhans 1994), thimerosal treatment of omphaloceles in infants (Fagan 1977), and a suicide attempt with thimerosal (Pfab 1996). These studies reported local necrosis, acute hemolysis, disseminated intravascular coagulation, acute renal tubular necrosis, and central nervous system injury including obtundation, coma, and death resulting from the exposures.

Are there any side effects?

CNN Statement: The most common side effect is a mild rash or redness at the injection site. There may also be a little swelling. All of these symptoms disappear quickly. On rare occasions, some people have had allergic reactions to the preservative.

WMP Fact: What CNN fails to acknowledge are the thousands of families who have reported developmental regression of their children after exposure to thimerosal containing vaccines. [One such case](#) was actually covered by CNN in 2007 when a child who received multiple thimerosal-containing vaccines regressed developmentally within 48 hours after receiving the vaccines and was later diagnosed with autism.

Do children get vaccines with thimerosal?

CNN Statement: All routinely recommended vaccines for children in the US are available in a thimerosal-free formulation or contain only a trace amount.

WMP Fact: Flu vaccines are universally recommended for infants and children. Approximately 1/3 of all flu vaccines contain thimerosal. According to the CDC 48 million doses of flu vaccine manufactured this year contained thimerosal. A trace amount is defined as being 1 microgram (mcg) or less. Flu vaccines contain 25 mcg of mercury. According to EPA mercury exposure guidelines of 0.1 mcg per kilogram of body weight, a baby would need to weigh 550 lbs to be able to safely process the amount of mercury in a thimerosal containing flu vaccine. State and Federal guidelines require that any product that contains more than 0.2 milligrams per liter (200 PPB) of mercury must be disposed of as a hazardous waste. All flu vaccines preserved with mercury that are not used [must be disposed of as hazardous waste](#) because they contain 50,000 PPB mercury.

What makes it different from other mercury-based products?

CNN Statement: Thimerosal is an ethylmercury; the mercury that can be found in fish is a methylmercury. Though they are only one letter apart, the substances are different. Mercury is an element found in the Earth's crust. We are all exposed to mercury as we live on the surface of the planet. It's in our water, in our soil and in the air. Methylmercury is created when mercury comes into contact with some bacteria. Doctors warn pregnant women to avoid some fish because it can be contaminated with this form. Unlike ethylmercury, which can pass through your body quickly, methylmercury can linger and accumulate. If enough accumulates, it can be toxic.

In 1999, the National Vaccine Advisory Committee held a meeting to discuss the safety of thimerosal. Some who testified worried that babies were unable to eliminate the mercury from their systems. Follow-up studies of infants showed that they "excreted significant amounts of mercury in stool after thimerosal exposure," meaning it was removed from the body quickly, compared with methylmercury.



According to the CDC, 48 million doses of flu vaccine manufactured this year contained thimerosal.



A trace amount is defined as being 1 microgram (mcg) or less. Flu vaccines contain 25 mcg of mercury.

WMP Fact: Evidence that ethylmercury is quickly passes through the body is not supported by scientific research which documents that [ethylmercury accumulates in the kidneys and brain tissue](#). Although infants have been found to excrete some mercury in their stool after exposure to thimerosal containing vaccines, the amount excreted does not account for the amount injected. [Michael Pichichero](#), a pediatrician, measured mercury concentrations in stool of 22 normal infants exposed to thimerosal in vaccines, ages two and six months, and found a range of 23-141 *nanograms* of mercury per gram of stool (dry weight). The authors interpreted these levels, mere parts per billion, as positive evidence of mercury elimination. But these mercury levels are extremely low and [not nearly enough to allow for rapid excretion as the authors propose](#).

One of the few researchers who studies the effects of ethylmercury is Thomas Burbacher, PhD, professor of environmental and occupational health sciences and director of the infant primate research lab at the National Primate Research Center, University of Washington, Seattle. Burbacher says that just because ethylmercury is gone from an infant's blood soon after it receives a dose of thimerosal — a half-life of just 3.7 days in the Pichichero study — doesn't mean it's gone from the body. It could have gone to the brain," [Burbacher tells WebMD](#). "Although total mercury levels in the blood are lower following thimerosal exposure [than following methyl mercury exposure], mercury in the blood from thimerosal has an easier time getting to the brain than methylmercury."



GRIM GUIDELINES—The CDC currently recommends the flu shot for pregnant women and annually for children aged six months and older.

If it is safe, why was it removed from kids' shots?

CNN Statement: Based on the recommended childhood vaccination schedule, there was concern that some babies could be exposed to a higher cumulative level of mercury in the first six months of life from these shots. At the time, babies got diphtheria-tetanus-acellular pertussis, Haemophilus influenza type b and hepatitis B shots. If an infant got all three, the accumulation went beyond the [EPA guidelines](#) for methylmercury.

WMP Fact: This is actually a factual statement. WMP would like to add that the amount that infants received from thimerosal containing vaccines was far in excess of EPA guidelines. An average 5 KG infant at 2 months of age could receive 62.5 mcg of mercury from vaccines. According to EPA guidelines the allowable exposure levels would be .5 mcg. Infants were routinely exposure to 125 times EPA allowable guidelines based on weight.



A study published in [Pediatrics](#) in 2000 measured blood mercury levels in newborns administered the Hepatitis B vaccine, containing 12.5 mcg of ethyl mercury. The investigation documented elevated post-immunization concentrations relative to pre-immunization levels in all neonates studied. One infant was found to have developed a mercury level of 23.6 mcg/L, thus meeting the [CDC criteria as a case of chemical poisoning from mercury](#).

Experts contend that there are “windows of vulnerability” which occur during neurological development and that specific types of developmental outcomes may have separate windows of vulnerability. These critical periods of development have not been established and may be relatively short in duration. The fact that thimerosal from vaccines has been documented to raise blood mercury levels over known thresholds where developmental effects have been documented to occur during the first few months of life means that particular “windows of vulnerability” may have been breached. Even [minor neurological impairment can have profound societal effects when amortized across the entire population and life span](#).

For more information regarding the use of mercury in vaccines see [click here](#).

For more information about the use of thimerosal in vaccines see [World Mercury Projects FAQ](#)