



[< Back to web version](#)

Vaccines and autism: Separating fact from fiction

Last updated: September 2010

Highlights

[I've heard that a preservative in some vaccines can cause autism – what's going on?](#)

[Why was thimerosal added to vaccines in the first place?](#)

[Is it true that thimerosal contains mercury?](#)

[Is it true that children were exposed to unsafe levels of mercury from thimerosal?](#)

[What's the evidence that thimerosal is linked to autism?](#)

[What's the evidence that thimerosal is *not* linked to autism?](#)

[Wasn't there some link between the MMR vaccine and autism?](#)

[How can I tell if my child received vaccines that contained thimerosal?](#)

[Isn't thimerosal still used in flu shots and some others?](#)

[What are the risks of not immunizing my child?](#)

[Where can I get more information on thimerosal and vaccine safety?](#)

I've heard that a preservative in some vaccines can cause autism – what's going on?

This controversy has been raging for some time, with government and mainstream scientists on one side, and several small but vocal advocacy groups on the other. And many parents have been left feeling confused and frightened about their children's health.

The advocacy groups say that thimerosal, a preservative used in vaccines, is toxic to the central nervous system and responsible for an alarming rise in rates of autism among children in the United States and around the world. Most scientists say there's no credible scientific evidence that vaccines cause autism.

Over the last 15 years, a number of major medical institutions have reviewed the evidence from the United States and abroad, and all have concluded that there's no link between autism and exposure to thimerosal. What's more, the preservative has been removed from most childhood vaccines in the United States.

But some health activists continue to challenge the validity of the existing science and assert that the U.S. government has conspired with vaccine manufacturers to cover up the truth about thimerosal and autism.

Why was thimerosal added to vaccines in the first place?

Thimerosal has been used for over 70 years as a preservative to inhibit the growth of bacteria and fungi in vaccines. Many vaccines are stored most efficiently in large multi-dose vials from which health workers draw individual doses, leaving the vaccine vulnerable to contamination every time the rubber top is punctured by a new syringe. Several deadly incidents of contaminated vaccines in the 1920s prompted vaccine manufacturers to begin adding preservatives to all multi-dose vials of vaccines.

Thimerosal used to be one of the most widely used preservatives. Now that most vaccines in the U.S. no longer contain thimerosal, they are stored in individual dose vials or pre-filled syringes – a system that's more expensive for vaccine manufacturers.

Is it true that thimerosal contains mercury?

Thimerosal contains a mercury compound known as ethyl mercury. This is not the same as methyl mercury, found in high amounts in some fish. Methyl mercury accumulates in human tissue and, at certain levels, can impair cognitive

development in young children – which is why the Food and Drug Administration (FDA) now says that [children shouldn't eat certain fish](#).

From studies of vaccines, scientists have concluded that ethyl mercury does not have the same effects as methyl mercury. In addition, research conducted by the National Institute of Allergy and Infectious Diseases has established that the body eliminates ethyl mercury much more quickly than it does methyl mercury, so ethyl mercury doesn't accumulate in human tissue.

According to mainstream research to date, the only known side effects of exposure to thimerosal in vaccines are minor reactions such as redness and swelling at the injection site in some patients.

Is it true that children were exposed to unsafe levels of mercury from thimerosal?

From the mid-1980s until 1999, as shots were added to the list of routine childhood immunizations, children in the United States were exposed to more and more thimerosal. Some versions of the [diphtheria-tetanus-pertussis \(DtaP\)](#), [Haemophilus influenzae type b \(Hib\)](#) and [hepatitis B](#) vaccines, as well as the [flu shot](#), contained the preservative.

In 1997 the FDA reviewed food and drugs containing mercury and found that some children may have been exposed to a cumulative dose of 187.5 micrograms (mcg) of mercury from all sources during the first six months of life. This amount exceeded the Environmental Protection Agency guidelines for *methyl* mercury exposure. (There are no federal safety standards for *ethyl* mercury.)

As a precautionary measure, the Public Health Service agencies, the [American Academy of Pediatrics \(AAP\)](#), and vaccine manufacturers agreed in 1999 that thimerosal should be reduced or eliminated in all childhood vaccines for children 6 years of age and younger. Since that time, research has concluded that thimerosal poses no risk to children.

Still, childhood vaccines today contain no more than trace amounts of thimerosal, and children are exposed to a cumulative dose of less than 3 mcg of mercury from vaccines by the time they're 6 months old.

What's the evidence that thimerosal is linked to autism?

Some advocacy groups point to a handful of studies done in the late 1990s that purported to show that thimerosal triggered autism. These studies were conducted by Mark Geier, M.D., and his son David. Mark Geier, a geneticist by training and a former researcher at the National Institutes of Health, has served as a consultant and expert witness in support of claimants in a number of vaccine injury cases brought before the National Vaccine Injury Compensation Program, as well as civil cases.

According to the Geiers, children exposed to thimerosal in vaccines are six times as likely to have autism as unexposed children. They base their conclusions on their analysis of data obtained from the Vaccine Adverse Event Reporting System (VAERS), a U.S. government reporting system that compiles vaccine-related health complaints.

In a detailed critique of the Geiers' findings, the AAP explained the problem with relying on VAERS data – namely, that the system collects complaints but has no means of evaluating their legitimacy. "Health effects reported to VAERS as being associated with vaccines may represent true adverse events, coincidental occurrences, or mistakes in filing," the AAP said.

Experts at the AAP were also troubled by the Geiers' methodology, arguing that the father and son didn't specify "how their data were generated, thus preventing accurate review of their methods and replication of their outcomes." The Institute of Medicine found the Geiers' work to be full of methodological flaws and dismissed the results as "uninterpretable."

What's the evidence that thimerosal is *not* linked to autism?

Here are the results of some of the most important reports:

- A study published in the August 2003 issue of the *American Journal of Preventative Medicine* looked at the rates of autism in Denmark and Sweden, where thimerosal use in vaccines stopped in 1992. The rates for autism continued an upward trend from 1987 through 1999, even though the number of cases would be expected to drop after the discontinuation of thimerosal had there been a link.

In fact, experts who have looked closely at the data point out that the rise in autism rates does not correspond to an increase in exposure to thimerosal. In Great Britain, for example, the incidence of autism has risen dramatically since the 1980s. But only one vaccine (DTP) administered in Britain contains thimerosal. All the other vaccines given there are thimerosal-free and always have been.

- Also in 2003, researchers from the U.S. Centers for Disease Control and Prevention (CDC) examined data from the Vaccine Safety Datalink, a database in which eight HMOs log their patients' vaccine records, including any adverse reactions. The authors analyzed the records of more than 120,000 children at two different HMOs and found no

difference in autism rates among children exposed to various levels of thimerosal.

- In 2004, the Institute of Medicine (a division of the National Academy of Sciences) evaluated research on the issue, including five major studies that examined the health records of hundreds of thousands of children in the U.S., Britain, Denmark, and Sweden, as well as the Geiers' studies. They concluded that "the body of epidemiological evidence favors rejection of a causal relationship between thimerosal-containing vaccines and autism."
- The results of the CDC's Thimerosal Follow-Up Study were published in the *New England Journal of Medicine* in September 2007. In this study, researchers administered a three-hour neurodevelopmental test to over one thousand children ages 7 to 9 years. Their findings did not support a connection between vaccines containing thimerosal and neuropsychological functioning of the children at ages 7 to 10 years.
- A CDC-funded study in Italy published in the February 2009 issue of *Pediatrics* compared children who received DTaP vaccines containing thimerosal with children who received DTaP vaccines without the preservative. At ages 10 to 12 years (10 years after vaccination), the study found no neurological or developmental harm to the children who received the vaccines containing thimerosal.
- The World Health Organization's Global Advisory Committee on Vaccine Safety (GACVS) has been assessing the issue of thimerosal in vaccinations since August 2000. They have examined independent epidemiological studies investigating neurobehavioral disorders in relation to thimerosal in the UK, Ireland, and Denmark.

In June 2006, GACVS reaffirmed its ongoing position that "there is no evidence of toxicity in infants, children, or adults exposed to thimerosal in vaccines."

- A study published in the October 2010 issue of *Pediatrics* concluded that prenatal and infant exposure to thimerosal does not increase the risk for autism. Researchers compared 256 children with autism to 752 children without autism, and found that the children with autism received no greater amounts of thimerosal-containing vaccines than those without autism. The study was conducted by the CDC, Harvard Medical School, Kaiser Permanente, and the University of California's Center for Vaccine Research, among others.
- An epidemiological study recommended by the Institute of Medicine is currently being conducted by the CDC's Vaccine Safety Datalink (VSD) to examine whether exposure to thimerosal in infancy or in utero is related to the development of autism. The CDC reports, "Data from this VSD study should provide the best available scientific information on whether a causal association between exposure to thimerosal and the development of autism is possible." At this point the researchers are collecting data.

Wasn't there some link between the MMR vaccine and autism?

In 1998, the British medical journal *The Lancet* published a study connecting the [measles-mumps-rubella \(MMR\) vaccine](#) with autism. Researchers noticed that eight of the 12 autistic children being studied had started showing symptoms of autism around the time they received their MMR shots, and hypothesized that the children were having a physical reaction to the vaccine.

It turned out to be a coincidence, and the study has now been repudiated by several of the researchers and retracted by *The Lancet*. The study had nothing to do with thimerosal, which has never been used in the MMR vaccine, but people continue to confuse the two issues.

How can I tell if my child received vaccines that contained thimerosal?

If your child was vaccinated after the year 2001, it's unlikely that he was exposed to more than trace amounts of thimerosal. In 1999 the Food and Drug Administration, the National Institutes of Health, and the Centers for Disease Control and Prevention, along with the American Academy of Pediatrics, asked vaccine manufacturers to reduce or eliminate the use of thimerosal in vaccines, and manufacturers took steps to comply.

Some doctors' offices continued to use existing stockpiles of vaccines containing thimerosal, but most experts believe they would have been used up by 2001 or 2002. Ask your child's doctor if you want to know for sure.

Isn't thimerosal still used in flu shots and some others?

Thimerosal is still used as a preservative in some adult flu shots. Thimerosal-free formulations are available for infants, children, and pregnant women, but there's not always enough to meet demand, and doctors routinely run out of thimerosal-

free supplies.

Also, some DTaP booster shots, which are given to children age 7 or older, contain thimerosal. Finally, thimerosal is still used in some childhood vaccinations in other countries, mostly in the developing world.

What are the risks of not immunizing my child?

Medical experts agree that the benefits of vaccinating your child far outweigh the risks – for your child and for your community as a whole. A certain percentage of children have adverse reactions to vaccines, but such incidents are rare, given the large number of children vaccinated each year.

Julia McMillan, a professor of pediatrics at Johns Hopkins University in Baltimore, likes to remind parents about the number of serious diseases now controlled or eliminated by vaccinations.

"Many parents today are too young to remember the toll these diseases took before vaccines were developed," she says. "Polio has not been seen in the United States for decades. Measles, which still kills children in Africa every day, has been virtually eliminated in the United States. Vaccines against *Streptococcus pneumoniae*, *Haemophilus influenzae* type b, and meningococcus have drastically reduced the frequency of bacterial meningitis and other invasive conditions due to these bacteria. Our vaccination program has been one of the most successful health campaigns – in terms of saving lives – in history. But it will only continue to be successful if people have their children vaccinated."

If enough people decided not to be vaccinated, these illnesses could easily spread to epidemic proportions again. We know this is true because it has happened:

When measles vaccination rates in the United States dropped in the late 1980s, for example, more than 100,000 people came down with the disease and 120 died from it. In 1998, when immunization rates were back up, only 89 people became sick from measles and no one died.

Even as recently as 2008, outbreaks of measles have occurred in the U.S. Almost 90 percent of those in 2008 were either acquired abroad or linked to imported cases, and more than 90 percent of those who were infected had not been vaccinated (or their vaccination status was unknown). While the number of people infected with measles in the U.S. remains low, worldwide in 2008 there were 164,000 deaths attributed to measles.

In addition to measles, other diseases, such as polio and diphtheria, are still only a plane ride away. And even if you and your family never leave the country, lots of people do travel and they can unknowingly bring these diseases back with them.

The more people in your community don't get vaccinated, the more quickly disease can spread throughout the population.

Where can I get more information on thimerosal and vaccine safety?

This is a complex issue, and given the widespread rumors and contradictory reports, it's not surprising that parents are alarmed and confused. Start by talking to your child's doctor. And if you'd like to do some reading on your own, there's no shortage of information available on the Web.

Here are links to websites for health organizations that offer information on thimerosal and vaccine safety:

- [Centers for Disease Control and Prevention](#)
- [The Vaccine Education Center at the Children's Hospital of Philadelphia](#)
- [Food and Drug Administration](#)
- [National Institute of Allergy and Infectious Disease](#)

And here are links to websites for advocacy groups:

- [National Vaccine Information Center](#)
- [Association of American Physicians and Surgeons](#)