Hypothesis

Thimerosal in mandated vaccinations is the major etiological agent in the recent increase in autism and Attention Deficit/Hyperactive Disorder

Boyd E. Haley
Professor and Chair
Department of Chemistry
University of Kentucky

Submitted: January 5, 2005 Accepted March 30, 2005

Abstract

The recent epidemic of autism spectrum disorders (ASD) seems to confound the federal agencies responsible for the USA vaccine program. A recent Institute of Medicine report dismissed all biological research that strongly implied that the vaccine preservative thimerosal may be the likely causation factor. They also dismissed the epidemiological studies done using an American data base and based most of their opinion on studies from Denmark and England, studies the IOM described as "well designed". The Danish studies presented results implying that thimerosal in vaccines actually reduced the occurrence of ASD, a highly questionable possibility. The IOM ignored the relative rates of autism in Denmark versus the USA, about 4-5 versus 60 per 10,000, respectively, and the fact that Denmark children are exposed to less mercury and only after they are much older than the USA children. This suggests that early and excessive thimerosal might be causal. Also, the exposure to mercury from vaccines greatly surpassed the EPA safe level. This safe level was determined by studies on young children ingesting fish. However, the injection of thimerosal bypasses the heavy metal protection provided by the intestines and is a much more toxic delivery route. Even though the IOM was presented with confirmed research that autistics represented a genetically susceptible subpopulation that could not effectively excrete mercury they still put more weight on studies showing the half-life of blood mercury from vaccines in "normal" children where the authors made the unsubstantiated claim that infants cleared thimerosal to quickly for it to be toxic. A simple analysis of maximum fecal excretion of mercury by these children proves this claim unlikely for normals, let alone autistics who seem to retain mercury longer. The IOM also refused to consider two separate facts, that testosterone is specifically elevated in the amniotic fluid of mothers who give birth to autistic children and that testosterone, in contrast to estradiol, enhanced the toxicity of thimerosal to neurons in culture. This could explain the high ration of male to females in ASD. The IOM dismissal of all research supporting the thimerosal/ASD hypothesis, and the lack of supplying another reasonable hypothesis is an incredibly unscientific approach that the American medical and scientific community should not accept.

Keywords: Thimerosal, etiological agent, autism, attention deficit/hyperactive disorder

Since the early 1980s there has been a consistent elevation of the rate of autism that appears to coincide with the increased exposure of infants to vaccinations that have been mandated by the CDC and approved by the FDA. This has been done with good intentions as most agree, including myself, that vaccinations can greatly reduce the level of many infectious diseases. However, underlying this protection against infectious diseases by vaccines was another apparent risk that has, in my opinion, lead to the tremendous increase in neurological diseases such as autism, ADHD and other medical problems. The 714% increase in autism has, in my opinion, occurred through the early exposure of infants and toddlers to the compound thimerosal used as a preservative in many vaccines. Does this follow logic? Consider the case of Acrodynia, or Pink Disease, that affected about 1 in 500 American children up to the 1940s. When it was discovered that the cause was calomel (mercurous chloride) in teething powders and these powders were taken off the market the disease disappeared. Calomel toxicity pales to insignificance compared to the toxicity of the ethylmercury released by thimerosal. How can educated medical authorities be so incapable of understanding the relative toxicity of thimerosal and the damage it can and has caused?

Thimerosal is a compound that breaks down in the body to release ethyl-mercury, a very neurotoxic compound quite similar to methyl-mercury found in fish. However, ingestion of fish exposes any methyl-mercury to the intestines where about 65% of the heavy metal protective protein, metallothionine (MT), exists in the body. This MT has the ability to bind mercury and organic mercury rendering them much less toxic and leads to their removal in the feces before they enter the blood stream.

In contrast, vaccinations containing mercury by-pass the major protection provided by the intestinal MT as the ethylmercury directly enters the blood stream from the site of injection. It has been documented that the amount of mercury these infants are exposed to at single visits to the doctors office are 30-70 times the minimum safe level as determined by the EPA. The recommendation to mandate vaccinations of infants, even as early as on the day they were born, was made without adequate studies to determine that this was a safe procedure. It was primarily through the action of several "parents of autistic children" organizations that this catastrophic occurrence was brought to the public's attention. Today, using statistics from the US Dept. of Education, data on autistic children served through "Individual With Disabilities Act" it was observed that from 1991-92 through 2001-02 a 714% increase in autism has occurred throughout the USA. In Kentucky the increase was from 38 to 1,022; a 2,689% increase over this time period.

Further, just recently the Dept. of Education released a study worrying why boys have lost the capacity to stay with educational programs. It is questionable as to what causes this, but if

doi: 10.1588/medver.2004.02.00057

1 of 6 children in the USA has a 'defined' neurological disorder how many boys have impaired attention abilities that do not make it into the 'disorder' category? The ratio of boys to girls in autism is about 4 to 1, and it is higher in Asperger's syndrome and ADHD. Our use of drugs to control children with behavior disorders has risen rapidly in the recent past to the point where we now spend more funds on these drugs than we do on antibiotics and asthma drugs. We have produced at least two generations of mercury toxic and mercury damaged children and, due to the lobbying efforts of specific manufacturers, our Congress and State legislators have ignored this disaster. We must also ask ourselves is the exposure to thimerosal at birth the reason why academia added 100 points to the Scholastic Aptitude Test (SAT) scores to make up for the recent, inexplicable drop in intellectual abilities of all our students based on their SAT scores? We blame bad schools, bad teaching, computers, etc. for this problem, but maybe we have just damaged our children by exposing them on the day of their birth to a level of injected mercury that, based on EPA standards would be safe for someone weighing 275 pounds! The EPA standard was also set using effects in older children eating mercury in fish where the bulk is rapidly excreted in the feces, not on injection in day old infants where none is rapidly excreted.

There is little doubt about the increase in autism and related disorders since 1985. There is severe contention as to whether or not vaccines in general, and specifically thimerosal in particular, are involved in this epidemic of autism, etc. The question at hand is whether or not this contention is based on conflicts of scientific data? Or is this conflict constructed to avoid identifying the cause and the lack of government oversight on the production of a safe vaccine policy. I can find no conflict of the science based on studies of the toxicity of thimerosal. It is only in the area of easy manipulation of data, i.e. the epidemiological studies, that a conflict has been identified.

At the first review by the Institute of Medicine (IOM) of the National Academy of Science (NAS) in 2000 it was concluded that there was no direct epidemiological connection between vaccinations and autism, but that the hypothesis of thimerosal toxicity causing autism was "biologically plausible". At this time the "biological plausibility" was supported by research from my laboratory on thimerosal toxicity and the epidemiological studies were commissioned by the CDC. At the 2004 meeting of the IOM the conclusion was that thimerosal was not involved and that all research regarding this connection should be stopped and that treatment of children with protocols based on thimerosal toxicity, e.g. chelation therapies, should be ended. However, we now see that what is diagnosed as autism, a non-treatable disease, can be safely and effectively treated in many children using protocols developed by the Think Tank of the Autism Research Institute. If we listened to the "experts" from the CDC and IOM many children now recovered would still be in the autism spectrum. Remember, this is the group of experts that could not convert the percent of thimerosal in vaccines to micrograms of mercury.

A parents group called Safe Minds obtained the original CDC studies as well as minutes from earlier meetings on thimerosal and autism. It seems as if there were strong indications from the original CDC epidemiological studies that thimerosal was involved, but these data were not presented at any IOM meeting nor have they ever been released except through the Freedom of Information Act extraction used by the Safe Minds organization. It is questionable if the members of the IOM committee ever saw this conflicting data. Rather, a cleansed version of this CDC study was presented which has been challenged by many. Due to the political complexity and sensitive nature of the issue of the reliability of the CDC presentation I would encourage all of you to read on this issue yourselves by visiting the Safe Minds website. In contrast to the CDC results, other researchers have gained access to the CDC's vaccine adverse effects reporting system (VAERS) data and have completed epidemiological studies that strong imply that vaccinations are causal in autism (Geier & Geier, 2003). Epidemiological studies are a form of statistics and are prone to manipulation. However, biochemical and biological scientific data collection is much more detailed and, when data is published with details of the experimental approach, it is easy to have the studies repeated, evaluated and critiqued.

Legislators should ask themselves why the IOM report dismissed all of the hard core scientific reports and believed totally in the soft epidemiological reports that implied that injecting a huge excess (30-60 fold) of mercury over the EPA standard in a day old infant was safe? Legislators should ask themselves how come the bulk of these epidemiological studies the IOM depended on were done on a data base in/and from foreign countries where an epidemic of autism did not occur? Legislators should ask why were these epidemiological studies lead by workers employed by vaccine manufacturers, and why (in the case of Denmark and the Statens Serum Institut) did one country feel adequate selling thimerosal containing vaccines to the USA while it is illegal to use such vaccines in their own country (Denmark)? Finally, how could these epidemiological studies imply that exposing a child to thimerosal, a very potent neurotoxin, decrease the rate of autism—this is nonsensical and implies an improper manipulation of the data? The latter implies we should give thimerosal as a preventive for autism, a thought that is patently ridiculous to anyone aware of the toxicity of this preservative in animal studies.

What does published science have to say about thimerosal toxicity and the possibility that this mercury containing compound may be involved in autism and related disorders? First, all of basic research has shown that thimerosal at very low concentrations is extremely toxic to human cells, especially neurons. A study in 1977 showed that 10 of 13 children treated topologically with thimerosal agents in a Toronto hospital for umbilical cord infections died of mercury toxicity. This lead to the removal of the topological antiseptic agents (mercurochrome and merthiolate) from the market.

In essence, there are numerous research articles that clearly describe the toxicity of thimerosal, even enough to warrant the removal of this material from small animal vaccines in 1992. In the early 1980s Russian researchers did work that caused them to conclude that thimerosal has no place in vaccinations. Research keeps coming out, now that the thimerosal issue is common knowledge to scientists, that shows that many biochemical pathways and many cell types are extremely sensitive to the toxic effects of thimerosal.

Research that I have been involved in has shown that the amount of thimerosal that is needed to cause neuronal damage is easily reached in infants given the normal vaccine procedures. In fact, it would be quite predictable that damage would be done when infants are given on at least 3 days of their life before 1 year of age vaccine exposures to mercury that are 30-70 times above the EPA recommended safe level. I, in collaboration with others, have measured the mercury levels in the birth-hair of normal and autistic children that was primarily contributed from the birth-mother's mercury exposures. What we observed was data that clearly showed that autistic children do not excrete mercury as effectively as do normal children and this data has been confirmed by research at two other universities. This results in a much lower blood levels

doi: 10.1588/medver.2004.02.00057

of mercury and therefore lower levels of birth-hair mercury level in autistic children. The lower blood levels are due to the mercury rapidly being taken up by the cells and not effectively excreted in autistic infants. Further, the observation that the more severe the autism, the less mercury in the birth hair, was additional proof of retention of mercury in the autistic child. Therefore, autistic children represent a subset of the population that cannot effectively excrete mercury and, being unable to detoxify themselves are more susceptible to mercury's toxic effects. This data has been backed up by recent research showing that autistic children have low levels of the compound (glutathione) that the body uses to complex and remove mercury from inside the cells. This fits into the genetic susceptibility hypothesis for damage from thimerosal which would explain the fact that only certain children are affected by the vaccinations. This is similar to observation that Alaskan natives cannot detox alcohol as well as Caucasians—they have a genetic susceptibility to alcohol toxicity. However, alcoholism is not a genetic disease based on the fact that if they are not exposed (i.e. don't drink alcohol) they will not become an alcoholic.

The other connection between thimerosal toxicity and autism comes from the observation that 4 of every 5 autistics are boys, a distinct gender bias. This ratio may be explained by the effects of estrogen versus testosterone on thimerosal toxicity. In our studies the female hormone was protective against thimerosal toxicity whereas the testosterone dramatically increased its neuron killing capability. This explanation was supported by the observations by a Dr. Baron-Cohen in England who reported that the amniotic fluid of mothers who gave birth to autistic children differed from the same fluid from mothers of normal children by only the elevated presence of testosterone. This can be evaluated as autistic children, on the day they are born, have higher testosterone levels and can be much more sensitive to the thimerosal exposure from the first Hepatitis B shot they receive that day.

However, there is a push for research showing thimerosal safety by certain groups who were positioned to be responsible for vaccine safety or who are directly involved in the manufacturing of vaccines. There are two papers regarding this issue (published in multiple sites) that have been released that I feel need discussing. One, called the Danish study (mentioned above), contends that removal of thimerosal from their vaccines was followed by an increase in autism thereby proving that thimerosal was not causal for this disease! An amazing claim when one considers the toxic potency of thimerosal. However, according to their own records, the rate of autism in Denmark before removal of thimerosal was about 0.2 per 10,000, an amazingly low rate! Note that this is lower than the pre-epidemic rate in the USA which was about 3-5 per 10,000. The current elevated rate the Danish report after the removal of thimerosal went up to 2-5 per 10,000 compared to the current USA rate of 67 per 10,000. Comparing the Danish rate to the USA or British rate is like comparing apples to cows! Therefore, a quick review of the Danish autism data system was done and it showed that they kept very poor records, loosing autistic children from their early records, which likely accounts for their initial exceptionally low rates. It appears as if the recent keeping of more accurate records and the inclusion of other changes (such as changing the description of other diseases as now being autism) was the reason for recent apparent increase in recorded autism cases, not the removal of thimerosal. Common sense requires that one question any argument where the removal of a potent neurotoxin like thimerosal increases neurological problems.

Looking at the broad picture, it should be noted that the Danish never vaccinated their children on the day of birth as we have done in the USA. Instead they waited several weeks to months before the first vaccination and never approached the number of vaccinations or mercury exposure levels that USA infants have been given before age one. Therefore, considering the autism rates in Denmark today (2-5 per 10,000) versus the USA rates (about 67 per 10,000) one could logically conclude that the lower rates in Denmark are due to exposing their infants to less vaccine derived mercury and exposing them only after a period of maturation.

The second study needing discussion was presented in *Lancet* by Pichichero et al. where they used about 36 children and measured the decrease in blood mercury levels and also monitored fecal excretion levels after vaccinations containing thimerosal. Their conclusions were that the mercury from thimerosal cleared the blood with a half-time of 5 days or less and therefore was not around long enough to cause toxic problems. They also found nanogram levels of mercury (ppb) in the feces and stated this as proof that the mercury was being removed by fecal excretion. I evaluated this paper with Mark Blaxill, a statistician, and we noted that, using the amounts excreted in the fecal material, that it would take much longer than 5 days to remove the mercury that was found decreased in the blood. We determined a minimum of about 74 days to greater than 1,339 days to excrete the amount of mercury in the feces that a USA child receives in their first six months (187.5 mcg). Therefore, the mercury that Pichichero et al. reported decreasing in the blood of infants given thimerosal within the first 5 days is primarily being removed from the blood by being taken up by the infant's central nervous system cells and other tissues. It is not being excreted in the feces or urine!

In summary, there is sound scientific data available to indicate that thimerosal in vaccines would be the most likely suspect in the recent epidemic of autism. Epidemiological studies using the VAERS data-base from the CDC presents strong evidence to conclude that the hypothesis that thimerosal exposures are the etiology of autism is correct.

Studies comparing autistic to normal infants show that there is a major difference in the way these two groups excrete mercury. Even normal children show great differences in their ability to excrete mercury. It appears as if autistic children do not effectively excrete mercury and are therefore more sensitive to its toxic effects. There are many individuals, organizations and agencies that will be embarrassed by this observation as they did not consider the safety testing of early vaccinations before they encouraged the mandated vaccine policies that lead to the toxic mercury exposures in infants that greatly surpassed EPA recommended levels. This has lead to the publication, supported by accompanying news releases, of articles that seem designed to come to conclusions that hold thimerosal as a harmless agent when given to infants. These articles never suggest any other hypothesis for the epidemic of autism. In the end, thimerosal will be removed from all infant vaccines and the truth will come out. Until then, our legislators have to recognize that the great increase in autism and related disorders will impose a huge cost on our medical welfare system. It will also cost immensely in the loss of healthy, happy lives and a corresponding increase in the misery of the autistic children and their parents and family.

doi: 10.1588/medver.2004.02.00057