



Andrews, Nick et al. “Thimerosal Exposure in Infants and Developmental Disorders: A Retrospective Cohort Study in the United Kingdom Does Not Support a Causal Association.” *Pediatrics* 4.3 (Sep. 2004): 584-591.

This is a U.K. retrospective cohort study that seeks to investigate whether infant reception of increasing thimerosal doses via the diphtheria-tetanus-whole-cell pertussis (DTP) and diphtheria-tetanus (DT) vaccines yields a subsequent risk for developing general developmental disorders.

The U.S. EPA limit for daily ethylmercury (thimerosal) exposure is 0.1 µg/kg. But during the 1990’s, children receive a cumulative dose of 187 µg from vaccines by the age of 6 months, so it is important to assess whether high exposure to thimerosal is harmful to children. The U.K. administers much lower cumulative thimerosal doses, as DTP and DT are the only thimerosal-containing vaccines in the country. Although U.K. children receive lower cumulative doses, children in both countries receive about the same amount of thimerosal (150 µg) by age 3-4 months, making comparison between these two countries highly reliable. “Exposure” in this study is defined as the number of DTP/DT doses received by age 3-4 months. Data for 109,863 U.K. children is analyzed between 1988 and 1997. The “outcome” encompasses all reports of general neurodevelopment disorders, including autism, behavior problems, speech delay, ADD, tics, encopresis, enuresis and other unspecified developmental delays. Hazard ratios (HRs) for each disorder are calculated per dose or per unit of cumulative DTP/DT vaccine exposure.

The results find that the increasing doses DTP/DT actually offer a protective effect from general developmental disorders, speech delay and ADD. In only one incidence does increasing doses of thimerosal result in a negative outcome (tics). For all other disorders, no association is



found. It can be concluded that, besides the possible exception of tics, thimerosal in DTP/DT vaccines does not cause developmental disorders.

This cohort study is presented at the infamous February 9, 2004 IOM Immunization Review Committee meeting. This document is a significant resource because it contributes to the government's final official silencing of the autism-thimerosal hypothesis. One limitation of this study is that it focuses on general developmental disorders as the outcome. The results would be stronger if only one disorder is focused on. However this is still a very good scientific source.



“Autism and the MMR Vaccine.” *National Institutes of Health* Pub. No. 01-4963  
(June 2001): 1-8. Web. PDF file. 1 Feb. 2010.

This is a 2001 National Institute of Child Health and Human Development (NICHD) pamphlet that presents evidence against the autism and MMR vaccine link.

The pamphlet begins by giving a basic definition of autism. It then explains that many people falsely believe that the MMR vaccine causes autism, since the vaccine administration and onset of autism tend to coincide temporally. Also published studies such as Wakefield et al. 1998, Singh et al. 1998, etc. have augmented this widespread misconception, but the pamphlet repeatedly assures that these studies’ claims are completely wrong. The pamphlet reiterates this point by providing a list of reliable studies that find no link between vaccines and autism.

There is also a list of proposed studies exclusive to the NIH. The agency promises that it is in the process of “expansion, intensification, and coordination of the NIH with respect to research on autism.” The NIH also shares a hope to start a committee of parent representatives from various autism advocacy groups.

The final sections of the pamphlet discuss the benefits of vaccination over non-vaccination. It states that the risk of measles, mumps and rubella far outweighs the risk of vaccination. It lists symptoms and death rates for each disease. Also there is a paragraph warning that rubella can cause birth defects in the babies of pregnant women. The pamphlet ends with a last reassurance that the CDC and the AAP highly recommend everybody to get their children vaccinated.



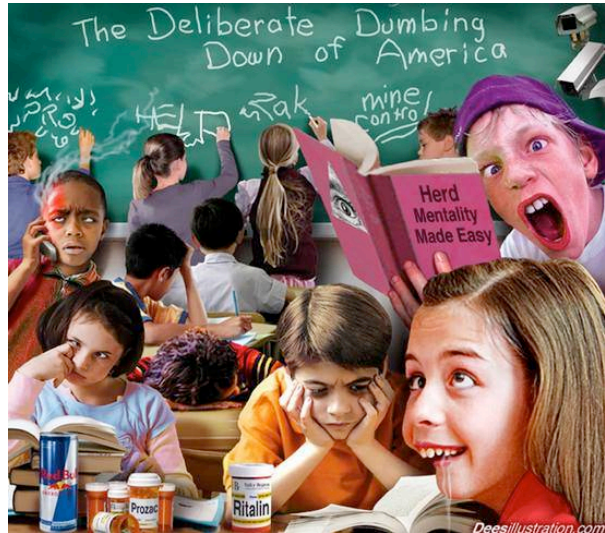
There are many elements about this pamphlet that may make it a significant “debunking” resource during this highly controversial anti-vaccination era. One appeal is that it is written in lay terms and is very easy to follow. Second is the overwhelming amount of listed research projects in support of vaccination, and most of these projects are conducted by trusted government agencies. The anti-vaccination studies are only briefly reviewed and the pamphlet is sure to put down their findings, stating that “none of these provide scientific proof of such a link.”

However, this pamphlet could be detrimental to its purpose. Parents, particularly autism activists, may interpret the pamphlet as a government attempt to “hush” their opposing support of anti-vaccination. For example, the reassuring claim that the NIH is going to start a parent committee (a long sought-after goal of autism activists) could be misinterpreted as a weak attempt to pacify enraged parents. Also the pamphlet is worded in a way that “guilts” mothers who choose not to vaccinate their children. Basically it says, “If you choose not to vaccinate your child, it is your fault if your child gets sick and dies. We [the NIH] have sorted through the scientific evidence, and we are very confident that we know best about vaccination, and therefore you [the reader] should vaccinate your child because we say so.” This wording may be convincing to some parents, but not so much to the autism activist parents that are convinced of a government conspiracy theory.

Dees, David. "The Art of David Dees." Digitally altered photographs. *rense.com*, The Jeff Rense Program, n.d. Web. 6 May 2010.

This is a gallery of digitally altered photographs characterized as political art commentary. These images are often highly disturbing but extremely satirical in nature.

Included in the gallery are the anti-vaccination images shown below.





The artist uses photo manipulation to present extreme views with these images. The images are disturbing yet captivating, and these tactics are how Dees captures an audience. The satire of images lays in Dees' derision of the fanatic and radical nature of conspiracy theories. Many conspiracy theories are simply wrong interpretations of reality, but what is so compelling about Dees' art is that it transcends the views of the large anti-vaccination subpopulation during the height of the late 1990s autism-vaccine controversy. When a large majority of people believe in a conspiracy, it is counterintuitive to classify all of them as delusional simpletons. So really, Dees' images help reveal that the anti-vaccination movement is not a result of people misinterpreting reality, but rather the result of a





complex knowledge construction defined by the notions of a confused society. It would be interesting to contrast these new-age images to anti-vaccination illustrations from the 19<sup>th</sup> and 20<sup>th</sup> centuries, and inference how this constant, low-level anti-vaccination discourse has perpetuated for centuries.

Fombonne, Eric et al. "Pervasive Developmental Disorders in Montreal, Quebec, Canada: Prevalence and Links With Immunizations." *Pediatrics* 118.1 (Jul. 2006): e139. Web. 2 April 2010.

This is a Canadian retrospective cohort survey study that seeks to investigate whether changes in the vaccination schedule (where more thimerosal is administered) have an effect on the increasing trend of pervasive developmental disorders (PDD). Also, MMR vaccination rates are assessed via surveys to see whether this thimerosal-free vaccine contributes to PDD prevalence rates.

"PDD" is defined to include autism, PDD-NOS, Asperger syndrome and childhood disintegrative disorder (CDD). 27,749 schoolchildren are looked at between 1987 and 1999. Cumulative thimerosal exposure by age 2 years is classified as either medium (100-125 µg) from 1987 to 1991, high (200-225 µg) from 1992 to 1995 or nil (thimerosal use is discontinued) from 1996 to 1998. In addition, MMR vaccine coverage rates are determined using national surveys.

Out of the 27,749 children, 180 cases of PDD are found. Like in other studies, this study shows a high male-to-female ratio (4.8:1). During this study period, a linear increase in PDD cases is seen. The prevalence of PDD is significantly higher in the thimerosal-free vaccine (nil) cohort than in the thimerosal-containing vaccine cohorts (medium and high). Applying this data



to logistic regression models shows that thimerosal has no effect on the observed increasing PDD prevalence rates. In regards to the surveys, it is seen that MMR vaccination coverage rates decrease from 96.1% during the 1988 to 1989 cohort to 92.4% in the 1996 to 1998 cohort. When the statistical and survey results are combined, it shows that PDD rates increase as both thimerosal uptake and MMR vaccination rates decrease. When adjustments are made for possible limitations and misclassifications, these results are still shown to be robust. Thus no relationship is seen between thimerosal and PDD prevalence rates, and no relationship is seen between MMR vaccination and PDD prevalence rates.

This study has little limitations, but it is hard to follow because it attempts to assess two unrelated variables: the thimerosal-PDD link and the MMR-PDD link. Also, the study applies different methods of epidemiologic analyses for these two variables: one is a cohort study and the other uses national survey results. This study would be better if it is divided into two separate studies. However, the study's design is ultimately compelling despite the confusion because the results show that both thimerosal-free and thimerosal-containing vaccines show no relationship with the increasing PDD prevalence rates. This study also gives good figures and data. Overall this is a strong scientific source.



Gillberg, Christopher, Suzanne Steffenburg and Helen Schaumann. "Is Autism More Common Now Than Ten Years Ago?" *British Journal of Psychiatry* 158 (1991): 403-409. Web. 4 Feb. 2010.

This is birth cohort study analyzing autism prevalence rates in Sweden. Gillberg performs a total of three autism prevalence studies in the same area at different time periods (this study is his last) and compares the rates to determine if an increase in autism cases is observed over time.

In the first two studies, Gillberg screens autism rates in the cities of Göteborg and neighboring Bohuslän in 1980 and again in 1984 (note the 1984 age-specific population is defined as children born between 1975 and 1984). Screening is accomplished by administering surveys to physicians, psychiatrists/psychologists, social workers, therapists, teachers, school authorities and parents. These studies define "autism" to encompass classic autism, childhood psychosis, childhood schizophrenia and mental retardation with autistic traits. The results for the 1980 study give an autism prevalence rate of 4.0/10,000 children (singular data from Göteborg), with 50% of the cases reported as classic autism. In contrast, the 1984 study gives a higher rate of 6.6/10,000 children (combined data from Göteborg and Bohuslän), and nearly 67% of the cases are identified as classic autism.

In this new study, Gillberg seeks to identify any missed cases from his previous 1984 study (the 1980 study is not analyzed because it has a different birth cohort from the 1984 study and only includes singular data from Göteborg), and to also examine the possibility that many newly reported cases may come from immigrant families. In 1998, Gillberg recalculates the autism prevalence rates for the 1975 to 1984 cohort by screening data from various state-wide registers and contacting the original 1984 survey-takers. All newly reported autism cases are meticulously examined to confirm their autism diagnoses. The results give a new adjusted prevalence rate of 9.5/10,000 children (combined data from Göteborg and Bohuslän), with 75% of the cases representing classic autism. This study also finds that 60% of the newly reported Göteborg cases between 1984 and 1988 are reported from immigrant families, which indicates a true increase in autism. Gillberg concludes that autism prevalence in Göteborg is closer to 1/1000 rather than the previous calculation of 1/2000 to 1/5000, and that this increase in rate is likely due to improved diagnostics and influx of immigrant families.

This study gives good epidemiologic data. It is also culturally significant because it is later reanalyzed and cited in a 2001 NIH document entitled, “Autism and the MMR Vaccine.” However this study has some major flaws. For one, it attempts to analyze way too many variables. Although not discussed in the summary above, Gillberg surveys other factors like SES and IQ among the study group and attempts to make generalized inferences from them. For example, Gillberg finds that IQ and SES are generally higher among autistic children in his 1998 survey and concludes that autism is now spreading to the upper-classes. Analyzing multiple variables and making one generalized conclusion about them is bad science. Also, his definition



of “autism” is outdated, as no one today would dare classify mental retardation and autism as similar.

Gillberg, Christopher and Harold Heijbel. “MMR and autism.” *Autism* 2:4 (1998): 423-424. Web. 2 Feb. 2010.

This is an ecologic reanalysis of an original Swedish study (Gillberg et al. 1991). The author applies a new variable, the 1982 introduction of the MMR vaccine, to the data from his 1991 study. He then determines if this event is the cause of the increased prevalence rates (the 1991 study shows that the original rate 6.6/10,000 increases to 9.5/10,000 when a miscalculation adjustment is applied).

The data for the 1975 to 1984 cohort is reanalyzed by comparing it to the 1982 introduction of the MMR vaccine. The hypothesis is that children born after 1980, when MMR administration becomes widespread, are susceptible to MMR-linked autism. The subjects are divided into two birth cohorts: Group I is the children born between 1975 and June 1980 (55% of the 10-year period); Group II is the children born between July 1980 and 1984 (45% of the 10-year period).

The results find that 62% of Group I and 38% of Group II contain children diagnosed with autism. If the MMR vaccine does have a strong effect on the prevalence of autism, at least



45% of Group II should be autistic. Since this is not the case, the reanalyzed data from the 1991 study does not support an autism-MMR link.

This paper is written in response to the 1998 Wakefield study. It is significant because it is cited in the 2001 NIH pamphlet entitled, “Autism and the MMR Vaccine.” This pamphlet is published by the government to advocate vaccination, and it uses this particular study as one of its argumentative supports. This study’s reanalysis is striking, but it has many limitations. For example, the sample size of the 1975 to 1984 cohort includes only 55 children, a study population way too small to imply that this study has strong statistical results. Also, the parameters for this paper and his 1991 study are culturally outdated- the definition of “autism” for these studies includes childhood schizophrenia and mental retardation, diagnoses that are no longer classified with autism. These studies are also performed when the DSM-III is in use, which has much different diagnostic criteria than the current DSM-IV version.

Halsey, Neal, Susan Hyman and the Conference Writing Panel. “Measles-Mumps-Rubella Vaccine and Autism Spectrum Disorder: Report From the New Challenges in Childhood Immunizations Conference Convened in Oak Brook, Illinois, June 12-13, 2000.” *Pediatrics* 107:5 (May 2001): e84-107. Web. 2 Feb. 2010.

This paper presents data from a 2000 American Academy of Pediatrics (AAP) conference where scientists, physicians and parents are brought together to present data on the MMR vaccine and autism. A panel of experts reviews the presented data and concludes that there is no autism-MMR link and that the monovalent measles, mumps and rubella vaccine provides no protective benefit over the combination vaccine.

The main autism-MMR link hypothesis is made by A.J. Wakefield in his 1998 and 2000 studies. His hypotheses are summarized below:

- The measles virus, especially when associated temporally with another acute illness, increases the risk for chronic G.I. inflammation.
- Risk factors such as age, sex, type of exposure, etc. influence the severity of the G.I. illness.
- In autistic enterocolitis, the measles virus damages the intestines’ immune function.

- Disrupted immune function causes increased intestinal permeability, which allows neurotoxic substances to reach the brain. Permanent damage is more likely in the developing brains of infants and young children.
- In certain susceptible subgroups, the trivalent MMR vaccine presents an atypical form of measles infection that alters the immune response to antigens, thus increasing the risk of developmental regression; the monovalent measles vaccination is more natural and reduces this risk.
- The MMR vaccine is responsible for the worldwide “autism epidemic.”

Another scientist, Edward Yazbak, also suggests an autism-MMR link. His hypotheses differ from Wakefield’s ideas:

- Some children are genetically susceptible to autism by a G-alpha protein defect.
- The live measles virus depletes the body of vitamins, resulting in metabolic, immunologic and behavioral disruptions.
- Vitamin A supplements can be used to treat and possibly reverse these disruptive symptoms.

In order to test the validity of the presented data, the review panel starts out by listing criteria and parameters for what they find to be acceptable data. One such criterion is assessing causality, which is accomplished through determining the following:

1. Strength of association
2. Consistency
3. Specificity
4. Temporality
5. Biologic gradient





6. Plausibility
7. Coherence
8. Experimental evidence
9. Analogy

Another criterion is determining what the term “autistic” encompasses. The panel determines that all autism spectrum disorders (ASD) are to be considered. This definition includes autism, Asperger syndrome, childhood disintegrative disorder and pervasive developmental disorders (PDD).

The panel discusses the limitations and the misinterpretations of epidemiological studies. Reported prevalence rates are often skewed by confounding factors; these factors include migration, change in age of onset or diagnosis, influx of unaffected children, increased ascertainment of children with ASD diagnoses, expansions in diagnostic criteria and true increases in the incidence of ASD. Due to these variables, deciding if there is a true increase in ASD in the last decade proves quite difficult. Many epidemiologists agree that increased ASD diagnoses can be attributed to improved diagnostic techniques and availability, improved public awareness and the expansion of the diagnostic definition of “autism.” With this in mind, the panel moves on to debate the various hypotheses seen below.

First, the panel tries to determine whether or not there is a temporal association between the MMR vaccine administration and the onset of autism symptoms. If a temporal clustering is proved, three possible explanations can explain it:

1. The vaccine unmasks latent ASD in children who are predetermined to develop the syndrome.
2. The vaccine causes ASD.

3. The vaccine is an epiphenomenon, an event that occurs simultaneously with another event and affects the outcome.

After reviewing various studies and data, the panel concludes that there is not sufficient data to support a temporal association. For example, many studies show that ASD cases continue to increase dramatically even when MMR immunization rates (~95%) remain constant. There is also a study that shows significant ASD rate increases between the late 1980s and 1990s, long after the MMR vaccine has been introduced.

Other proposed ASD causes are listed. First genetics is considered (inheritance, polymorphisms of an early developmental gene (HOXA1), mutation of MeCP2 gene, genetic loci on chromosomes 15q11-15q13 and 7q, tuberous sclerosis). Then environmental factors are debated (infection, aberrant immune response, exposure to teratogens/thalidomide during fetal development, PKU, differences in MHC genes). The panel also considers the interaction of these genetic predispositions and the environment.

Some scientists hypothesize that structural brain changes could imply the timing of an insult. Some changes include increased brain size, decreased Purkinje cells in the cerebellum, hypoplasia of the cerebellar vermis and decreased volume of the amygdala. However these structural changes are not uniform findings among all ASD individuals. It is also notable that most of the reported abnormal brain development seen in ASD cases occurs before thirty weeks gestation. These findings suggest that vaccines are not responsible for changes in brain structures.

The panel then explores the possibility that ASD children may have a different immunological function from the general population. There is evidence that ASD children exhibit small immunologic function differences from mean populations, but generally ASD

children are still generally within the normal range of functioning. Thus the panel concludes that there is no significant difference in immunology between ASD children and unaffected children.

Then the review panel discusses the association of G.I. symptoms with ASD. Examples of proposed gut-autism links include: increased serotonin levels associated with gut platelets, peptide receptors in the gut, peptides and vagal stimulation, excess absorbance of opiate-like peptides and defects in G-alpha subunit proteins. These associations suggest that there is a bidirectional interaction between the CNS and the enteric nervous system, and that disruptions in the gut can directly result in harmed brain function. Thus, the panel believes that as ASD cases increase, there should be a subsequent increase in the reports of G.I. disorders. However there is a lack of data to support this hypothesis so the panel dismisses it.

Later the effects of measles, mumps and rubella infections are assessed. Measles infection is known to cause persistent CNS infection in immunodeficient individuals. Mumps infection can cause meningitis and meningoencephalitis. Rubella infection is linked to congenital rubella syndrome during pregnancy, which can insult the developing brain and perhaps cause autism. However, all of the evidence shows that MMR infection, not the MMR vaccine causes these problems and the panel again finds nothing significant against vaccines.

The panel then reviews data on the administration of the MMR vaccine. The panel members conclude that simultaneous administration of the MMR vaccine is not associated with an increased rate of adverse events, as compared with the rate for separate vaccine administration. The panel also concludes that separate vaccine administration can cause missed or delayed immunization, which is almost as harmful as non-vaccination.

A few more hypotheses are presented. One question is whether or not the measles virus is present in the intestinal wall of patients with IBD or ASD, but only conflicting data is

presented on this. The proposition that measles, the measles vaccine or the MMR vaccine are associated with IBD is debunked. Finally, a study is presented that suggests that ASD has an infectious origin. When rats are injected with live viruses, researchers observe long-term alterations in brain development and behavior. These findings are interesting, but the panel rejects them because the effects are only seen in animals, not humans.

The panel concludes the meeting by applying the causality criteria that is laid out at the beginning of the meeting:

1. **Strength of association:** Weak. Increased ASD reporting is not correlated with the MMR vaccine. No temporal clustering is observed.
2. **Consistency:** Weak. No consistent pattern of the MMR vaccine causing ASD is seen. No uniform comorbidity with IBD is observed.
3. **Specificity:** Weak. ASD and the MMR vaccine are associated by chance; no findings are specific.
4. **Temporality:** Weak. Ambiguity is seen in the timing of reports of behavioral and G.I. symptoms after immunization.
5. **Biologic gradient:** Weak. There are no reports of late-onset ASD due to extra MMR vaccine dosages. There is no data suggesting a dose-response effect between the MMR vaccine and the subsequent development of ADS.
6. **Plausibility:** Weak. There is no evidence that postnatal rubella exposure induces a predisposition to ASD. There is no persistent evidence of measles in the G.I. tract of individuals with IBD. There is no evidence for viral causes of ASD. Simultaneous MMR vaccination poses no addition risk to test subjects. It can be concluded that the association between the G.I. system/CNS with ASD is most likely the result of common

gene action or common physiology mechanisms, not the result of one abnormal organ system causing an abnormality in the other.

7. **Coherence:** Weak. There is no evidence that patients with particular genetic, G.I. or other predisposing factors develop ASD after receiving the MMR vaccination.
8. **Experimental evidence:** Weak. There is no risk or benefit for receiving either a trivalent or monovalent MMR vaccination.
9. **Analogy:** Weak. Simultaneous viral exposure is not linked to causing a predisposition to ASD or other neurological disorders.

This paper is probably one of the most reliable resources published during the MMR vaccine scare. At this conference, the panel thoroughly combs through all of the data and studies available at the time and forms a reliable conclusion that the autism-MMR link is false. The panel discussion is unbiased- pros and cons of each subject are debated fairly. This is a highly reliable scientific source. One limitation of this panel meeting is that every single outcome supports a non-causal relationship between ASD and vaccines, and some people are bound to misinterpret these as “rigged” conclusions.

Hvidd, Anders et al. “Association Between Thimerosal-Containing Vaccine and Autism.” *Journal of the American Medical Association* 290.13 (1 Oct. 2003): 1763. Web. 25 Mar. 2010.

This is a Danish population-based cohort study that compares children vaccinated with the thimerosal preservative with children receiving the same thimerosal-free vaccinations. The study seeks to find whether thimerosal poses an increased risk for developing autism or ASD.

This study uses data from the Danish Civil Registration System. Denmark’s vaccination program is free and voluntary. Also, the only thimerosal-containing vaccine administered since 1970 is the whole-cell pertussis vaccine, and the thimerosal-containing version of this vaccine is discontinued in 1992. Statistics are derived from children that are vaccinated between 1990 and 1996, giving two testable groups. Children vaccinated prior to June 1, 1992 represent the thimerosal recipients and children vaccinated after June 1, 1992 represent the thimerosal-free recipients.

467,450 children are born between 1990 and 1996, during which 407 cases of autism and 751 ASD cases are reported. Of the 407 autism cases, 104 receive the thimerosal-containing vaccine and 303 receive the thimerosal-free vaccine; of the 751 ASD cases, 321 receive the thimerosal-containing vaccine and 430 receive the thimerosal-free vaccine. The rate-ratio (RR) of autism and ASD is found to be 0.85 and 1.12, respectively. These rates indicate that the risk





for developing autism/ASD is not significantly different between groups vaccinated with and without thimerosal. Furthermore an increase in RR per 25  $\mu\text{g}$  of ethylmercury is 0.98 for autism and 1.04 for ASD, showing that there is no dose-response association.

According to the calculated RRs, it seems that there is no significant difference in risk for developing autism/ASD between those vaccinated with thimerosal and those vaccinated without thimerosal, and that administering vaccines with higher doses of thimerosal poses no risk either. Therefore a causal relationship between thimerosal and autism is not supported.

This cohort study is presented at the infamous February 9, 2004 IOM Immunization Review Committee meeting, where the government officially rejects the autism-thimerosal hypothesis. One limitation of this study is that the presented data is hard to follow, so readers that are not specifically trained to interpret epidemiological data could easily misconstrue the results. Another limitation is that the U.S. administers more thimerosal-containing vaccines than the singular one administered in Denmark, making inference between these two countries nearly irrelevant.

Kirby, David. *Evidence of Harm*. New York: St. Martin's Press, 2005. Print.

This is a non-fictional book, quite lengthy and comprehensive in content, which describes the autism-vaccine controversy during the 1990s. The book's main purpose is to convince readers of a government vaccination conspiracy theory so people will be discouraged to vaccinate their children. The story is told from the viewpoint of a father with an afflicted autistic child, as an anecdotal recount of the major events that occur during this time. The book is drenched with opinions and cultural interpretations of vaccination data. Below is a chapter-by-chapter summary and explanation.

## **1. Mothers on a Mission**

The opening chapter describes the main characters in the book and their anecdotal experiences during the time leading up to their children's autism diagnoses. Most of the stories are strikingly similar among the children: child develops normally until he receives his early childhood vaccines, child gets sick, child starts to regress and he eventually receives an autism spectrum disorder (ASD) diagnosis. During this time (the early 1990s) it is generally believed that autism is an inherited genetic disease.

Lyn and Tommy Redwood have a son, Will in 1994. Will receives the hepatitis-B, Haemophilus influenzae type B (Hib) and diphtheria-tetanus (DT) vaccines before the age of 1

year. Will is very sick as a child, with a notable history of gastrointestinal problems. Will begins to regress, eventually losing his ability to talk. He is eventually diagnosed with pervasive developmental disorder, not otherwise specified (PDD-NOS). His diagnosis is given to him before the MMR vaccine is available. Once the Redwoods become aware of the possibility that thimerosal in the vaccines may have poisoned their son, they test a baby hair sample and find that it contains 4.8 ppm of mercury (5 ppm indicates poisoning).

Sallie and Thomas Bernard give birth to premature triplets in 1987. Their son Bill weighs only 3 pounds at birth. As an infant and young child, Bill develops more slowly than his siblings and is always behind in reaching typical childhood milestones. By the age of 3 years, Bill loses his fine motor control, becomes socially withdrawn and depressed and is a total tyrant. He is misdiagnosed with dysphasia, but in 1992 he is given the correct diagnosis of PDD-NOS. Sallie enrolls Bill in a special education facility called the Developmental Learning Center in Madison, WI. She notes that when she first enrolls Bill, there are only a few dozen kids and the school is very small, but within 2 years time, the school has grown to include three large campuses. Sallie thinks the school's exponential growth evidences an "autism epidemic."

Liz Birt gives birth to her son, Matthew in 1994. Matthew receives all of his childhood vaccines on schedule. When Matthew receives his MMR vaccine at 14 months, he becomes very sick and develops gastrointestinal problems. Liz hears the rumors that vaccines may be linked to developmental disorders, so she attends an autism conference in 1998 featuring Dr. Vijendra K. Singh, a prominent autism researcher at the time who publishes multiple studies linking the MMR vaccine to autism. Dr. Singh's main hypothesis is that the measles virus causes certain predisposed children to develop autoantibodies to the myelin basic protein (MBP) in the brain.

The MBP is essential for higher brain functions. Liz also reads the 1998 Wakefield study in *The Lancet*, and becomes convinced that the MMR vaccine is the cause of her child's downfall.

Kirby sets the tone for the rest of his book in this opening chapter. The use of anecdotal information is emotionally appealing to readers who share similar experiences with their autistic children. Also, by telling nearly identical stories, Kirby implies that the behavioral regression and sickness observed in the children is a common result of vaccination. Using these techniques, the author encourages his readers to adopt his belief in anti-vaccination.

## **2. Injecting Fear**

This chapter discusses how the anti-vaccine avocation really starts gaining momentum. With alarming statistics, multiple published studies supporting the autism-vaccine hypothesis and questionable governmental response, many parents begin to believe in the anti-vaccination propaganda.

The chapter begins with another anecdotal account of an autistic child. Parents Alberta and Sima Enayti have an autistic son named Payam in 1987. After discovering all of the shocking autism research, Albert decides to call Merck to question a pharmaceutical representative about the safety of their vaccines. The representative assures him that all of Merck's vaccines are safe and FDA approved. When Albert asks about thimerosal and whether it can possibly cause neurological damage, the representative replies that the preservative is "harmless" and "like lemon juice." Later the Enaytis are blundered to find out that thimerosal is actually a mercury-containing compound. They become convinced that they had been lied to by Merck and the government, and that their son has been intentionally mercury poisoned.

The rest of the chapter describes how parents nationwide have banded together to form an anti-vaccine campaign. With increasing diagnoses rates, parents believe there is an epidemic of autism erupting around the country. A scientific example of this is seen in the 1999 California study published by the California Department of Developmental Services, which finds that the state sees a 273% increase in autism cases over the past 10 years.

Parents' fears are further confirmed with the clinical autism-vaccine link studies published at this time. Major players who are glorified by autism parents include Dr. Singh, Dr. Wakefield and Dr. Bradstreet. Dr. Wakefield hypothesizes that the genetic predisposition to poor immunology, in combination with the insult of a live vaccine virus, destroys the immune system. He thinks that gluten and casein (peptides found in wheat and dairy products) leak through holes in the G.I. tract and enter the bloodstream. The peptides then cross through the blood-brain barrier and thus damage the brain. Dr. Bradstreet, father of an autistic son, shares a similar hypothesis with his colleagues. Bradstreet hypothesizes that autism is caused by a dysfunctional immune system and "leaky gut syndrome" described originally by Dr. Wakefield. He thinks that this hypothesis explains the gastrointestinal problems and poor absorption of food seen in many autistic children.

In 1999, a study is released that shows that children may be exposed to more thimerosal than is healthy. In response to this, the FDA charges the Center for Biologics Evaluation and Research (CBER) to investigate the content of mercury-containing vaccines. CBER discovers that children are receiving an alarming amount of thimerosal from their vaccines. In response to this, a conservative internet columnist named Jon Christian Ryter publishes an article on FreeRepublic.com entitled "Warning on Thimerosal Will Be Played Down by National Vaccine Program Office of the CDC on Friday." He claims that he owns a document proving that the



CDC is trying to “cover up” the dangers of thimerosal simply because the “government can’t afford to dispose of its inventory containing this substance.” The document Ryter is referring to is a paper issued by the European Agency for the Evaluation of Medicinal Products (EAEMP). The EAEMP paper states findings dating back to 1990 that find “200 mcg of mercury in a fetus or infant could cause moderate to severe brain damage that would result in a rise in learning impaired children.” The following Friday, the CBER Joint Statement is released, just like Ryter predicts.

This chapter induces readers to further develop a belief in anti-vaccination. Most of the studies and data presented here are either theoretical or incomplete, but it is easy to accept it as truth. The author’s frame of the data and events makes his conspiracy theories highly believable.

### **3. Mercury Rising**

This chapter focuses on the effects of mercury overexposure. This chapter is set during the time (1999) when the government calls for the removal of thimerosal from vaccines. Vaccines from this point on are to be made with only trace amounts or no thimerosal at all. Many parents view the thimerosal recall as a governmental cover up, causing them to shift their trust to internet autism groups, scientists who publish study findings that support the autism-vaccine link and radical treatments. The thimerosal issue has more than just a parental response, but also a large political one. The release of the Joint Statement causes uproar among many right-wing, anti-government (and anti-Clinton) alarmists. There is also an upheaval among the medical community, as many doctors battle over the safety and morality in recommending potentially dangerous vaccines to their patients. Also in this chapter is an interesting list of





mercury-related diseases that have very similar symptoms to autism. In addition, there is a section explaining very popular treatments at the time known as chelation and secretin therapy.

The 1999 CDC statement release is quite confusing and infuriating to many parents. The statement is entitled “Thimerosal in Vaccines: A Joint Statement of the American Academy of Pediatrics and the Public Health Service” and it claims that “Some children could be exposed to a cumulative level of mercury over the first 6 months of life that exceeds one of the federal guidelines on methyl mercury.” Due to the potential risks of thimerosal exposure, the USPHS, AAP and vaccine manufacturers agree that thimerosal should be removed as soon as possible. The statement urges parents to postpone the birth dose of hepatitis-B until 2 to 6 months of age. Despite these negative findings, the government still urges parents and doctors not to waver from the childhood vaccine schedule because there is overall little reason for concern. When Lyn calculates how much thimerosal her son Will had received in his young life, it comes to a total of 237  $\mu\text{g}$  of mercury, 173  $\mu\text{g}$  of which he had received before six months of age. Will’s exposure has exceeded the EPA limit by 125 times.

Another reason why parents become so convinced by the autism-thimerosal link is the growing research on mercury poisoning, and how mercury-poisoned people often develop neurological and behavioral problems very similar to the trademark symptoms of autism. The effects of mercury poisoning vary according to the individual, and children are much more sensitive than adults are to the same dose of mercury. Other factors include the rate of exposure (chronic versus acute), the route of exposure (inhalation, topical, oral, injections) and predetermined genetic susceptibility.

- **Mad Hatter’s Disease:** A syndrome common in the 1800s as a result of occupational exposure to mercury vapor. Some hat makers during this time are known to develop

depression, sluggishness, acute anxiety, irrational fears, poor social interaction, poor movement and coordination and are prone to agitation, irritability and aggression.

- **Minamata Disease:** Seen in the early 1950s among residents of Minamata Bay in southwestern Japan. A fishing community is located in close proximity to a factory that expels heavy mercury wastes into the surrounding sea. Many people begin suffering from severe neurological problems, including limb numbness, sensory disturbance, poor movement and coordination, fatigue, tremors, seizures, slurred speech, diminished vision and hearing, partial paralysis, jerking movements, difficulty swallowing, convulsions, brain damage and death.
- **The Iraqi Grain Incident:** In 1971, Iraq's Fertile Crescent suffers a severe drought and as a result, the government imports 178,000 tons of drought-resistant wheat seed to plant for the following year. The grain is treated with a methylmercury insecticide. After consuming bread made from this grain, many people suffer from neurological problems such as burning or prickling of the skin, poor vision, poor motor coordination, blindness, hearing loss, coma and death. Pregnant mothers exposed during this time give birth to children with cerebral palsy, mental retardation, weakness, seizures, visual loss, delayed development, seizures and abnormal reflexes. An outbreak occurs, leading to the deaths of 450 people and countless illnesses.
- **The Pig Farm Poisoning:** In 1950, a farming family from New Mexico eats from one of their slaughtered pigs for about 3 months. The pig had been fed mercury-treated grain throughout its life. Not until after the pig is consumed entirely do family members begin to suffer from quadriplegia, mental defects and vision loss. The family members have

elevated brain mercury levels for years after the event, and two of the younger children die.

- **Acrodynia or “Pink Disease”:** A childhood disease outbreak that afflicts tens of thousands of children in Europe, Canada and Australia in the 1930s. Infants are exposed to inorganic mercury through teething powders, calamine lotions and Mercurochrome. About 1 in 500 children develops the disease, which strangely this rate is about the same as the U.S. autism rate during the 1990s. Symptoms include a red rash, peeling skin, lethargy, anemia, sensitivity to light, respiratory distress, depression, loss of speech, diminished affect, irritability, self destructive behavior and general poor health. It is not until 20 years after this outbreak do most manufacturers feel pressured to remove mercury from their products.

A major autism event in 1999 is the October Defeat Autism Now! (DAN!) Conference. DAN! is a group of physicians and scientists who join together to focus on curing autism. This group has a large following from parents since it offers the “DAN Protocol,” a document that lists state-of-the-art diagnostics and treatments for autistic patients. At the conference, speakers discuss the potential environmental causative agents of autism, which include vaccines, pesticides, diet, infectious diseases, pollution and toxic metals. One man, Dr. Kenneth Block, says that toxic metals can “down-regulate” the immune system so much that it reverses the ratio of cytokines. Cytokines are divided into two categories: TH1 and TH2. TH1 induces the growth of immune cells that attack infection and TH2 heads antibody production. Dr. Block hypothesizes that toxic metal exposure causes the production of more TH2 than TH1, and the antibody response makes the body attack itself.

In response to mercury fears, many parents begin treating their children with an unproven, but anecdotally successful treatment known as chelation. The treatment consists of oral administration of dimercaptosuccinic acid (DMSA) every 4 hours for a week. The treatment is continued for a set amount of weeks, on an every-other-week basis. The mercury is excreted through urination. Once urine mercury levels are down and stabilized, lipoic acid is then administered to chelate the remaining mercury that is tightly bound within cells. The idea behind chelation therapy is that complete eradication of bodily mercury will return an autistic child to his original level of functioning. This treatment is dangerous and has a lot of side effects, but parents desperate for a cure are willing to give it a try. There are many anecdotal accounts of autistic children making dramatic improvement after the therapy, although the improvement is usually temporary.

Another popular treatment choice during this time is secretin therapy. Findings show that many autistic children are deficient in secretin, a hormone that stimulates the release of bicarbonate from the pancreas, which assists as a buffer against stomach acids. Secretin is therefore hypothesized to reverse the effects of “leaky gut syndrome” by promoting nutrient absorption in the deprived autistic brain. There is also some evidence that secretin also increases low serotonin levels in autistic brains. Like chelation therapy, secretin therapy is an unproven cure for autism and only anecdotal accounts of success have been noted.

The chapter closes with a contrast between the governmental and parental views of vaccination. After reviewing the available body of scientific studies, the government repeats the mantra (for the next decade) that there is “no evidence of harm having occurred from thimerosal vaccine administration.” But parents oppose this conclusion, believing that “no evidence of harm does not equate with no harm having occurred.”

The release of the 1999 Joint Statement causes a profound growth in the anti-vaccination following. Previously unsure of the validity of the government's recommendations, now the thimerosal recall feeds into parents' unconfirmed conspiracy theories. Although the anti-vaccination response may be premature, it is understandably justified by the circumstances at the time. It is interesting to see how this general distrust of the government shifts the autism public's attention and trust towards more unreliable and radical theories for answers. Parents now find dangerous treatments unnerving, and reasonable government actions are ignored. It seems that autism parents share a common longing in three areas:

1. Wanting someone to blame for their children's diagnoses'.
2. Working to retrospectively unravel the events that cause autism.
3. Doing everything in their power to find a cure for their child.

#### **4. Red Flags on the Hill**

This chapter offers descriptions on events where parents join forces with politicians, and how the autism-vaccination hypothesis voice is heard loudly now in Washington D.C.

In 2000, a Dr. Offit publishes the book, *Vaccines: What Every Parent Should Know*. The book insists that the benefits of vaccines far outweigh their risk, and encourages parents to ignore theoretical information and continue vaccinating. Merck is both the book distributor and business partner of Dr. Offit. Autism parents are outraged by the book when they discover this fact. One reviewer writes that "the sole purpose of this book is to convince parents to vaccinate their babies when and how the medical establishment/drug industry wants them to," and "everyone should proceed with caution when a multi-billion dollar conglomerate gives their stamp of approval on a book."

Another event that occurs during this time is Wyeth Lederle's release of Rotashield, a rotavirus vaccine. But weeks after the release, the vaccine is pulled because 10 children die from a deadly bowel obstruction called intussusception. Both the book release and the vaccine recall only fuel more criticism from the autism community. Parents believe that the government has an overzealous drive to achieve a 100% vaccination rate, as quickly as possible and without regard to possible side effects.

This section mentions a few notable political figures in support of anti-vaccination conspiracy theories. First there is Congressman Dan Burton. Burton is known for busting otherwise unseen political scandals such as the Janet Reno Waco disaster and the Vince Foster murder ordeal, and is now focusing his attention towards proving the government responsible for the national autism crisis. There is also Rick Rollens, a former secretary of the upper house in the California State Senate, who establishes Families for Early Autism Treatment (FEAT) and helps create the Medical Investigation of Neurodevelopmental Disorders (MIND) Institute at UC Davis. Rollens is also responsible for convincing legislature to carry out the famous 1999 California epidemiological report.

The chapter goes on to describe the autism events that occur April 4-7, 2000 in Washington D.C. There is a press conference, a congressional hearing, a NIH debriefing and a major rally on the Mall. During the press conference, Burton along with a panel of parents, question the safety of administering vaccines laden with toxic metals. Vaccine proponents argue that most of the current reliable research, that withstands the rigors of the scientific method, generally proves a non-causal link between vaccines and autism. Burton is accused as being a "cheap publicist" trying to appeal to confused Americans in an attempt to gain an anti-





vaccination following. The NIH debriefing turns into a yelling rally after parents become tired of NIH officials presenting “20-year-old information” on autism.

The Offit book opposition, the Rotashield recall and the political arguments described in this chapter are just more examples of how bad the polarization between parents and professionals really is. It is also important to note how powerful vaccine opponents and autism advocacy groups become with the support of politicians. Autism and vaccines is now a national focus.

## **5. Hidden Agendas**

This chapter explores the conflicting data on the autism-vaccine link. Some studies show causal links, others do not. At this point, so many people are so totally entrenched in their ideas that there is no chance in changing their mindset. Autism advocacy groups hail studies and scientists that support the causal link.

The chapter begins with describing the difficulties a main anti-vaccination parent group, Safe Minds, has in landing a tête-à-tête with FDA, CDC and NIH officials in order to discuss the publication of their mercury paper. The agencies eventually agree to holding meetings, but the parents are discontented when the officials dismiss their findings. The parents describe the officials as cold and unconcerned.

The parents decide that they need to gain access to the Vaccine Safety Datalink (VSD), a government monitoring program that uses epidemiologic data to assess the impact of vaccine events. The CDC uses the VSD to conduct an unpublished 1999 study called “Infant Exposure to Thimerosal-Containing Vaccines and Risk for Subsequent Neurological and Renal Disease,”



which analyzes a sample of hundreds of thousands of children. The study first calculates birth weight and ethylmercury exposure, and finds that over half of the kids have been exposed to levels of ethylmercury higher than the recommended EPA standards. Next the number of adverse outcomes that are reported among the children is analyzed. Among the group with adverse outcomes, no significant difference is found between children who are exposed below the EPA exposure limit and those who are overexposed.

However, confounding findings to the 1999 study are released by the CDC in 2000 in a study headed by Dr. Thomas Verstaeten. This study analyzes 110,000 children and finds that as children are exposed to higher and higher doses of thimerosal, there is an increasing risk of developing a neurological problem. Although these findings are significant, the same results cannot be replicated during a second phase study that uses the same methods. Due to overwhelming conflicting scientific evidence, many parents become wary that the data in many of these studies is manipulated, which is why Safe Minds seeks VSD access to carry out their own independent analysis. The parent group hires a lawyer and files a Freedom of Information (FOIA) request, which provides access to unreleased government documents.

Another study released during this time is the EPA sponsored report, "Toxicological Effects of Methylmercury." The main focus of the report is to decide if the previous EPA daily methylmercury exposure limit of 0.1 µg is the correct number. The report finds that 0.1 µg is the correct figure, but also states that this limit could be too high for sensitive subpopulations, especially children. The report concludes that basically, there is no correct limit because there is so much inter-individual variation. However, a NIH article that is published back in 1995 called "Neurobehavioral Effects of Developmental Methylmercury Exposure" has opposing results to



this current study. This older study concludes that the accepted methylmercury limit should be lowered to a range between 0.025 and 0.06  $\mu\text{g}/\text{kg}/\text{day}$ .

Dan Burton is at it again in a June, 2000 Government Reform Committee hearing on conflicts of interest in the vaccine approval process. Burton defends evidence that many advisory panels on vaccine approval receive grants and other “perks” from drug companies, own patents for vaccines that would be affected by their decisions and many of the panelists are granted conflict-of-interest waivers by the CDC. Burton explains that these forms of bribery and internal corruption are why so many vaccines had been quickly added to the childhood vaccine schedule, in complete disregard for the possible negative effects the vaccines might have on the nation’s children.

Once again conspiracy theories are deepened in this chapter. Confounding study results are seen in many prominent illnesses such as cancer, Alzheimer’s disease and HIV/AIDS, and poor information on them is simply accepted as a limitation of current knowledge and technology. But lack of knowledge in the autism-vaccine link seems unacceptable to the public- in fact, many people are utterly accusatory and hostile about it. Parents believe that the government knows early on that vaccines are poisoning their children, but the government does not release this information because it would compromise the recommended vaccine schedule. This leaves many parents feeling that they have a very important, unanswered question: If the government is so concerned with protecting public health, why does it hide findings from the people who are most affected by it? At this point in the book, it becomes clear that government conspiracy theories are the main alternative health literacy in the autism-vaccine controversy.

## **Chapter 6. Safe Minds**

This chapter lists more autism-vaccine links that promote the suspicions of parents. Lyn attends another Government Reform Committee in July, 2000 alongside Dan Burton and a group of women known as the “Mercury Moms.” The vaccine opponents present their data on mercury poisoning and its similarities to autism, anecdotal accounts and the recent Verstraeten study findings. These quotes made by the anti-vaccination campaigners are significant in illustrating the anti-vaccination dissent:

- “It is time for someone to step forward and acknowledge these facts and provide the science to fully investigate what has happened to our children and what can be done to help them. Some may say we don’t have a smoking gun, but the truth is there are bullets all over the floor!” (p. 135)
- “My son was injured for the greater good. But these children have voices. They have the voices of their parents, many of whom are in this room. And those voices will be heard, no matter how unpleasant the message.” (p. 136)

Another autism-causation theory is described in this section. A biochemist named William J. Walsh finds the 4:1 boy/girl ratio to be particularly strange. He hypothesizes that the lack of a body protein called metallothionein (MT) seen among autistic patients contributes to the accumulation of metals in the brain. Walsh also hypothesizes that the 4:1 boy/girl ratio could be attributed to testosterone and estrogen: testosterone is found to suppress MT function while estrogen protects it.

Meanwhile, parents find more reasons to be upset with the government. In 1999, the FDA refuses to issue an official recall of thimerosal from vaccines, but will only *suggest* that drug companies consider removing the additive. An official letter from Dr. Kathryn Zoon, a CBER director, states that the apparent increase in autism rates with the rise in thimerosal

exposure represents an “ecological association,” which is weak evidence for supporting a causal link because “ecological associations do not link individual exposure to individual outcome.”

Some interesting themes are introduced in this chapter from the bulleted quotes listed above. The first quote reveals what may have been the most important fuel source in the anti-vaccination movement: a parent’s intuition to protect their child. Sometimes this intuition can be so strong, that parents will go in and fight blindly against the perceived bad guy (in this case, the government) and do whatever it takes to defend their baby. It does not matter who or what causes autism; if the parents perceive that broccoli is the cause of autism, this would have been book about a huge autism-broccoli link controversy. So, it seems that the autism controversy feeds solely on the vulnerable hearts of good parents. The second quote describes the belief that personal illness or suffering can have a widespread positive impact on the rest of the world. The root of this belief could be a permeated idea inherited through Christianity, which teaches that Christ was resurrected from death (the good) only because he was willing to die for us (the sacrifice). Another root for this belief is that parents could be using it as a psychological “bargaining” technique used during the five stages of grief. Psychologically, the individual is accepting their conflict, but hoping for a way out of it. Whatever the root, the quote illustrates the psychology behind the parental obsession with finding an autism scapegoat.

## **7. Mounting Evidence**

It is now 2001. This year, the first thimerosal suits are filed in vaccine court, two IOM hearings on the MMR vaccine and thimerosal are scheduled and the debate over the “autism epidemic” is addressed.



The 1999 California study shows that autism rates are rising drastically each successive birth year. However, government officials still deny a “true” increase in cases, instead attributing the increase to improved diagnostics and awareness. An anti-vaccination advocate calls this phenomenon “Epidemic Denial,” saying further that the CDC and FDA “are in it for the satisfaction, the sense of mission. They want to go after disease, and vaccines are the way to go” (p. 152). At the IOM hearings, anti-vaccination parents and scientists present data in support of the autism-thimerosal link. Lyn Redwood says, “The IOM was incredible! The government looked very bad, and all the science was on our side. Even folks who were presenters who we did not think shared our views, did” (p. 181).

Also mentioned in this chapter is the rise in anti-vaccination litigators. Lawyers become a new support for enraged parents. One lawyer states that he wants to, “expose the lack of concern for our most vulnerable citizens, our infants” (p.155). The chapter goes on to discuss the intricacies of Vaccine Court claims. Kirby believes vaccine courts need to be fixed, as parents’ hearings lag on sometimes for years. Also, the courts are so unwilling to award damages that a bank of \$1.6 billion in tax money accumulates and goes unawarded to deserving parents.

In June 2001, Liz from Safe Minds finally hears back from the CDC about Safe Minds’ FOIA requests. The CDC is charging a \$1,563 access fee for any private studies they send her, and refuses access to raw VSD data citing confidentiality.

A key concept in this chapter is the uninhibited motivation of anti-vaccination proponents. These parents and scientists now feel that they have power and a voice. Vaccine opponents now feel like heroes rather than victims of government conspiracies. Historically, this



anti-vaccination movement is comparable to the French Revolution, where masses of enlightened citizens' attempt overthrow the government for its unjust rulings.

## **8. Damn Lies and Statistics**

Autism can take a toll on family life, especially in families where one parent is an anti-vaccination crusader. Divorce rates are typically high in autism families. It is also common for families to become dysfunctional, being psychologically classified as a “disengaged family.” Members of disengaged families tend interact very little and parents tend to form superficial relationships with their children. However, autistic disengaged families vary slightly from this classic definition. Usually the autistic child receives plenty of attention- it is the siblings who do not, which is why siblings in autism families are at increased risk for suffering from depression and other psychological afflictions.

Kirby suggests therapies for autism. The only widely accepted and proven therapy is Applied Behavior Analysis (ABA). This therapy uses conditioning techniques to change behaviors. Kirby also lists other alternative therapies, which include chelation and dietary interventions. Dietary interventions can include gluten-/casein-free diets and oral supplements of vitamin B12, glutathione and selenium.

There is an interesting relation between the September 11, 2001 terrorist attacks and national vaccine discourse. In response to bioterrorism fears, vaccine makers are pressured to produce vaccines against threats like smallpox and anthrax. In return these companies are given protection from lawsuits, including cases involving thimerosal.

Liz Birt receives a second round of FOIA documents from the CDC. She decides to investigate a particular document entitled “Thimerosal VDS Study, Phase I- Update 2/29/00”

because the top of each page says “CONFIDENTIAL- DO NOT COPY OR RELEASE.” This is a Verstraeten publication. The study concludes that test subjects who receive the highest amounts of mercury (62 µg) at 3 months of age are 2.48 times more likely to develop autism. However, the final published study gives a relative risk value of 1.69, which leads Liz to believe that the data is statistically manipulated before publication. Liz sends copies of the study to her Safe Minds colleagues. Liz also finds sketchy emails in the pile of FOIA documents. She cites a December 17, 1999 email that Verstraeten sends to his co-authors: “It just won’t go away...All the harm is done in the first month...Some of the relative risks increase over the categories, and I haven’t yet found an alternative explanation. Please let me know if you can think of one.” Kirby also cites other scandalous studies and correspondences like this one.

Statistical manipulation and epidemiological limitations are discussed. Dilution is a problem with many autism study designs. Since many children are not diagnosed with autism until 2 to 4 years of age, including children younger than this in cohort studies reduces relative risk calculations. Another problem is the method of data acquisition. For example, VSD data shows that 1.4% of children have a speech or language problem but national surveys reveal values of 4 to 5%. Comparison methods can also be worrisome. Some studies compare data from countries that have very different vaccine schedules and thimerosal exposure doses. Other studies compare injected ethylmercury levels to data on ingested methylmercury. Comparing unrelated study variables will obviously produce invalid conclusions. Another issue in these studies is what the term “autism” encompasses. For example, studies sometimes include autism and autistic-like conditions, while others encompass all general developmental disorders. But studies with a broad definition of autism can dilute hazard ratios. Some believe that the



government uses these fraudulent statistical manipulations to change negative outcome thimerosal-vaccine studies.

This is the first chapter where Kirby advocates beyond his argument for anti-vaccination. There is bound to be a population of readers who fear infectious disease more than vaccination, and Kirby offers enlightenment for them by mentioning alternative autism treatments. Also, the sections on the 9/11 effect on vaccine discourse and the limitations of statistical studies mark the first legitimate arguments Kirby makes that are unrelated to his government conspiracy theories. For example, statistical studies do have many of the limitations he brings up. Now whether these limitations are fraudulently manipulated by the government is his opinion, but he at least does a better job of separating facts from personal bias in this chapter.

## **9. War on Four Fronts**

The four battles referred to by the chapter title are: the scientific battle, the legal battle, the political battle and the bureaucratic battle. These linked battles come together in 2002.

More studies are discussed. One study by Boyd Haley analyzes the effect of vaccine components on neuronal death. In-culture mouse neurons are exposed to aluminum, neomycin (a common pediatric antibiotic) and thimerosal, and the percentage of neurons that are still alive after a 24-hour period is measured. The results show no effect on the control group; 90% survival in the aluminum-exposed group; 80% survival in the antibiotic-exposed group; and only 30% survival in the thimerosal-exposed group. Haley also notes a synergistic effect when thimerosal is combined with these other chemicals, noting survival rates as low as 10%. Haley also performs another experiment to examine the high boy-to-girl ratio typically seen in other autism prevalence studies. He observes that cells exposed to testosterone and thimerosal die a



hundred times faster than those exposed to thimerosal alone. He also sees that estrogen/thimerosal cells have pretty good survival rates. Haley concludes that estrogen must have some kind of a protective effect against the insults of vaccine preservatives.

Other studies are performed on investigating mercury levels in hair samples. When children are exposed to the same levels of thimerosal, controls show far greater amounts of mercury in their hair than autistic children. At first glance, these results are counterintuitive, because autism-mercury hypotheses have always implied that raised mercury levels are what cause autism, so the autistic children would be expected to have higher levels in their hair. However, the scientists discuss the findings and conclude that people who actively excrete metals (non-autistic) have higher hair levels. Another study finds similar results. In non-autistic children, elevated mercury hair levels correlate to the number of dental fillings in the mother. But autistic children show very low mercury hair levels, even when the mother has a mouthful of fillings.

Legal battles are then discussed. In February 2002, lobbyists from vaccine manufactures and the Pharmaceutical Research and Manufacturers of America (PhRMA) rally on Capitol Hill. They argue that the high costs associated with injury case litigation are putting vaccine makers out of business and creating a shortage in the number of vaccines produced. The Frist Bill is soon passed in their favor, which closes the door to many families seeking vaccine-related compensation.

A controversy erupts when the Waters & Kraus coalition discovers internal Lilly documents. These documents evidence that the Lilly vaccine company knows about thimerosal's dangers as early as 1930, but Lilly is so eager to promote the preservative that it uses a bogus study to maintain FDA approval. The referred-to 1930 study is performed on 22

patients dying from meningitis. The patients are injected with thimerosal and monitored. Most of the patients die within a few days from meningitis, and the study concludes that the preservative is not life-threatening. Lilly cites this study for decades as the reason for thimerosal's safety. For whatever reason, this is the only clinical study the FDA has ever seen on thimerosal exposure. There is also a huge controversy over the fact that the Bush administration appoints Lilly president Sidney Taurel to the Homeland Security Advisory Council, and that Lilly has donated over \$2 million to the CDC.

Kirby then moves on to discuss the political struggles. Congressman Dan Burton is on the forefront of this battle. In spring 2002, he demands hearings with the NIH and CDC to discuss the channeling of autism research funds. The CDC spends \$932 million on AIDS, but only \$11.3 million on autism. The NIH spends \$688 million on diabetes while autism gets a mere \$56 million. However, no changes are ultimately made on the agencies' funding priorities.

This chapter is drenched with the 2002 national autism-vaccine debates. Polarization and rifts grow to their peak during this time. It has become easy to give in to the anti-vaccination mantra. For one, the Lilly documents are quite revealing. Even I question why the FDA has done no controlled studies on thimerosal exposure prior to the 1930 study. Another question I find myself trying to answer is why the government channels so much money into research for AIDS, a disease much less prevalent than autism. You know this book is good when even a pro-vaccination reader such as myself is becoming convinced of the government's wrongdoings.

## **10. Homeland Insecurity**

In 2002, more science is presented and more political movements occur, but not in favor of the anti-vaccination movement.



The 2002 Denmark epidemiological study is released, with the most conclusive evidence to date against the autism-MMR link. The study finds that there is no association with increased thimerosal doses and a subsequent risk for developing autism. Of course, anti-vaccination followers respond indifferently to these results, stating that controlled clinical studies, not epidemiological studies, are the only way to prove anything worthwhile.

The politics of vaccine making are discussed. Many vaccine makers are either on executive boards in the government, or they are protected by the government. Many CEOs of vaccine companies hold high or influential positions. An example of this is Eli Lilly, the thimerosal producer, who holds a seat in the Homeland Security Advisory Council. Vaccine opponents argue that the government is made up of the very same people that it should be monitoring. Then there is the issue of “drug money,” a form of governmental bribery. Popular media has calculated that the drug industry dishes out over 14 million dollars to the Republican party prior to the 2002 presidential election campaign.

Also involving politics is the continuation of the Lilly document debate. Senator Bill Frist tries to stop lawsuits against Eli Lilly, citing that he is technically a vaccine manufacturer and therefore protected by the VICP. Senator Edward Kennedy attempts to intercept this action, but his efforts fail and President Bush signs the Homeland Security Act of 2002. H.R. 5005 provides vaccine makers like Lilly with protection from civil lawsuits. What is interesting about this Lilly rider is that no one in the White House “will own up to a legislative deed that is both cynical and shameful.” The fact that the government denies supporting the addition of the Lilly rider to H.R. 5005, and the fact that the Bush administration has very close ties with Eli Lilly, makes vaccine opponents sure this is another government cover-up. The rider is later appealed in 2003.

2002 marks the year when the autism-vaccine controversy is losing momentum in American politics. More and more epidemiological studies are released during this time, and most all of them find the same results, discounting the autism-vaccine link. The parental voices that once resonated loudly through Washington D.C. are now being silenced.

## **11. “Proof” on Both Sides**

More science supports a non-causal autism-vaccine link, and the publication of three successive studies with this conclusion puts an end to the government’s involvement on the issue. These studies are all cited in this bibliography (Hviid, Madsen and Stehr-Green). Vaccine opponents list dozens of criticisms for these studies, but overall their criticisms are ignored.

Access to VSD data is still a goal of Safe Minds. After years of rallying, they are finally given a chance to review the data. The group has to pay thousands of dollars, hire an epidemiologist to translate the SAS language used in the database and they are monitored by a CDC official the entire time. After reviewing the data, Safe Minds finds that autism rates have been going down each successive year since the removal of thimerosal. They also cite a specific study, where children who are given three doses of the thimerosal-containing DTaP shots are calculated to be 27 times more likely to suffer from autism. The CDC has never released (and never does release) data similar to Safe Minds’ calculations, instead consistently concluding that “No consistent significant associations were found between thimerosal-containing vaccines and neurodevelopmental outcomes” (p. 283). At the end of Safe Minds appointment with the VSD data, a CDC employee, who says she has an afflicted autistic relative, gives Safe Minds “insider” information that, “The autism numbers are going down. We’re watching them drop.” When Safe Minds attempts to contact this woman later, she denies ever making this statement.

The controversy again is dwindling down in this chapter. The main characters of the book (parent heads of anti-vaccination autism groups) are disappointed to learn that their cause is losing its momentum. However, Safe Minds triumphs over its success in accessing VSD data, as it is the first time a parent panel is given involvement in the government.

## **12. Showdown & 13. Paying the Piper**

These chapters are given no summary because it is not necessary. Chapter 12 focuses on the 2004 IOM Committee Hearing, which is already thoroughly cited from the view of a vaccine opponent in Yazbak 2008. Chapter 13 presents views that have already been thoroughly discussed in other chapters, so I do not feel justified in summarizing these repetitive notions.

Madsen, Kreesten et al. "Thimerosal and the Occurrence of Autism: Negative Ecological Evidence from Danish Population-Based Data." *Pediatrics* 112.3 (Sep. 2003): 604. Web. 25 Mar. 2010.

This is a Danish epidemiological study that seeks to investigate whether the removal of thimerosal from vaccines will result in a subsequent decrease in autism cases.

This study uses data from the Danish Psychiatric Central Research Registrar. Denmark has always had high vaccination acceptance rates (>90%), and by 1992 all thimerosal-containing vaccines are removed from the country. Statistics are derived from all reported autistic children, ages 2 to 10 years old, from 1971 to 2000.

The results find that removal of thimerosal-containing vaccines does not reduce the incidence of autism. From 1971 to 2000, 956 cases of autism are reported with a male-to-female ratio of 3.5:1. The number of autism cases remains constant from 1971 to 1990. A sharp



increase in reporting is seen between 1991 and 2000, despite the 1992 removal of thimerosal-containing vaccines.

If thimerosal has a causal relationship with autism it would be expected that while thimerosal is being phased out (1971-1992), a decrease in autism would follow suit. However the data actually supports an increase in autism incidence, so this study does not support the autism-thimerosal link.

This epidemiological report is presented at the infamous February 9, 2004 IOM Immunization Review Committee meeting. This document is a significant resource because it contributes to the government's final official silencing of the autism-thimerosal hypothesis. One limitation of this study is that the U.S. administers higher doses of thimerosal in its vaccines than Denmark does, making an ecological inference between the two countries difficult.

Schechter, Robert and Judith Grether. "Continuing Increases in Autism Reported to California's Developmental Services System: Mercury in Retrograde." *Archives of General Psychiatry* 65.1 (2008): 19-24. Web. 2 April 2010.

This is an age/birth cohort study based in California that analyzes the prevalence of autism among children who are active clients of the California Department of Developmental Services (DDS). The prevalence rates are then compared temporally to the decline in thimerosal exposure to see if there is a correlation.

Prior to the 1999 discontinuation of thimerosal use, the preservative is found in the DT, DTP, Hib and hepatitis-B vaccines. After calculating cumulative ethylmercury doses, the American Academy of Pediatrics and the U.S. Public Health Service find that children are being exposed to doses of ethylmercury that exceed the standard EPA limit. As a result, the government calls for the removal of thimerosal from all vaccines as a precautionary measure.



A person with “active DDS status” is defined to have a developmental disorder diagnosis, although individuals with milder disorders like PDD and Asperger syndrome may not be included. Children are not typically given active status until 3 years of age. DDS data is analyzed between 1995 and 2007. DDS children are classified into a 1989 to 2003 birth cohort and then subdivided into age cohorts. Using this approach, yearly birth cohorts can be categorized by their age groups, making graphical comparisons more accurate. Prevalence is estimated by dividing the number of DDS children from 1995 to 2006 by the number of live births from 1989 to 2003. To contrast these raw prevalence calculations, the top number is divided by state annual age-specific population estimates from 1995 to 2004 (instead of the number of live births), and this result adjusts for potential migration or mortality since birth.

The results show an overall increase in autism. The prevalence of autism among children at each year of age from ages 2 to 12 years increases throughout the 1989 to 2003 time period. Similar results are seen with a narrower age-range cohort of 3 to 5 years for the same time period. For each successive birth cohort, prevalence estimates increase with age, usually stabilizing by 10 years of age. Also, the calculated rate increase amplifies each year. After the year 2004 (when no child beyond this time is vaccinated with thimerosal), numbers of DDS children aged 3 to 5 years continues to rise, with prevalence increasing from 3.0 to 4.1 per 1000 live births. Results are similar when adjustments for migration and mortality are calculated.

If thimerosal is the cause of autism, then it would be expected that DDS prevalence rates would decrease after the 1999 thimerosal-containing vaccines recall. However the results show that autism prevalence rates continue to increase rapidly well beyond this date, so this study does not support the hypothesis that thimerosal causes autism.





A limitation of this study is that interpreting its methods and data is very hard, which makes it highly plausible that lay communities may misunderstand this study. Despite this problem, the study is very thorough, and its results are supported by a large body of studies with similar outcomes.

Stehr-Green, Paul et al. "Autism and Thimerosal-Containing Vaccines: Lack of Consistent Evidence for An Association." *American Journal of Preventative Medicine* 25.2 (2003): 101-106. Web. 30 Mar. 2010.

This is a graphic ecologic analysis comparing the prevalence of autism in California, Sweden and Denmark with average exposures to thimerosal-containing vaccines.

Data for this study is obtained from various resources. U.S. data is derived from national surveys and counts of autistic children receiving special needs education in California. Swedish data includes a count of national inpatient autism cases and national vaccination coverage rates. Danish data is obtained from the national registry, including a count of both inpatient and outpatient autism cases, as well as national vaccination coverage rates. This data is compared among the countries from the mid-1980s through the late-1990s.



The results show that autism reports escalate from 1985-1989 and then continue to rise through the early-1990s in all three countries. During this time the U.S. increases administration of thimerosal-containing vaccines, while Sweden and Denmark (where thimerosal exposure is already much lower) completely eliminate use of the preservative.

In the U.S., the sharp rise in autism cases begins in the late-1980s, which is prior to the major increase in coverage rates and prior to the addition of many thimerosal-containing vaccines to the childhood vaccination schedule. In Sweden and Denmark, the cases of autism continue to increase despite the complete removal of thimerosal from vaccines. Therefore this study cannot support a causal relationship between thimerosal and the rise in autism reporting.

This ecologic report is presented at the infamous February 9, 2004 IOM Immunization Review Committee meeting. This document is a significant resource because it facilitates the government's final rejection of the autism-thimerosal hypothesis. There are a few limitations to this study. For one, the study compares countries with very different vaccination practices- it would be better to compare the U.S. to countries with similar vaccination schedules and thimerosal exposure rates. Another problem is that autism case reporting is not uniform among the countries. For example, Swedish data only includes inpatient reports of autism but Danish data includes both inpatient and outpatient data, which makes statistical comparison between these countries invalid. Also, the inclusiveness of the term "autism" is not clearly defined, as autism can refer to a wide range of diagnoses. These limitations are common throughout epidemiological studies, which is why many vaccine opponents believe studies like this are worthless. However, despite its limitations, this study overwhelmingly discounts the autism-



thimerosal link and its results coincide with the current body of knowledge concerning autism causation.

Wakefield, A.J., et al. "Ileal-Lymphoid-Nodular Hyperplasia, Non-Specific Colitis, and Pervasive Developmental Disorder in Children." *The Lancet* 351.9103 (Feb. 1998): 637-641. ScienceDirect. Web. PDF file. 1 Feb. 2010.

This is the original U.K. study proposing the link between the MMR vaccine and autism. Editors of *The Lancet* later retract this study's findings. Children with chronic G.I. problems and regressive developmental disorders are studied using the "opioid excess" theory of autism as the study's basis.

Twelve children (mean age 6 years [range 3-10 years], 11 boys) with chronic enterocolitis and regressive developmental disorder are investigated. The children's medical histories are extensively reviewed. Gastrointestinal, neurological and developmental

assessments are made for each child. All test subjects are sedated and undergo a colonoscopy, biopsy sampling, MRI, EEG and lumbar puncture. This investigation is approved by the Ethical Practices Committee of the Royal Free Hospital NHS Trust, with informed consent given by parents.

The results suggest that an inflamed or dysfunctional intestine may influence behavioral changes in children. In 8 of the 12 children, the parents or assessing physician report in hindsight that the children show autistic symptoms 1 to 14 days (average 6 days) after the administration of the MMR vaccine. 8 children also give abnormal lab tests, showing raised urinary methylmalonic acid, low hemoglobin and low serum IgA, in addition to their abnormal gastrointestinal problems such as inflammation and ulceration.

Earlier studies that support this study's findings are described. Dr. Asperger links celiac disease with behavioral psychosis; Walker-Smith et al. find low concentrations of alpha 1-antitrypsin in children with classical autism; D'Eufemia et al. perform a study on a group of autistic children with no G.I. problems and find that 43% of them feature abnormal intestinal permeability.

The "opioid excess" theory of autism is then defined and associated with this study's findings. It states that autistic disorders result from the incomplete breakdown and excessive absorption of gut peptides from food sources containing gluten and casein. These peptides can disrupt normal neuroregulation in the CNS, either directly or through the formation of ligands. One hypothesis, known as the "leaky gut syndrome" hypothesis, states that impaired G.I. function increases the gut's permeability to these peptides. Wakefield supposes that this increased gut permeability may be due to a deficient phenyl-transferase system, which disrupts

the normally sulphated glycoprotein matrix of the gut wall (which acts to regulate cell and molecular trafficking).

Other abnormal test results from this study are discussed. The raised urinary methylmalonic acid levels seen in some of the samples are indicative of a vitamin B12 deficiency. Vitamin B12 is essential for the generation of myelin (the coating along the axons of neurons; essential for higher level processing) in the CNS. It is also hypothesized that impaired hepatic function, due to deficient sulfation and insufficient detoxification of phenolic amines (dopamine, tyramine and serotonin), may also contribute to behavioral regression.

This singular article can be blamed for creating a worldwide vaccine scare. In 1998, the rumors of an “autism epidemic” along with the observed temporal association between MMR administration and the onset of autism symptoms, make the public particularly vulnerable to believe that vaccines are malice. These study findings are the first scientific source released that confirm the fears of an autism-vaccine link, and since this data is published in a world-renowned scientific journal, it is trusted by many parents. There are numerous problems with this study that nullify its validity. Wakefield violates ethical research practices by performing unapproved spinal taps and colonoscopies on his young test subjects. He is later tried for professional misconduct by the General Medical Council (GMC) and found guilty. But by the time *The Lancet* retracts this article 12 years later, the damage is already wrought and a large anti-vaccination movement takes hold, persisting still to this day.

Yazbak, Edward. "The Unconvincing Thimerosal Epidemiological Studies: How and Why They Were Produced, Published and Protected." *whale.to.com*. Vaccine Autoimmune Project, 2008. Web. 23 Mar. 2010.

This is a paper written to critique to various research that is presented at the February 9, 2004 IOM Immunization Review Committee meeting. Yazbak searches for limitations in the research, criticizing the vagueness of epidemiological data and the fact that all data has the same outcome of rejecting the autism-thimerosal hypothesis.

The paper is introduced with a strong statement by the Vaccine Autoimmune Project for Research and Education (VAP):

Government agencies including the NIH and CDC are conspiring with seemingly reputable publications like PEDIATRICS to push junk science. They hope to bury evidence of the dangers of vaccines. At the same time they have waged a misinformation campaign in making claims that skyrocketing Autism/ASD rates are due to better diagnostics. Dr. Ed Yazbak of our scientific board debunks their efforts with two fantastic articles that expose the government's lies and vindicate vaccine rights activists. (VAP)

This introduction sums up the thesis of Yazbak's paper, which is that the government is knowingly infecting America's children with developmental disorders in order to maintain herd immunity.

Yazbak gives an autobiography of himself. He is an infectious disease pediatrician who has practiced as a school physician for thirty-four years. He is a fellow of the American Academy of Pediatrics (AAP). He has also been charged with maintaining high vaccination rates in two school districts in Rhode Island in the past. Yazbak makes sure to verify that he is pro-vaccination, but he believes that thimerosal never should have been added to vaccines. He also believes that thimerosal is not the only cause of autism, and although removing it from vaccines would be beneficial, he does not believe it will significantly decrease the rising rates of autism. Yazbak also has an autistic grandson.

He goes on to describe various government agencies and celebrities that supposedly support the autism-vaccine causation hypothesis. He describes the "Challenge-Dechallenge-Rechallenge" autism-MMR hypothesis, which he says is backed by the Institute of Medicine (IOM) and the U.S. courts. The sequence goes like this: child receives his first MMR vaccination, regresses shortly after, slightly improves over time and finally regresses again after



receiving his second MMR vaccination. Yazbak also describes the Larry King Show episode that aired April 23, 2008, where two doctors from the AAP, as well as Jenny McCarthy, discuss their support for the autism-MMR link.

Yazbak then discusses “the government’s lies” on the final studies that put a definitive end to the autism-vaccine controversy at the 2004 IOM Immunization Review Committee meeting. Yazbak frames this meeting as the dreaded deadline for the government to find a way to disprove the autism-thimerosal link. He claims that the government did not yet have hard evidence to disprove the autism-thimerosal link, so agencies quickly created “rush-order” studies that were pre-designed to have the outcome of a rejection. He says that all of these studies have the same “Up and Down” outline, where the data is adjusted to show that autism continues to rise (“Up”) even when thimerosal content is decreased (“Down”). Yazbak also claims that the Committee rejects strong in-the-works research projects that support the autism-thimerosal link, and repeatedly ignores reasonable claims for the link. Basically Yazbak is convinced that the government wants to put an end to the controversy, and any science that inhibits this goal will ultimately be dismissed. He ends his discussion by listing the flaws of each of the final studies presented at the meeting, as well as his criticisms for 2 later studies:

### **1. 2003 Madsen Mercury Study**

Madsen, Kreesten et al. “Thimerosal and the Occurrence of Autism: Negative Ecological Evidence from Danish Population-Based Data.” *Pediatrics* 112.3 (Sep. 2003): 604. Web.

#### Summary

- This is a Danish epidemiological study that analyzes the incidence of autism from 1971 to 2000. The results find that autism cases continue to escalate despite the national 1992 removal of thimerosal-containing vaccines.



## Flaws

- The pediatric vaccination schedules are much different in the U.S. than they are Denmark.
- This study finds that between 1991 and 2000, autism rates increase despite the removal of thimerosal from vaccines. But in 2002 a co-author of this study, Marlene Lauristen, sends Madsen an email saying, “But the incidence and prevalence [of autism] are still decreasing in 2001.” Yazbak thinks that the 2001 data is removed from the final published study because it would taint the desired results.
- An assistant surgeon general backs the study.

## **2. 2003 Hvidd Thimerosal Study**

Hvidd, Anders et al. “Association Between Thimerosal-Containing Vaccine and Autism.” *Journal of the American Medical Association* 290.13 (1 Oct. 2003): 1763. Web.

## Summary

- This is a Danish population-based cohort study that compares children vaccinated with and without the thimerosal preservative from 1990 to 1996. The results find that the risk for developing autism/ASD is not significantly different between groups vaccinated with and without thimerosal, and that there is no thimerosal dose-response association.

## Flaws

- Hvidd is a co-author of a similar study that is published eleven months prior to this article. Yazbak compares these two studies and says that the Danish

autism statistics are small and variable, year-to-year and therefore the IOM Committee should reject both of these studies.

	Madsen (2002)	Hviid (2003)
	Hviid 1st co-author	
Registry	1999	2000
Study period	1/1/1991 – 1/1/1999	1/1/1990 - 1/1/1997
Study duration	8 years	7 years
Autism cases	316	440
Cases /year (average)	40	63
ASD cases	422	787
Cases /year (average)	53	113
Cohort	537,303	467,450
Person/year	2,129,864	2,986,654
Average f/u pp in years	4	6.4

- The Madsen study is CDC funded.
- This study is “protected” by the CDC, for the agency will not publish any of the submitted critiques of the paper’s statistics.
- Yazbak and a colleague use the same Danish data and find that autism does increase after the introduction of the MMR vaccine and before the national removal of thimerosal from vaccines. Yazbak’s study, “An Investigation of the Association between MMR Vaccination and Autism in Denmark” is published.

### 3. 2003 California-Sweden-Denmark Thimerosal Study

Stehr-Green, Paul et al. “Autism and Thimerosal-Containing Vaccines: Lack of Consistent Evidence for An Association.” *American Journal of Preventative Medicine* 25.2 (2003): 101-106. Web.

#### Summary

- This is a graphic ecologic analysis comparing the prevalence of autism in California, Sweden and Denmark with average exposures to thimerosal-containing vaccines between the mid-1980s and the late-1990s. The results find that autism rates rapidly increase between 1985 and 1989, when thimerosal exposure rates are low in all three countries. The increase in cases continues to rise in the 1990s, regardless of thimerosal removal (Sweden and Denmark) or thimerosal increase (U.S.). This shows that thimerosal does not cause autism.

## Flaws

- It is a “rush-order” study.
- The study is funded by the CDC.
- The study fails to mention the authors’ conflicts of interest.
- The pediatric vaccination schedules are much different in California than they are in Sweden and Denmark.

## **4. 2004 Britain Thimerosal Study**

Andrews, Nick et al. “Thimerosal Exposure in Infants and Developmental Disorders: A Retrospective Cohort Study in the United Kingdom Does Not Support a Causal Association.” *Pediatrics* 4.3 (Sep. 2004): 584-591. Web.

## Summary

- This is a U.K. retrospective cohort study that seeks to investigate whether infant reception of increasing thimerosal doses via the diphtheria-tetanus-whole-cell pertussis (DTP) and diphtheria-tetanus (DT) vaccines yields a subsequent risk for developing general developmental disorders. Data for

109,863 U.K. children is analyzed between 1988 and 1997. The results find that besides the possible exception of tics, thimerosal in DTP/DT vaccines does not cause developmental disorders.

## Flaws

- This is not a published study at the time of the IOM Committee Meeting- only raw data is presented.
- The study fails to mention the authors' conflicts of interest.
- Although WHO commissions the study, the CDC vets it.
- The U.K. vaccine and mercury loads are incomparable to those of the U.S.
- Although the study says that mercury exposure in the U.K. is similar to that in the WHO vaccination schedule, it turns out that U.K. children receive 75% less thimerosal by age 14 weeks.
- The study fails to mention confounding factors.
- One of the authors, Brent Taylor, continually refuses to produce the data on which this study is based.
- The study finds that increasing thimerosal exposure might actually produce a protective effect against developmental disorders.

## **5. 2006 Fombonne Study**

Fombonne, Eric et al. "Pervasive Developmental Disorders in Montreal, Quebec, Canada: Prevalence and Links With Immunizations." *Pediatrics* 118.1 (Jul. 2006): e139. Web.

### Summary

- This is a Canadian retrospective cohort survey study that seeks to investigate whether changes in the vaccination schedule (where more thimerosal is administered) have an effect on the increasing trend of pervasive developmental disorders (PDD). Also, MMR vaccination rates are assessed via surveys to see whether this thimerosal-free vaccine contributes to PDD prevalence rates. Data for 27,749 children is analyzed during the 1987 to 1999 time period. The results find that no relationship is seen between thimerosal and PDD prevalence rates, and no relationship is seen between MMR vaccination and PDD prevalence rates.

## Flaws

- A statement following the publication of this study says that Fombonne is “an expert witness for vaccine manufacturers in U.S. thimerosal litigation,” but “none of his research has ever been funded by the industry.” Yazbak finds this statement very sketchy.
- This is Fombonne’s first published thimerosal study and Yazbak does not understand how this makes him an “expert witness.”
- The authors do not examine vaccination records and do not individually assess whether the children actually have PDD or not.
- Many of the children included in the study are adopted or foreign-born, and these children are routinely revaccinated before entering French schools.

When the data is reanalyzed with this consideration, it demonstrates that there are proportionally more diagnosed cases of ASD among revaccinated children. Fombonne refuses to comment on this discrepancy.

- The study location is inappropriately referred to. The data is taken from Quebec City, not Quebec like the study's title implies.

## 6. 2008 California Thimerosal Study

Schechter, Robert and Judith Grether. "Continuing Increases in Autism Reported to California's Developmental Services System: Mercury in Retrograde." *Archives of General Psychiatry* 65.1 (2008): 19-24. Web.

### Summary

- This is an age/birth cohort study based in California that analyzes the prevalence of autism among children who are active clients of the California Department of Developmental Services (DDS). The prevalence rates are then compared temporally to the decline in thimerosal exposure to see if there is a correlation. DDS data is analyzed between 1995 and 2007. The results show that autism prevalence rates increase throughout this time period, even long after the removal of thimerosal. Also, the calculated rate of increase is amplified each succeeding year. Therefore the autism-thimerosal causation hypothesis is not supported.

### Flaws

- It is an "Up and Down" study.
- Not many psychiatrists are interested in thimerosal studies.
- The study fails to mention the authors' conflicts of interest.
- There is a lot of word confusion.
- The study only focuses on disproving an autism-thimerosal link, and not on the true cause of increased autism case reporting.

This paper is an opinion-based criticism of several widely-accepted scientific studies. Although Yazbak does point out limitations of these six studies, most of them are unwarranted. In fact, most of Yazbak's criticisms do not make logical sense whatsoever. For example, Yazbak conspires about "secret" political supports for these studies, but cites no evidence for his claims. He also complains about the "Up and Down" study designs, but this design is actually the most effective way to demonstrate correlations in cohort and ecologic studies. It is clear that he advocates biological study designs, but he does not seem to realize that the above studies are epidemiological and therefore cannot produce the biological outcomes he so desires. An example of his limited mindset is seen his Study 6 criticism: "The study only focuses on disproving an autism-thimerosal link, and not on the true cause of increased autism case reporting." But Study 6 is an age/birth cohort study, so it is impossible to expect its population-derived statistics to test for biological variables that are outside of its parameters.

Overall this is an unreliable scientific source, but a significant social source. Yazbak makes very few intelligent comments on the six studies, but his unsubstantiated claims will appeal to the sub-population of people against vaccination. An example of this is seen in the beginning of this paper, when Yazbak purposely lists his credentials and views just to convince lay readers of his expertise and lack of bias (but the fact that he has to prove his worth just makes him seem subnormal). Anti-vaccination lay readers tend to glorify scientists like Yazbak because one: they are predisposed to trust scientists with anti-vaccination views similar to their own, and two: they need people with high-ranking credentials to stand up for their cause. By echoing the views of his readers, Yazbak is emotionally appealing to them. Ultimately, this



paper shows how scientists like Yazbak, who use emotional bribery to gain lay following, contribute significantly to the unalleviated vaccination fears during this time period.