Approved: March 8, 2006
Date

MINUTES OF THE SENATE PUBLIC HEALTH AND WELFARE COMMITTEE

The meeting was called to order by Chairman James Barnett at 1:37 P.M. on March 1, 2006 in Room 231-N of the Capitol.

All members were present.

Late Arrival:
Sen. Haley 1:43

Committee staff present:
Emalene Correll, Kansas Legislative Research Department
Terri Weber, Kansas Legislative Research Department
Norm Furse, Office of Revisor of Statutes
Diana Lee, Office of Revisor of Statutes
Morgan Dreyer, Committee Secretary

Conferees appearing before the committee:
Dr. Mark Geier and David Geier
Rev. Joyce Harris Scott
Donald Bondank, Lenexa, KS resident
Dan Morin, Dir of Government Affairs-KS Medical Society
Dr. JoAnn Harris-American Academy of Pediatrics
Dr. Howard Rodenberg-KDHE
Gianfranco Pezzino, MD

Others attending:
See attached list.

Upon calling the meeting to order, Chairman Barnett asked Emalene Correll to give a reading and explanation of the language in **SB 537.**

Hearing on SB 537– An act concerning public health, relating to vaccinations

Chairman Barnett called upon the first proponent conferee, Dr. Mark Geier. MD, who stated statistics of children that are diagnosed with a developmental disorder, autistic disorder, significant dates regarding the use of Thimerosal in U.S. pediatric vaccines, and early downward trends in Neurodevelopmental disorders following removal of Thimerosal-containing Vaccines. A copy of his testimony is (Attachment1) attached hereto and incorporated into the Minutes as referenced.

Next the Chair called upon proponent conferee, Rev. Joyce Harris Scott, stated her experience and observation of others in her community, and the help that is requested of the legislature to pass this bill. No written testimony was given

Chairman Barnett called upon the third proponent conferee, Donald Bondank, concerned Kansas resident, stated his personal story about his son's diagnosis and disability. He urges the Committee to pass the presented legislation before them. A copy of his testimony is (Attachment 2) attached hereto and incorporated into the Minutes as referenced.

The Chair then called upon David Geier to make additional comments on Dr. Mark Geiers presentation, stated information about birth defects and drugs in pregnancy and statistics on children with malfomations that show uniform rates in relation to exposure to topical antimicrobials. A copy of his testimony is found within (Attachment 1) that is attached above and incorporated into the Minutes as referenced.

Chairman Barnett called up his first opponent conferee Dan Morin, Director of Government Affairs, from the Kansas Medical Society, stated that vaccines have contributed to a significant reduction in many childhood diseases, believes that there is no evidence children are harmed by thimerosal, a mercury containing preservative that was used in certain childhood vaccinations. A copy of his testimony is (Attachment 3) attached hereto and incorporated into the Minutes as referenced.

The Chair then called upon the second opponent conferee, Dr. JoAnn Harris, with the American Academy of Pediatrics who stated vaccinations are considered on of the most important public health initiatives in the history of mankind, passage of the bill would limit the states ability to quickly administer influenza vaccines in cases of epidemics, and considers the bill would be dangerous to the welfare of the citizens of the state. A copy of his testimony is (Attachment 4) attached hereto and incorporated into the Minutes as referenced.

Chairman Barnett then called upon his fist neutral conferee, Dr. Howard Rodenberg, Director of the KDHE Division of Health and State Health Officer, stated the importance of vaccinations to our health, concern over mercury compounds such as thimerosal, the bill's provisions that may impact ability to prepare for prospects of both seasonal and pandemic influenza, the bills' fiscal impact, Mercury content in vaccines statistics, and the absence of link between vaccines and Autism. A copy of his testimony is (Attachment 5) attached hereto and incorporated into the Minutes as referenced.

The Chair then called upon the last neutral conferee, Gianfranco Pezzino, MD, Kansas Health Institute, who stated concerns about an association between thimerosal and Autism, a study and review brief of Dr. Geier and son's study, and statistical chart information about the Percentage of Kansas Children Receiving the Hepatitis B Brithdose by Month. A copy of his testimony is (Attachment 6) attached hereto and incorporated into the Minutes as referenced.

The Chair then called the Committee's attention to the written testimony submitted by Dr. George Lucier, Boyd Haley, David Ayoub MD, Linda Winemaster, Kelly Kerns, Kathy Madison, and Debbie Graves in support of **SB 537**. A copy of his testimony is (Attachment 7) attached hereto and incorporated into the Minutes as referenced

The Chair then called the Committee's attention to the written testimony submitted by Chip Wheelen, Joe Davidson, Alexander Mathews, Association of Immunization Program Managers, Council of State and Territorial Epidmiologist, Hipatitis B Foundation, Immunization Action Coalition, Infectious Diseases Society of America, Parencts of Kids with Infectious Diseases, Pediatric Infectious Diseases Society, Society of Teacher of Family Medicine, Vaccine Education Center at the Children's Hospital of Philadelphia, PhRMA, and Kansas State Nurses Association, in opposition of **SB 537**. A copy of his testimony is (Attachment 8) attached hereto and incorporated into the Minutes as referenced.

Chairman Barnett closed the hearing on **SB 537**.

Adjournment

As there was no further business, the meeting was adjourned at 2:30 p.m.

The next meeting is scheduled for Thursday, March 2, 2006.

SENATE PUBLIC HEALTH AND WELFARE COMMITTEE

GUEST LIST

DATE: March 1, 2006

NAME	REPRESENTING
Jim McLean	ICs Health Institute
[illegible]	KDHE
GIANFRANCO PEZZINO	KANSAS HEALTH INSTITUTE
Derek Hein	Hein Law Firm
John Rule	Kansas Health Institute
Monica Megu	MUD
Gary Robbins	KS Optometric Assn
Gail Hansen	KDHE
Charlie Hunt	KDHE
Bob St. Peter	KHI
Star Jones	John Peterson
Alice Devereux	Kansas Livestock Assoc
Kate Kulesher	Wyeth-Ft. Dodge Animal Health
Chad Austin	Kansas Hospital Association
Sharon Wenger	KDHE
Chip Wheelen	Ass'n of Osteopathic Medicine
Kim Lynch	KFMC
Marchal Seaton	KDHE
MICHAEL F RUNAU	KDHE

Name	Representing
Dr Dennis Cooley	KAAP
Dan Morin	KMS
Jo-Ann S Harris	KAAP.
~~Kevin Robertson~~	~~KS~~ Dental Assn.
Richard Kerns & Kelly Kerns	Parents of 3 autistic children
Linda Weinmaster	parent of 3 boys / w/ mercury poisoning
Susan Kang	KDHE
Dr. Linda Helmig Bram	Parent of child with Autism; Psychologist
Gary Reser	Ks. Veterinary Medical Assn.
William W Sneed	Merck

AUTISM A.L.A.R.M.

Senate Public Health & Welfare
Date: March 1, 2006
attachment #1

attach. # 1

1 OUT OF 6 CHILDREN ARE DIAGNOSED WITH A DEVELOPMENTAL DISORDER

1 IN 166 CHILDREN ARE DIAGNOSED WITH AN AUTISTIC DISORDER

CDC

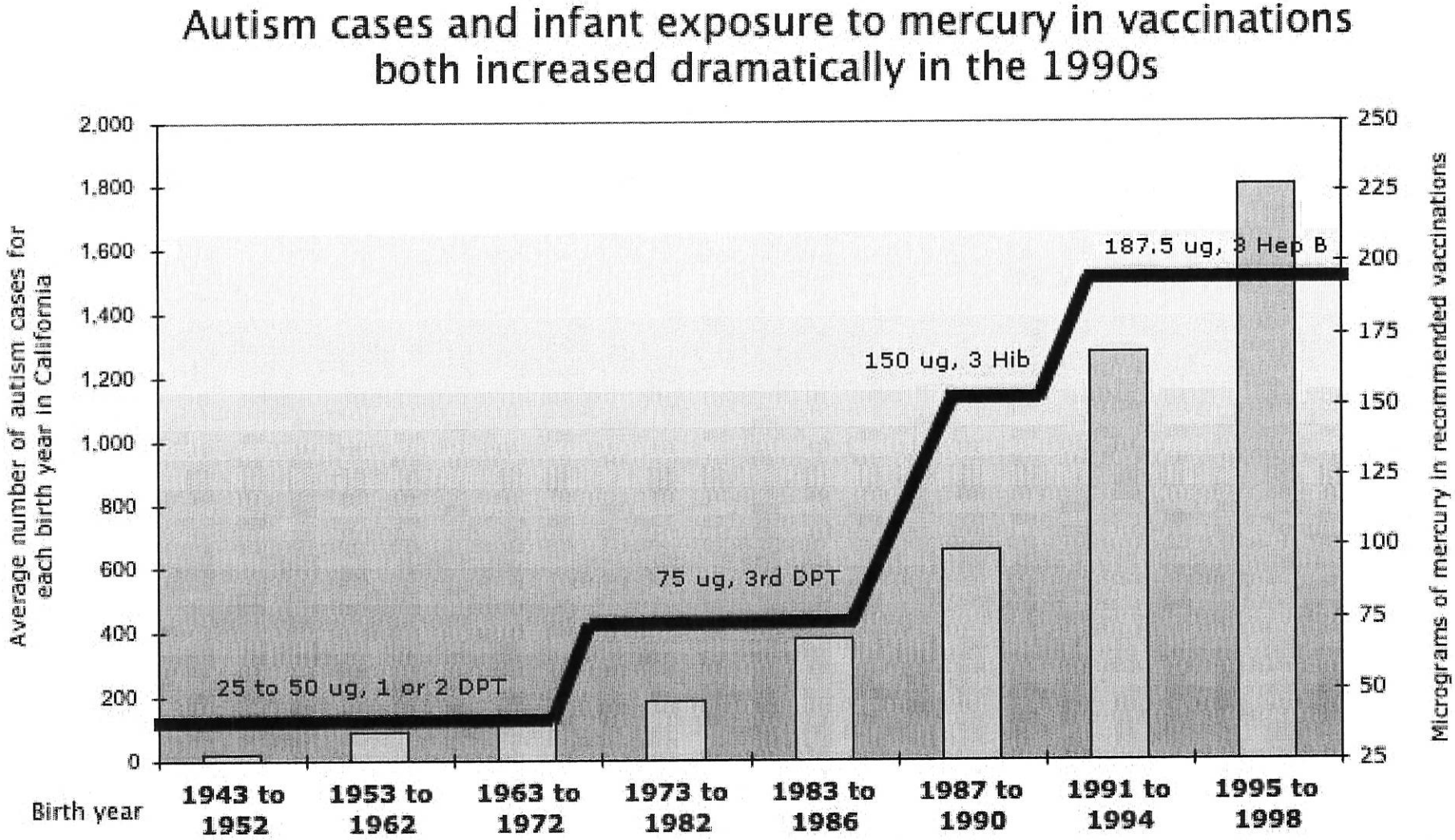
American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

MEDICAL HOME INITIATIVES

January 2004

vironmental Working Group. Overloaded? New science, new insights about mercury and autism in susceptible children. Washington, DC: EWG Action Fund, 2004.



Mercury was gradually removed from infant and maternal vaccinations between August 1999 and Nov 2002 (infant) or 2003 (maternal).
Autism data from California Department of Developmental Services 2004. Reliable data on autism rates in children born after 1998 are not available.

MAJOR RESEARCHERS PUBLISHING EVIDENCE SUPPORTING
Thimerosal-Neurodevelopmental Disorder Relationship

Dr. James Adams
Mercury Retention in Autistic Children Analyses
Chairman, Department of Materials and Engineering, Arizona State University

Dr. Ruma Banerjee
Thimerosal Neuro-Tissue Culture Analyses
University of Nebraska

Dr. David Baskin
Thimerosal Neuro-Tissue Culture Analyses
Department of Neurosurgery and Anesthesiology, Baylor College of Medicine

Dr. John Bernard
Mercury Retention in Autistic Children Analyses
Director, Nuclear Reactor Laboratory, Massachusetts Institute of Technology

Dr. Richard Deth
Thimerosal Neuro-Tissue Culture Analyses
Department of Pharmaceutical Sciences, School of Pharmacy, Northeastern University

Dr. Mark R. Geier
Epidemiology of Vaccines-Autism, Mercury Retention, Biochemical, & Genetic Analyses in Autistic Children Analyses
President, The Genetic Centers of America

Dr. Sudhir Gupta
Thimerosal Immune-Cell Tissue Culture Analyses
Chief, Basic and Clinical Immunology, Department of Medicine, University of California, Irvine

Dr. Boyd Haley
Thimerosal Neuro-Tissue Culture & Mercury Retention in Autistic Children Analyses
Chairman, Department of Chemistry, University of Kentucky

Dr. Mady Hornig
Thimerosal Mouse Model of Autism
Columbia University

Dr. Joel Mason
Thimerosal Neuro-Tissue Culture Analyses
Tufts University

Dr. Jill James
Thimerosal Neuro-Tissue Culture, Mercury-Biochemical Pathways Analyses in Autistic Children
University of Arkansas

Dr. Walter Spitzer
Epidemiology of Vaccines-Autism
Department of Epidemiology, McGill University

Dr. S Sukumar
Thimerosal Neuro-Tissue Culture Analyses
Johns Hopkins University

OLLI P. HEINONEN, M.D., M.Sc.

DENNIS SLONE, M.D.

SAMUEL SHAPIRO, F.R.C.P.

Drug Epidemiology Unit
Boston University Medical Center

BIRTH DEFECTS AND DRUGS IN PREGNANCY

with

Leonard F. Gaetano, B.Ch.E.
Stuart C. Hartz, Sc.D.
Allen A. Mitchell, M.D.
Richard R. Monson, M.D.
Lynn Rosenberg, M.S.
Victor Siskind, Ph.D.

David W. Kaufman, B.A., Editor

Publishing Sciences Group, Inc.
Littleton, Massachusetts

S-1

Table ***21.10***

Children (2,277) With Malformations Showing Uniform Rates by Hospital in Relation to Exposure to **Topical Antimicrobials** During Lunar Months 1–4 Among 50,282 Mother-Child Pairs

	No. of Mother-Child Pairs Exposed	No. of Malformed Children	Crude Relative Risk	Hospital Standardized Relative Risk	Survival and Race Standardized Relative Risk
Benzethonium	1,131	41	0.80	0.80	0.81
Phenylmercuric acetate	889	31	0.77	0.77	0.80
Cetalkonium	775	39	1.11	1.08	1.11
Cetylpyridinium	326	20	1.36	1.33	1.35
Boric acid	253	16	1.40	1.37	1.34
Nitrofurazone	234	7	0.66	0.65	0.67
Ricinoleic acid	110	5	1.00	0.97	1.13
Aminacrine	59	3	1.12	1.09	1.03
Thiomersal	56	6	2.37	2.50	2.69[1]
Thymol	52	4	1.70	1.67	1.62
Benzalkonium	50	1	0.44	0.41	0.50
Gentian violet	40	3	1.66	1.66	2.08
Chlordantoin	24	0	—	—	—
Phenol	23	2	1.92	1.96	1.67
Other topical antimicrobials	90	3	0.74	0.70	0.65

[1] $X^2_1 = 4.36$, $p < 0.05$

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Last Updated: Saturday, 7 August, 2004, 09:59 GMT 10:59 UK

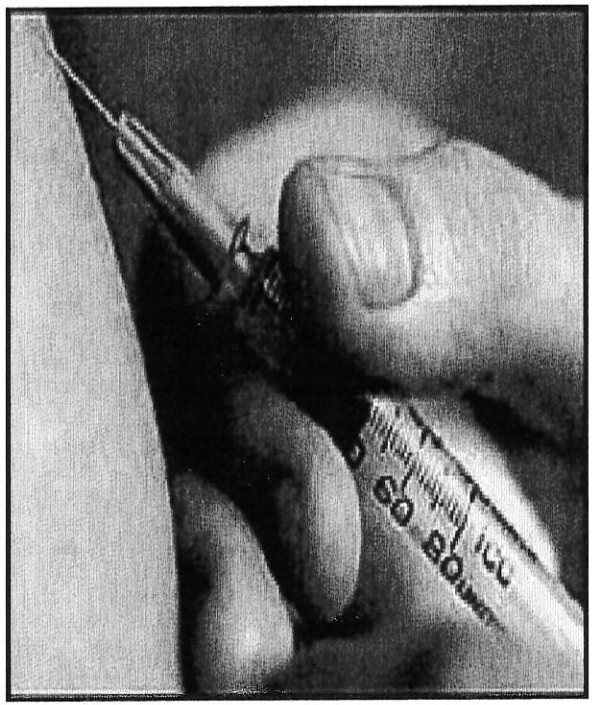
E-mail this to a friend Printable version

Vaccine scrapped over autism fear

A vaccine containing mercury given to babies when they are eight weeks old is to be scrapped amid fears of a link with autism.

The move follows recent research in America that suggests a connection between the mercury used to preserve the whooping cough vaccine, and autism.

The jab, without mercury, will be given as part of a new five-in-one vaccine.



The whooping cough vaccine contains mercury

WATCH AND LISTEN

The BBC's Daniel B

"The change is part towards a combined

VIDEO

SEE ALSO:

Mercury 'linked to a
18 Jun 03 | Health

Project to search fo
19 Jul 04 | Health

Study to probe caus
07 Jul 04 | Health

Mercury in Medicine Report Prepared by the Staff of the Subcommittee on Human Rights, Committee on Government Reform Following a Three Year Investigation.

Washington, Wednesday, May 21, 2003

** "The Committee, upon a thorough review of the scientific literature and internal documents from government and industry, did find evidence that thimerosal did pose a risk."

** "Thimerosal used as a preservative in vaccines is likely related to the autism epidemic."

** "This epidemic in all probability may have been prevented or curtailed had the FDA not been asleep at the switch regarding the lack of safety data regarding injected thimerosal and the sharp rise of infant exposure to this known neurotoxin."

** "Our public health agencies' failure to act is indicative of institutional malfeasance for self-protection and misplaced protectionism of the pharmaceutical industry."

State Legislation to Ban Thimerosal and it is Banned Internationally

- ** THE STATE OF IOWA BANS THIMEROSAL

  ** THE STATE OF CALIFORNIA BANS THIMEROSAL

  ** THE STATE OF MISSOURI BANS THIMEROSAL

  ** The State of Delaware bans Thimerosal

- ** THE STATES OF ILLINIOS BANS THIMEROSAL

- ** THE STATE OF NEW YORK BANS THIMEROSAL

- ** MANY OTHER STATES HAVE INTRODUCED BILLS TO BAN THIMEROSAL

b-1

sanofi pasteur

The vaccines business of sanofi-aventis Group

February 10, 2006

Dear Health-Care Professional:

You recently received an invitation to prebook Fluzone®, Influenza Virus Vaccine on Tuesday, January 31 for the 2006-07 influenza season. I am writing to express my sincere regrets for the long hold times, connection difficulties, and any other frustrations you may have experienced in attempting to reach us.

Anticipating a surge in telephone calls and traffic to our e-commerce site, we doubled the capacity of our telephone lines and online ordering systems. Despite this increase in capacity, we were unable to accommodate the overwhelming response we experienced throughout the day – more than 400,000* telephone attempts within the first hour of prebooking, and a 500% surge over the daily average of visits to our e-commerce site.

I am aware that many health-care professionals were unable to speak with a representative or place their requests due to this unprecedented increase in calls and Internet traffic. Unfortunately, we could not have augmented our staff and systems sufficiently to accommodate the immense volume experienced in one day.

Sanofi pasteur is a consistent and reliable supplier of influenza vaccine. In addition, we are dedicated to providing broad access to all customer segments with the aim of raising immunization rates and improving access to vaccine.

Unfortunately, we do not currently have the capacity to meet the entire nation's demand for inactivated influenza vaccine, and we have already committed all Fluzone vaccine doses planned for production for the next season. At this time, Fluzone No Preservative, Pediatric Dose vaccine is the only formulation we are still prebooking.

Based on public statements made by other influenza vaccine manufacturers, we anticipate that total market supply will be adequate to meet the nation's needs for the 2006-2007 season, and we encourage health-care professionals who could not prebook with sanofi pasteur to contact vaccine distributors about securing influenza vaccine from one of the other manufacturers.

1-9

01-1

To help address the longer-term needs of the country, sanofi pasteur has committed $150 million to construct a new manufacturing facility that will double our capacity to produce influenza vaccine for both routine influenza immunization and in case of an influenza pandemic. We broke ground on this new facility in July 2005 and expect it to come online for the 2008-2009 influenza season.

Once again, I offer my deepest apologies for any inconvenience you may have experienced, and I thank you for your continued interest in sanofi pasteur vaccines.

Sincerely,

Damian Braga
President
sanofi pasteur US

*Source: AT&T

MKT11603

CONCLUSION:

** At the current rate, 50 million Americans may be sacrificed to developmental disorders, if Thimerosal is kept in vaccines.

** Researchers, the FDA/CDC, U.S. Representatives, States, and Countries such as England, France, Sweden, Russia, Japan, Canada, and Denmark, have all concluded that Thimerosal has no place in vaccines.

<u>PRUDENCE DICTATES THAT NOW IS THE TIME TO ACT TO BAN THIMEROSAL</u>

21-1

Early Downward Trends in Neurodevelopmental Disorders Following Removal of Thimerosal-Containing Vaccines

David A. Geier, B.A.
Mark R. Geier, M.D., Ph.D.

ABSTRACT

Contemporaneously with the epidemic rise in neurodevelopmental disorders (NDs), first observed in the United States during the 1990s, the childhood immunization schedule was expanded by the U.S. Centers for Disease Control and Prevention (CDC) to include several additional thimerosal-containing vaccines (TCVs). On July 7, 1999, a joint recommendation was made by the American Academy of Pediatrics (AAP) and the U.S. Public Health Service (PHS) to remove thimerosal from vaccines. A two-phase study was undertaken to evaluate trends in diagnosis of new NDs entered into the Vaccine Adverse Event Reporting System (VAERS) and the California Department of Developmental Services (CDDS) databases on a reporting quarter basis, from 1994 through 2005. Significant increasing trends in newly diagnosed NDs were observed in both databases 1994 through mid-2002. Significant decreasing trends in newly diagnosed NDs were observed in both databases from mid-2002 through 2005. The results indicate that the trends in newly diagnosed NDs correspond directly to the expansion and subsequent contraction of the cumulative mercury dose to which children were exposed from TCVs through the U.S. immunization schedule.

Background

In 2004, the Department of Health and Human Services and the American Academy of Pediatrics (AAP) issued an Autism A.L.A.R.M., stating that 1 in 166 children currently have an autistic disorder, and 1 in 6 children have a developmental and/or behavioral disorder. Autism, once rare, is now more prevalent than childhood cancer, diabetes, and Down syndrome.[1] Epidemic trends in neurodevelopmental disorders (NDs) were first observed in the United States during the 1990s,[1-8] and cannot be explained by immigration, changed diagnostic criteria, or improved identification.[1,6-8]

Autism is an ND characterized by impairments in social relatedness and communication, repetitive behaviors, and stereotypic abnormal movements.[1] While genetic factors are important in the pathogenesis of autistic disorders, a role for environmental factors has received considerable attention.

Exposure to mercury has previously been shown to cause immune, sensory, neurological, motor, and behavioral dysfunctions similar to traits defining or associated with autistic disorders, and with similarities in neuroanatomy, neurotransmitters, and biochemistry.[9-12] Furthermore, recent research that codes children's communicative, social, affective, repetitive behaviors, and toy play from videotapes of the toddlers' first and second birthday parties demonstrates that the regression associated with autistic disorders clearly manifests between the ages of 12 and 24 months,[13] concurrent with the exposure to thimerosal-containing childhood vaccines (TCVs).

Thimerosal is an ethylmercury-containing compound (49.6% mercury by weight) that was historically added to many vaccines at the preservative level (0.005% to 0.01%). The U.S. Centers for Disease Control and Prevention (CDC), from the late 1980s through the 1990s, expanded the number of doses of TCVs to be administered to U.S. infants. To five doses of diptheria-tetanus-whole-cell-pertussis (DTP) vaccine were added three doses of hepatitis B (Hep b) vaccine and four of *Haemophilus influenzae* type b (Hib) vaccine. Additionally, the CDC began recommending three doses of influenza vaccine for certain infant populations. An infant who received all of these vaccines on schedule could have received as much as 200 micrograms (μg) of mercury during the first 6 months of life.[14]

In response to theoretical concerns about the cumulative doses of mercury from TCVs, the AAP and the U.S. Public Health Service (PHS) issued a joint statement on July 7, 1999, calling for the removal of thimerosal from all vaccines.[14] It has been estimated that the last thimerosal-containing Hep b, diphtheria-tetanus-acellular-pertussis (DTaP) and Hib vaccines were manufactured in 2000-2001 and expired at the end of 2002 (or early 2003).[14] Table 1 summarizes significant historical dates in the use of pediatric TCVs in the United States.

Considering all significant environmental exposures to mercury, such as through breast milk, TCVs represent almost 50% of the total mercury dose some infants received.[15] The 187.5 μg of mercury through TCVs plus the average of 164 μg from breast milk during the first 6 months exceeded the methylmercury safety guidelines established by the U.S. Environmental Protection Agency (EPA), Health Canada, the World Health Organization (WHO), the Agency for Toxic Substances Disease Registry (ATSDR), and the U.S. Food and Drug Administration (FDA).[15] With no additional exposure from any source, these doses also exceeded the methylmercury guidelines for the first year of life set by all of these agencies except the FDA.[15]

Despite its removal from many childhood vaccines, thimerosal is still routinely added to some formulations of influenza vaccine administered to U.S. infants, as well as to several other vaccines (e.g. tetanus-diphtheria and monovalent tetanus) administered to older children and adults. In 2004, the Institute of Medicine (IOM) of the U.S. National Academy of Sciences (NAS) retreated from the stated 1999 goal of the AAP and the PHS to remove thimerosal from U.S. vaccines as soon as possible.[16] Furthermore, many nations still add thimerosal to many of their pediatric vaccines, and WHO and several vaccine manufacturers still advocate the continued use of thimerosal in pediatric vaccines. As a result, assessing the safety of TCVs is a matter of significant importance.

Examinations of the Vaccine Adverse Event Reporting System (VAERS), the U.S. Department of Education, and the Vaccine Safety Datalink (VSD) databases showed significant links between exposure to TCVs and NDs.[17,2-3] Specifically, data from VAERS showed that additional doses of mercury from thimerosal-containing DTaP in comparison to thimerosal-free DTaP (administered in the late 1990s), and additional doses of thimerosal-containing DTP and Hib in comparison to *diphtheria-*

1-12

Table 1. Significant Dates Regarding the Use of Thimerosal in U.S. Pediatric Vaccines

Date	Significant Events
Middle 1980s	Thimerosal is present in virtually all whole-cell diphtheria-tetanus-whole-cell-pertussis (DTP) vaccines administered to children four times, starting at age 2 mon, during the first 18 mon of life (maximum of 25 µg Hg/dose). Maximum Hg exposure in 18 mon: 100 µg.
Late 1980s	Thimerosal-containing *Haemophilus influenzae* type b (Hib) vaccine is administered to children at age 18 mon (maximum of 25 µg Hg/dose). Maximum Hg exposure in 18 mon: 125 µg.
Early 1990s	Four doses of thimerosal-containing Hib are recommended within 18 months, starting at age 2 mon (maximum of 25 µg Hg/dose). Maximum Hg exposure in 18 mon: 200 µg.
Early 1990s	Three doses of thimerosal-containing hepatitis B (Hep b) vaccine are recommended within the first 6 mon, starting on the day of birth (maximum of 12.5 µg Hg/dose). Maximum Hg exposure in 18 mon: 237.5 µg.
Middle 1990s	Some DTP and Hib vaccines are combined to produce DTPH vaccine, which has only 25 µg of mercury per immunization, reducing mercury levels of exposure for some children, but is rapidly replaced by diphtheria-tetanus-acellular-pertussis (DTaP) vaccines beginning in 1996 (DTaP vaccine is almost exclusively produced separately from Hib vaccine).
1996-1997	GlaxoSmithKline introduces a new thimerosal-free DTaP vaccine (Infarix) that contains 2-phenoxethanol as a preservative. Aventis Pasteur introduces a new Hib vaccine (ActHIB) that contains no preservative.
Late 1990s	Three doses of thimerosal-containing influenza vaccine are increasingly recommended for administration to children during the first 18 mon, starting at age 6 mon (12.5 µg Hg/dose). Maximum Hg exposure: 200 µg in first 6 mon and 275 µg in first 18 mon.
July 7, 1999	AAP and PHS request removal of thimerosal from all pediatric vaccines as rapidly as possible, and AAP suggests delaying Hep b vaccine until after age 6 mon for children born to hepatitis B negative mothers.
August 27, 1999**	Thimerosal-free Recombivax HB (Merck) is licensed by the FDA.
March 28, 2000	Thimerosal-free Engerix-B (GlaxoSmithKline) is licensed by the FDA.
March 7, 2001	Thimerosal-free Tripedia (Aventis Pasteur) is licensed by the FDA.
Late 2002/ Early 2003	CDC and FDA claim that the last remaining doses of thimerosal-containing DTaP, Hep b, or Hib vaccines are administered to U.S. children.

** Thimerosal-containing formulations continued to be distributed/administered following FDA licensing of thimerosal-free formulations.

tetanus-pertussis-Haemophilus influenzae type b (DTPH) vaccines (ad-ministered in the early to mid-1990s), were associated with a significant 2- to 8-fold increase in risk of NDs, depending upon the symptoms or outcomes examined. The one other U.S. epidemiological study that has examined the relationship between TCVs and NDs, by Verstaeten et al. from the CDC, initially found a significant relationship between TCVs and some types of neurodevelopmental disorders (NDs), but upon examining a different dataset, it did not find a consistent effect.[24] The lead author concluded that this study could neither accept nor reject a causal relationship between TCVs and NDs.[25]

Now that a number of children have received reduced doses of mercury from TCVs for several years, the present rapid sampling study was undertaken to check for an effect on the occurrence of NDs. The first phase consisted of an evaluation of newly diagnosed NDs received by VAERS. The second phase examined whether the VAERS observations were consistent with trends in the new autism reports in the California Department of Developmental Services (CDDS).

Materials and Methods

Phase I: The Vaccine Adverse Events Reporting System

The VAERS database has been maintained by the CDC since 1990 as a surveillance tool to evaluate vaccine safety. Specific adverse events following vaccination are required by law to be reported to this database. The VAERS Working Group of the CDC has previously reported that less than 5% of the reports come from parents. The VAERS Working Group and the FDA analyze and publish epidemiologic studies based upon analyses of VAERS. They note that VAERS is simple to use, flexible by design, and provides data in a timely fashion, but warn that the potential limitations may include systematic error due to underreporting, erroneous reporting, frequent multiple exposures, multiple outcomes, and lack of precise denominators.[26]

Analysis Methods: The online public access VAERS database (updated through August 31, 2005) was examined using Microsoft Access.[27] The entire database was surveyed for duplicate reports (i.e. those having the same VAERS ID number), and these were eliminated. An ecological method was employed to evaluate NDs reported following immunizations, including autism (Costart Term = Autism) and speech disorders (Costart Term = Speech Dis), among children ≤ 5 years old). Descriptions of these adverse events by those reporting them were coded by VAERS technical staff into defined symptom fields. The total new number of adverse event reports for each type of ND received on a reporting-quarter basis (January through March, April through June, July through September, and October through December) for 36 consecutive reporting quarters, from January 1, 1994, through December 31, 2002, and for 14 consecutive reporting quarters from January 1,

1-13

Table 2. Regression Equations for the VAERS and CDDS Databases.

Time Period Examined	Line Equation	95% CI: Slope of the Line	r value	95% CI: r value	R^2 value	*P* value
	Vaccine Adverse Event Reporting System (VAERS)					
January 1, 1994 through December 31, 2002	Number of New Autism Events = 0.014 Reporting Quarter – 483	0.098 to 0.018	0.77	0.60 to 0.88	0.60	< 0.0001
January 1, 2002 through June 30, 2005	Number of New Autism Events = -0.0302 Reporting Quarter + 1,179	-0.054 to -0.0067	-0.63	-0.87 to -0.15	0.38	< 0.02
January 1, 1994 through December 31, 2002	Number of New Speech Disorder Events = 0.0076 Reporting Quarter – 263	0.0056 to 0.0095	0.80	0.65 to 0.90	0.65	< 0.0001
January 1, 2002 through June 30, 2005	Number of New Speech Disorder Events = -0.010 Reporting Quarter + 413	-0.019 to -0.0014	-0.59	-0.85 to -0.084	0.35	< 0.03
	California Department of Developmental Services (CDDS)					
January 24, 1994 through January 6, 2003	Number of New Autism Cases = 0.23 Reporting Quarter – 7,775	0.19 to 0.27	0.89	0.79 to 0.94	0.79	< 0.0001
January 3, 2002 through October 4, 2005	Number of New Autism Cases = -0.016 Reporting Quarter + 6,753	-0.31 to -0.0043	-0.52	-0.82 to -0.017	0.28	< 0.05

2002, through June 30, 2005, were evaluated in VAERS. The reporting quarter periods were defined so as to overlap slightly, to maximize the possibility of capturing the peak reporting period in both groups. Assuming a 3- to 4- year lag time between birth and diagnosis of an ND,[2-4] the peak followed by a decline in NDs would be expected to occur around 2002 if thimerosal had a significant impact on NDs.

Phase II : California Department of Developmental Services

The California regional center system consists of 21 nonprofit and independent agencies, which are under contract with the Department of Developmental Services to provide services to persons with developmental disabilities. The CDDS system was created in 1969. Originally, autism was not included in the Lanterman Developmental Disabilities Services Act that established the statewide system of services. Autism, a low-incidence disorder in 1969, was added in 1971, largely because the impact of autism on children was substantially disabling and expected to be a lifelong condition. The CDDS recognizes only professionally diagnosed individuals with mental retardation, autism, epilepsy, cerebral palsy, and conditions similar to mental retardation as conditions eligible for services. Persons diagnosed with one of the other Pervasive Developmental Disorders (PDD), including Pervasive Developmental Disorder, Not Otherwise Specified (PDD, NOS), Asperger's Disorder, Rett's Disorder, and Childhood Disintegrative Disorder are not eligible for regional center services.[1]

Analysis Methods: The online public access CDDS database (updated through October 4, 2005) was examined using Microsoft Access.[1,2,8] The total new number of autism reports received by the CDDS from 36 consecutive reporting quarters (from that starting on January 24, 1994, through that ending on January 6, 2003), and for 15 consecutive reporting quarters (from that starting on January 3, 2002, through that ending on October 4, 2005) were analyzed. These periods of examination in the CDDS database were selected in an attempt to mirror the VAERS reporting periods analyzed in the present study.

The simple linear regression test in the StatsDirect (Version 2.4.2) statistical package was used to determine the equations for the regression lines, the slope of the regression lines, the correlation coefficients (r), the regression coefficients (R^2), and *P*-values for the number of newly diagnosed NDs reported to VAERS and CDDS during the two time periods before and after removal of thimerosal. The null hypothesis was that the slope of the lines for each of the two periods would be equal to zero. Additionally, the data were examined using the Kruskal-Wallis test statistic to determine whether the introduction, followed by removal, of thimerosal from childhood vaccines produced a discernable trend in the two separate reporting quarter periods examined in the VAERS and the CDDS databases. The null hypothesis was that the total number of newly diagnosed NDs should not be affected by the introduction/removal of thimerosal from childhood vaccines; in other words, that the slope of the lines for the two periods would be the same. A two-sided *P*-value of < 0.05 was considered statistically significant.

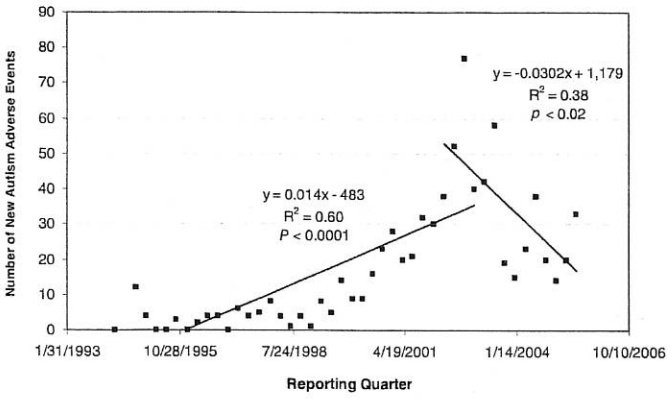


Figure 1. Trends in New Autism Adverse Events Reported to VAERS. The trend from Jan 1, 1994, through Dec 31, 2002, is significantly increasing, with $P < 0.0001$. The trend from Jan 1, 2002, through June 30, 2005, is significantly decreasing, with $P < 0.02$. The difference in the slope of the regression lines for the number of new autism adverse events in the earlier compared with the later periods is significant, with $P < 0.0005$.

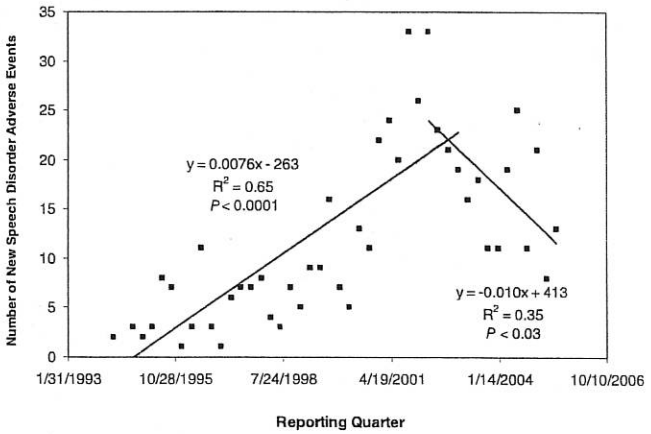


Figure 2. Trends in New Cases of Speech Disorders Reported to VAERS. The trend from Jan 1, 1994, through Dec 31, 2002, is significantly increasing, with $P < 0.0001$. The trend from Jan 1, 2002, through June 30, 2005, is significantly decreasing, with $P < 0.03$. The difference in the slope of the regression lines for the number of new speech disorder adverse events in the earlier compared with the later periods is significant, with $P < 0.005$.

Results

Figures 1 and 2 show the trend for new cases of autism and speech disorder (among those ≤ 5 years old) reported to VAERS for the 36 consecutive reporting quarters from January 1994 through December 2002, compared with that for 14 consecutive reporting quarters from January 2002 through June 2005. There was a significant difference in the trends, from an increasing to a decreasing slope, ($P < 0.0005$ for autism and $P < 0.005$ for speech disorder).

Figure 3 evaluates the trend of new cases of autism entered into the CDDS for the 36 consecutive reporting quarters from January 24, 1994, through January 6, 2003, and for the 15 consecutive reporting quarters from January 3, 2002, through October 4, 2005. For new cases of autism, the trends were significantly different ($P < 0.0001$). About 350 fewer cases of autism were reported to the CDDS in the reporting quarter ending on October 4, 2005, than would have been expected from extrapolating the trend line for the first set of 36 reporting quarters. About 200 fewer new cases of autism were reported to the CDDS in the last reporting quarter of the second set of 15 consecutive quarters than in the first of that set.

Table 2 summarizes the equations of the regression lines, the slope of the regression lines, the correlation coefficients, the regression coefficients, *P*-values, and 95% confidence intervals (CIs) in the present study.

Discussion

In the present study a novel rapid sampling epidemiologic technique was employed to evaluate trends in new NDs entered into two separate databases, the VAERS and the CDDS. It was observed that consistent significant trends were found in both databases, with limited effects from systematic error/bias.

There is a median lag time of 3 to 4 years between the time of birth and the diagnosis of an ND.[2,4] As a result, the first children evaluated, whose reports were entered into the VAERS and CDDS databases in early 1994, were probably born in the late 1980s or early 1990s. As was summarized in Table 1, these children received approximately 100 µg mercury from four doses of thimerosal-containing DTP vaccine, starting at 2 months of age. Subsequently, the children who were entered into the VAERS and CDDS databases from early 1994 through mid-to-late 2002 were probably born from the late 1980s to early 1990s through the late 1990s. These children, as shown in Table 1, received increasing doses of mercury from additional TCVs (Hib, Hep b, and in some cases influenza) as they were added to the recommended immunization schedule. Peak exposure from TCVs during the first 18 months of life was 275 µg mercury. Lastly, children entered into the VAERS and CDDS databases in the last period, beginning in mid-2002, were probably born from the late 1990s through the early 2000s. Table 1 shows that after July 7, 1999, as thimerosal was removed from vaccines, the total mercury dose children received from TCVs was gradually reduced, and what mercury remained in childhood vaccines was administered in a significantly less rigorous schedule than in previous time periods. Overall, it appears that the increasing and subsequent decreasing trends in the rates of NDs, observed in both the VAERS and CDDS databases, correlate with temporal periods when the cumulative amount of mercury in the childhood immunization schedule expanded and later contracted.

The consistency of the effects observed for the spectrum of NDs, including autism and speech disorders, and the agreement between the observations from two separate databases, support the conclusion that the effect is real and not a chance observation. The magnitude of the change in the trend lines is substantial. Moreover, other data are confirmatory: provisional data from the U.S. Department of Education show a recent decrease of 529 in the number of new autism diagnoses recorded among children 3 to 5 years old, after years of annual increases. There were 1,451 new cases in 2001-2002; 1,981 in 2002-2003; 3,707 in 2003-2004; and 3,178 in 2004-2005.[2,9]

The biological plausibility of the present findings is further supported by recently emerging extensive toxicokinetic, molecular, and animal studies.

Burbacher et al. have evaluated infant monkeys following injection of doses of mercury comparable to the dosing schedule (weight- and age-adjusted) that U.S. children received during the 1990s.[30] These researchers confirmed that thimerosal crosses the blood-brain barrier and results in appreciable mercury content in

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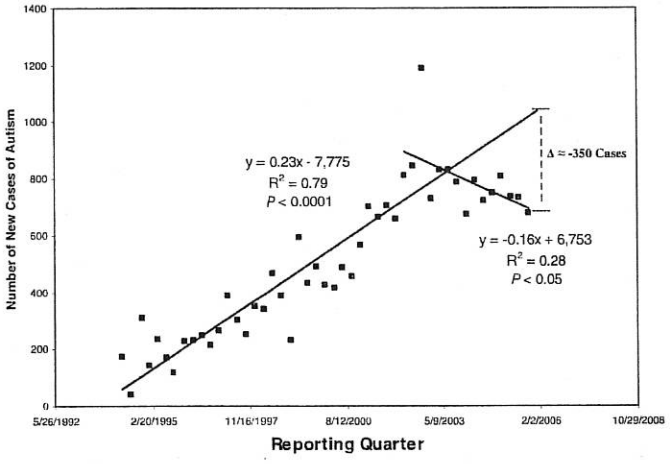

Figure 3. Trends in New Cases of Autism Entered into the CDDS. The trend from Jan 24, 1994, through Jan 6, 2003, is significantly increasing, with $P < 0.0001$. The trend from Jan 6, 2002, through Oct 4, 2005, is significantly decreasing, with $P < 0.05$. The difference in the slope of the regression lines for the number of new autism cases in the earlier compared with the later periods is significant, with $P < 0.0001$.

tissues including the brain. They determined that the overall half-life of mercury in the brain of the infant monkeys examined was approximately 24 days. In addition, it was determined that the concentration of inorganic mercury in the brains of the thimerosal-treated infant monkeys averaged 16 ppb following the dosing schedule, and the half-life of this inorganic mercury was very long (> 120 days).

In a series of in vitro studies with neurons it has now been shown that nanomolar (nM) to micromolar (μM) concentrations of thimerosal are capable of inducing neuronal death, neurodegeneration, membrane damage, and DNA damage within hours of exposure.[3,13-8] Additionally, it has been shown that nM to μM concentrations of thimerosal are capable of disrupting critical signaling pathways and biochemical events necessary for neurons to undergo normal development.[3,9,1-1] Such disruptions include testosterone-mercury synergistic induced neurotoxicity, while estrogen significantly reduced mercury-induced neurotoxicity.[4,2,4,3]

Hornig et al. administered thimerosal to mice, mimicking the U.S. routine childhood immunization schedule of the 1990s (weight- and age-adjusted), and observed autistic symptoms in a susceptible mouse strain that included growth delay, reduced locomotion, exaggerated response to novelty, increased brain size, decreased numbers of Purkinje cells, significant abnormalities in brain architecture affecting areas subserving emotion and cognition, and densely packed hyperchromic hippocampal neurons with altered glutamate receptors and transporters.[4,4] In addition, thimerosal exposure at specific prenatal developmental stages in several animal models and in humans has been shown to result in mercury crossing the placental barrier and resulting in significant fetal lethality and teratogenicity.[4,5,1-7]

The findings of the present study are also further supported by recent clinical studies examining the body burden of mercury and mercury susceptibility in children with NDs. Bradstreet et al. showed that, following chelation, urinary concentration of mercury was significantly greater, by a factor of approximately six, in autistic children compared with neurotypical children, whereas urinary cadmium and lead concentrations were similar.[48] Matched vaccinated and unvaccinated neurotypical children had similar urinary mercury concentration following chelation. Holmes et al. examined first baby haircuts and determined that autistics had significantly higher body burdens of mercury in comparison to nonautistic matched controls, by demonstrating that the mercury level in hair, and thus the ability to excrete mercury, was inversely proportional to the severity of autism and overall much lower in the autistic group.[49] James et al. have evaluated biochemical susceptibility to mercury in autistic children, in comparison to age- and gender-matched control children, by evaluating the methionine cycle and transsulfuration metabolites. They found a significant 46% decrease in the plasma concentration of glutathione, a necessary metabolite for the excretion of mercury from the body. Additionally, autistic children had significantly increased oxidative stress, as shown by a three-fold decrease in the glutathione/oxidized glutathione redox ratio, in comparison to control children, which would correlate with a significant body burden of mercury.[50-53]

Conclusions

The present controlled assessment of VAERS and CDDS databases shows that very specific NDs are associated with TCVs. This conflicts with the 2004 conclusions of the IOM, largely based upon examination of vaccine safety data from the National Immunization Program (NIP) of the CDC. The IOM stated that the evidence favored rejection of a causal relationship between thimerosal and autism, that such a relationship was not biologically plausible, and that no further studies should be conducted to evaluate it.[16]

From data presented here and other emerging data, it appears clear that additional research should be undertaken concerning the effects of mercury exposure, particularly from TCVs. This is especially true in light of the fact that the handling of vaccine safety data by the NIP has recently been called into question by the IOM.[54]

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Potential conflict of interest: David Geier has been a consultant in vaccine/biologic cases before the no-fault National Vaccine Injury Compensation Program (NVICP) and in civil litigation. Dr. Mark Geier has been an expert witness and a consultant in vaccine/biologic cases before the no-fault NVICP and in civil litigation.

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24005 W 80th Place
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March 1st, 2006

Honorable Senator Barnett and Committee

Thank you honorable committee members for giving me the opportunity to speak to you today regarding the use of mercury related products in children's vaccines. I have to admit I never thought I would be a vocal advocate appealing to my Government and believe me when I say that one of my goals in life was to avoid public speaking at all cost.

I cannot tell you in a short five minutes the pain my family has experienced because of this product. Nor do I feel that the human language is robust enough to express those same feelings.

The salient point to understanding this issue is very simple. Mercury is a neurotoxin and it has no business in any product that a living being receives. I encourage you to view the attachment to the copy of my speech. What you have is the Material Data Safety Sheet or MSDS. It cleary shows the toxicity of this stuff. Had I seen this sheet before my son was born I would have never allowed a single vaccine to be given to my son that contained this thimerosal.

Secondly, there will be those that will tell you that has never been a scientific study demonstratiing a link between thimerosal and developmental delays. But there has never been a study proving that lead in paint causes neurological problems either. Thus is the nature of science. It neither proves or disproves. A hypotheses only after many cleverly designed studies come to be regarded as facts.

They, like some sort of "promercury Ahmad Chalabi" will tell you the partial story because it serves their financial interests.

Thirdly, I want to share a personal story with you. A year after my son's diagnosis my wife and I had a conversation with a area Developmental Pediatician and this is how the conversation went. The doctor asked how my son was doing. Then followed up with the question "what are you doing to help your son?". To which we replied we were doing a special diet, supplements, and chelation. For those of you that do not know what a "chelator" is, it is an agent that can be given orally, transdermally, or intravenously. It "binds" to heavy metals and allows the body to excrete it. Now listen to what this doctor recommened to us when we mentioned chelation. The doctor's words were (and I will never forget this) "oh, you do not want to chelate" To which my wife asked..."why not?" The doctor then said "because the chelator could cause mercury inside him to travel to another part of his body and do more damage". We are all smart people here. What did you miss? We never mentioned mercury. We could have been chelating for lead, aluminum, anything. But she specificially mentioned mercury.

Your job as Legislators are to weigh the costs and benefits to Kansans. I can assure you, the minute cost of passing this Bill far outweighs the cost to the State and the living hell that we parents and our children must endure. By the simple fact of an organization wanting to save 2 dollars a vial, my son will have permanent disabilites for the rest of his life. This has hurt my wife, certainly my son, and myself beyond repair and I vowed to myself and my Lord that I will do whatever I can to ensure that this never ever happens to another living soul again.

I sincerely thank for your time and I will joyously make myself available to you to answer any questions you might have,

Regards,

Donald Bondank
Father of a mercury poisoned son.

Senate Public Health & Welfare Committee
Date: March 1, 2006
Attachment #2

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To: Senate Committee on Public Health and Welfare

From: Dan Morin
Director of Government Affairs

Subject: SB 537; An act concerning public health, relating to vaccinations.

Date: March 1, 2006

The Kansas Medical Society appreciates the opportunity to appear before the committee and stands in opposition to SB 537, which will eventually prohibit any vaccine or drug administered in Kansas from containing any level of mercury. It is well known that vaccines have contributed to a significant reduction in many childhood diseases such as diphtheria, polio, measles, and whooping cough.

Right now vaccine safety experts believe that there is no evidence children are harmed by thimerosal, a mercury containing preservative that was used in certain childhood vaccinations. Unfortunately, many Kansans have experienced a wide range of negative coverage in traditional and electronic media that often overstates the risks of vaccines. The benefits of the flu vaccines for infants and toddlers, for example, far outweigh any theoretical risks from thimerosal. Any action by the Kansas Legislature to ban mercury-containing vaccines could be interpreted as somehow validating the unsubstantiated claims and fears of those that believe it causes certain disorders

The Centers for Disease Control and Prevention, American Academy of Pediatrics, National Institutes of Health, and the US Public Health Service have all investigated the issue and found no positive correlation. There have also been five large epidemiological studies since 2001 conducted in the United States, the United Kingdom, Denmark, and Sweden that have concluded there is no association between thimerosal containing vaccines and autism. The Institute of Medicine (IOM) of the National Academies convened an Immunization Review Safety Committee, which was charged with reviewing the science of current and emerging vaccine safety concerns. After eight thorough studies since 2001 reviewing all relevant data, the panel convened by the IOM concluded available evidence did not confirm any connection between autism and influenza vaccines containing thimerosal, The Kansas Medical Society believes current safety systems, guidelines, and recent research provide reassuring evidence to counter unsubstantiated claims of any link. Thimerosal is in fact still used in many effective and necessary drug products.

Senate Public Health & Welfare Committee
Date: March 1, 2006
Attachment #3

Although thimerosal has never been shown to be harmful, it has been removed from or reduced to trace amounts for nearly 5 years in all vaccines routinely recommended for children 6 years of age and younger, with the exception of inactivated influenza vaccine. This action came as a result of the Food and Drug Administration Modernization Act (FDAMA) of 1997. The vaccines with trace amount of thimerosal licensed to date contain less than 1 microgram of mercury per dose. With the newly formulated vaccines, the maximum cumulative exposure during the first 6 months of life is less than three micrograms of mercury. This use of vaccine with no or only trace amounts of thimerosal represents a greater than 98 percent reduction from previous maximum exposure in young infants. The reduction or elimination of thimerosal was, in principle, achievable because over time it was possible to replace multi-dose vials with single dose vials, which do not require a preservative. There exists currently a preservative-free influenza vaccine (with only trace amounts of thimerosal) available in single dose pre-filled shots should a patient remain concerned after appropriate discussions with a physician. This would not be the case should an influenza outbreak occur.

We remain concerned about future vaccine shortages to control infectious diseases. As stated above, thimerosal-free vaccine can be packaged only in single-dose units. It is necessary to package vaccines in multi-dose vials to prepare for any future influenza pandemic. Kansas would be far short of the capacity needed to fill enough single dose vials for a majority of residents. Between 2000 and 2002 the country experienced significant shortages of 8 of 11 childhood vaccines and many physicians were forced to recommend deferral of some vaccines in order to prioritize and ration a dwindling supply. Vaccine shortages in 2004 forced many to scramble to find clinics with flu shots available. Flu vaccine takes months to make — production must start in the early spring so vaccine can reach consumers by October and November. The exceptions allowed the Kansas Department of Health and Environment within SB 537 to exempt vaccines containing mercury would cause unnecessary delays and be futile in the face of a serious influenza outbreak in Kansas.

I would be happy to respond to any questions.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

Kansas Chapter

~~Dr. Cooley~~ Chair, Immunization committee
Step-In → Professor, Pediatrics
→ Dr. Jo-Ann Harris
University of Kansas School of Medicine

TESTIMONY ON SENATE BILL 537

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The Kansas Chapter of the American Academy of Pediatrics is a statewide organization representing over 95% of the practicing pediatricians in the state. The KAAP is providing testimony today in opposition to Senate Bill 537.

Vaccinations are considered one of the most important public health initiatives in the history of mankind. Despite this there is a small minority of the public that are mistrustful of vaccines. Most of this is not based in scientific facts but on emotional factors that result in misconceptions and misinformation.

Thimerosal, a preservative found in a small number of vaccines, has been implicated by a few as causing autism and other illnesses in children. To date there has been no good evidence that associates thimerosal and autism or any illnesses. In 2004 the Institute of Medicine reviewed the available scientific evidence and did not find any causal relationship with thimerosal and autism. There have been several other large studies that have come to the same conclusion. This issue has been evaluated extensively and as a result based on the evidence the FDA has not removed these vaccines from the market. The CDC and the Advisory Committee on Immunization Practices continue to recommend these vaccines. Still the myth persists.

Passage of this bill has serious implications. If SB 537 passes it would give the public the impression that these vaccines are unsafe despite the general scientific knowledge to the contrary. It would indicate to the public that vaccine safety oversight by the CDC and the FDA and ACIP is inadequate. . How then can they trust the safety of any vaccines? What will this do vaccine rates?

SB 537 would limit the states ability to quickly administer influenza vaccines in cases of epidemics. The process that the secretary must go through to get an exemption could result in a delay when vaccine shortages occur.

It is interesting that the bill allows exceptions to the restrictions. If these vaccines are truly unsafe why allow them at all? The answer is because they are not unsafe.

What is the cost of this bill? First influenza vaccine without thimerosal costs 25-30% higher and results in wastage of vaccines since single dose units must be used. This would have an effect on the states Medicaid expenditures. Second if immunization rates decrease there could be increase in number of individuals suffering from the illnesses and health care costs would again be affected. Finally who is going to pay for the random testing of vaccines and other drugs that KDHE is supposed to perform? Again all this is based on unproven claims.

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Finally this legislation sets a bad precedent. Standard of care in medicine requires a physician to provide parents information about the advantages and disadvantages of various immunizations and answer questions prior to administration. The parent can then make an informed decision. This bill prevents that. The state takes over the decision and prevents an acceptable method of treatment. Will lawmakers do this with other medical treatments that are considered within the standard of care because small groups oppose them?

In summary we strongly oppose passage of SB537 and consider it dangerous to the welfare of the citizens of our state. Thank you.

KANSAS

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

Testimony on Senate Bill 537
Regarding Vaccines Containing Mercury
Before the
Senate Public Health and Welfare Committee

Dr. Howard Rodenberg
Director, Division of Health
State Health Officer
Kansas Department of Health and Environment

Chairman Barnett and Members of the Committee, I am Dr. Howard Rodenberg, Director of the KDHE Division of Health and State Health Officer. I appreciate this opportunity to discuss with you legislation that addresses what we believe to be an important public health issue. SB537 indicates that, after January 1, 2007, no child eight years old or younger or a pregnant woman shall be vaccinated with a vaccine containing more than 0.5 micrograms of mercury. (For the purposes of this bill, we assume that the word "mercury" refers to thimerosal, a compound containing ethyl mercury and used as a preservative in vaccines.) SB537 further indicates that after July 1, 2008, no vaccine or any other drug administered in the state shall contain any mercury. The bill makes an exemption to this law possible if approved by the Secretary of KDHE and the Governor in cases of bioterrorism or public health emergencies.

Vaccination is one of the great successes of public health. One needs only to look at the death rates from childhood infectious disease a century ago and compare them with today to see how important vaccination is to our health. Some of you in the room today may recall the near-elimination of polio in this country that resulted from widespread immunization in the 1950's. Even within the twenty years since I graduated medical school, the incidence of pneumonia and meningitis from two of the major pathogens in children (*Haemophilus influenzae* and *Streptococcus pneumonia*) has plummeted to near zero in immunized populations. More vaccinations providing more protections are just over the horizon.

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The concern over mercury compounds such as thimerosal is linked to the idea that the presence of these chemicals in the vaccine product can retard neurologic development, and more specifically results in autistic disorders (clinicians refer to autism not as a specific condition, but as a term applying to range of problems known as "autistic spectrum disorders," or ASD). It is true that there is a correlation between exposure to mercury and impaired neurologic development. In response to this knowledge, in 2001 the Institute of Medicine (IOM) recommended that thimerosal be removed from all vaccines administered to infants, children, or pregnant women in the U.S. This was done as a precautionary step to limit the cumulative exposure infants might have to ethyl mercury. This determination did NOT establish that a danger existed, but did set a limit below which there was confidence that adverse effects would absent. It's also important to recall that the concern from the IOM was not based on the dose within the vaccine, but on the cumulative dose of mercury received from environmental exposures, such as eating fish laced with industrial mercury wastes and mercury leeching into the fetus from dental amalgams, among other sources. This hypothesis is supported by studies that document a lack of link between thimerosal in vaccines and the development of neurologic disorders, but suggest that cumulative environmental mercury exposure raises the risk. The IOM felt that the mercury in vaccines was a controllable exposure, whereas that in the environment at large was not; and as non-mercury alternatives could be identified, they should be used. Their recommendation was seen as a step towards mitigating a larger problem, and certainly not as a solution unto itself.

With one exception, no commonly used childhood vaccine contains thimerosal above the amount noted in SB 537. The one vaccine that does is the influenza vaccine, and specifically only the vaccine found in multi-dose vials. (The reason for this is that in a single-use vial, the seal is broken once and the product used immediately. In a multi-dose vial, thimerosal in needed to prevent contamination of the vaccine by bacteria and fungi once the seal has been broken for the first time.) There is a preservative-free form of the flu vaccine with less thimerosal than mandated by SB 537 currently available. However, only 10% of the 80 million doses of inject able influenza vaccine that were produced for the 2005-06 vaccination season were a thimerosal-free formulation. The limited amount of thimerosal-free vaccine would likely mean that not all those who need to be vaccinated could get the vaccine.

The benefits of influenza vaccination far outweigh the risks of not vaccinating. Each year approximately 36,000 people in the United States die from influenza and its complications, and 114,000 are hospitalized. Rates of infection are highest among children, and hospitalization rates are highest among children from birth to two years of age. Case reports and limited studies indicate that pregnancy can increase the risk for serious medical complications of influenza. One study found that out of every 10,000 women in their third trimester of pregnancy during an average flu season, 25 would be hospitalized for flu related complications. During influenza pandemics influenza-associated excess deaths among pregnant women have been documented. The Advisory

Committee for Immunization Practices (ACIP) therefore highly recommends that children 6 months to 5 years of age and pregnant women receive influenza vaccinations.

This bill also contains provisions that may impact our ability to prepare the state for the prospects of both seasonal and pandemic influenza. The bill does provide a means by which the Governor and Secretary can grant an exemption to the ban on vaccines containing thimerosal. However, the mechanism to do so appears cumbersome, and there are very real questions about what conditions are sufficient to constitute such an emergency. For example, we know that every year, influenza strikes Kansa and the United States; and we know that the most effective and cost-efficient way to immunize children against this virus is through the use of multi-dose vials that contain thimerosal. My interpretation of the bill is that this process, which protects thousands of Kansas children every year, may not qualify under the conditions for an exemption. Section 2, which implies that no exceptions can be granted after January 1, 2008, further limits the ability to protect children. As mentioned previously, manufacturers cannot currently make enough thimerosal-free vaccine in this country to immunize all our children with this product. Children do die of influenza and it's complications, and the limitations of this bill means that children may be at risk of not being able to receive the vaccine they need.

Section 2 also raises other concerns. If no vaccine, nor any drug product, administered in Kansas may contain mercury after January 1, 2008, many products are affected. It means that adults, as well as children, may not be able to receive influenza vaccination from multi-dose vials. They may also not be able to receive travel vaccinations such as those against encephalitis. Snake and spider antivenims also contain mercury products as preservatives, as do many products for the eyes, ears, and nose.

From a fiscal standpoint, the bill raises several key points. On a very basic level, we estimate that monitoring compliance with S537 would require one additional immunization field staff position be created at a cost of nearly $60,000 annually. In addition, the KDHE laboratory does not have the ability to test drugs to meet the requirements of Section 3. Providing such testing in a private laboratory would be very costly, and is estimated at a minimum of $40.00 per test. The bill does not specify how many doses need be tested nor how often, but depending upon the number of doses required to be tested in order to attain a random and reliable sample, the costs could range well into six figures. As an example, the Vaccines for Children Program supplies over 380,000 doses of childhood vaccinations each year to Kansas health care providers. If only 1% of these doses (3,800) are tested, the costs could climb to over $150,000. We cannot at this time estimate the additional cost of testing all vaccines that arrive in the state, nor of all products containing mercury; but one might reasonably assume that this figure increases markedly.

A final issue to raise is that of public confidence in the vaccination system. We know that while we've seen significant improvement in childhood vaccination rates in Kansas over the past two years, the state continues to lag behind the nation in immunization rates. A bill such as this, which calls into question the integrity of the vaccine supply, has

the potential to drive these rates even lower. We've already seen this phenomena occur. In the summer of 1999, there was a dramatic drop in the number of Kansas newborns receiving immunization against Hepatitis B after a recommendation to suspend vaccination with this agent due to thimerosal, content in the vaccine. A thimerosal-free product was released four moths later, but even now we still have yet to see a return of vaccination rates to 1999 levels.

We all recognize that issues like this bring very personal passions to the surface of the legislative process. Some of you know that I'm blessed with a happy and healthy eight-year-old son. If my son had gone through what some of the proponents of this bill describe, I would be doing exactly what they're doing. I'd be looking for an answer, something that I could see as a cause for the condition and something I could do to prevent it from happening to others. However, my role as a physician and as a public health professional requires me to present the evidence with an impartial eye, and to share the results of my review of the scientific background and policy implications with you. It's my hope that the information I've provided within this testimony will help the Committee to make the best decision possible for the children of Kansas.

Thank you, and I'll be happy to stand for any questions you might have.

Mercury Content in Vaccines and Selected Fish and Seafood

Vaccine Product	Brand/Mfr	Thimerosal concentration*	Ethylmercury in vaccine dose
DTaP	Tripedia (sanofi pasteur)	<0.00012%	≤0.3 µg
	Infanrix (GSK)	0	0
	Daptacel (sanofi pasteur)	0	0
DTaP-Hib	TriHIBit (sanofi pasteur)	<0.00012%	0.3 µg
DTaP-HepB-IPV	Pediarix (GSK)	<0.000005%	<0.0125 µg
DT (ped)	generic/single dose (sanofi pasteur)	<0.000012%	<0.3 µg
Tdap (10-18 yrs)	Boostrix (GSK)	0	0
Tdap (11-64 yrs)	Adacel (sanofi pasteur)	0	0
Td (adult)	Decavac (sanofi pasteur)	≤0.00012%	≤0.3 µg
	generic (Mass. Public Health)	0.0033%	8.3 µg
TT (adult)	generic (sanofi pasteur)	0.01%	25 µg
Hepatitis A	Havrix (GSK)	0	0
	Vaqta (MRK)	0	0
Hepatitis B	Engerix-B ped/adol (GSK)	<0.0002%	<0.5µg/0.5mL dose
	Engerix-B adult (GSK)	<0.0002%	<1µg/1mL dose
	Recombivax-HB (MRK)	0	0
HepA-HepB	Twinrix (GSK)	<0.0002%	<1 µg per 1.0 mL
Hib	ActHIB/OmniHIB (sanofi pasteur)	0	0
	HibTITER (Wyeth)	0	0
	PedvaxHIB (Merck)	0	0
Hib-HepB	Comvax (Merck)	0	0
Influenza (2005-06)	Fluzone (sanofi pasteur)		
	- multi-dose (≥3 yrs)	0.01%	25µg/0.5mL dose
	- multi-dose (6-35 mos)	0.01%	12.5µg/0.25mL dose
	- No preservative: 6-35 mos; ≥3 yrs	0	0
	- ≥3 yrs (No preservative)	0	0
	FluMist (MedImmune)	0	0
	FluVirin (Chiron/Evans)	0.01%	25µg/0.5mL dose
	FluVirin (Chiron/Evans; p-free)	<0.0004%	<1.0µg/0.5mL dose
	Fluarix (GSK)	<0.0005%	<1.25µg/0.5mL dose
Japanese encephalitis	JE-VAX (BIKEN)	0.007%	35µg/1.0mL dose
	JE-VAX (BIKEN)	0.007%	17.5µg/0.5mL dose
Meningococcal	Menomune/single dose (sanofi pasteur)	0	0
	Menactra (sanofi pasteur)	0	0
Polio (IPV)	IPOL (sanofi pasteur)	0	0
MMR	MMR II (Merck)	0	0
Pneumococcal	Prevnar (Wyeth-Ayerst)	0	0
	Pneumovax 23 (Merck)	0	0
Typhoid Fever	Typhim Vi (sanofi pasteur)	0	0
	Vivotif (Berna)	0	0
Varicella	Varivax (Merck)	0	0
Yellow Fever	YF-VAX (sanofi pasteur)	0	0

Fish or Seafood		Methylmercury concentration in PPM**	Methylmercury in µg per 6 oz serving
Swordfish		0.97	165
Grouper		0.55	94
Largemouth bass		0.43	73
Walleye		0.40	68
Tuna (fresh, frozen)		0.38	65
Halibut		0.26	44
Brown trout		0.16	27
Tuna (canned, light)		0.12	20

Table Note: Calculations for fish: (ppm = µg/gram x 28.35 gms per oz x 6 oz)

* Source: www.fda.gov/cber/vaccine/thimerosal.htm#t3 3/1/2006

** Source:www.cfsan.fda.gov/~frf/sea-mehg.html and www.epa.gov/waterscience/fish

FDA Consumer magazine
September-October 2004 Issue

IOM Report: No Link Between Vaccines and Autism

By Michelle Meadows

There is no link between autism and the measles-mumps-rubella (MMR) vaccine or the vaccine preservative thimerosal, according to a report released by the Institute of Medicine's (IOM) Immunization Safety Review Committee.

The report, released in May 2004, was prepared by a committee of independent experts established by the IOM in 2001 at the request of the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) to evaluate evidence on potential links between childhood vaccines and health problems. The agencies explored the issue because of growing controversy and questions from the public about vaccine safety.

Some parents have expressed concern because the symptoms of autism typically emerge in a child's second year of life, around the same time children first receive the MMR vaccine. Autism is a complex set of severe developmental disorders characterized by repetitive behavior and impaired social interaction and communication abilities. Other concerns the committee looked at include the use of thimerosal, a mercury-based compound used as a vaccine preservative, because many forms of mercury are known to damage the nervous system in high doses.

Review of the Research

This latest IOM report follows two reports on vaccines and autism published in 2001. The committee determined then that the evidence did not show an association between the MMR vaccine and autism, but that more evidence was needed regarding thimerosal. "The committee concluded that the evidence available at that time was inadequate to accept or reject a causal relationship between thimerosal and neurodevelopmental disorders," says Marie McCormick, M.D., Sc.D., chairwoman of the immunization safety committee and a professor at the Harvard School of Public Health.

The committee revisited these issues because several studies exploring possible links between vaccines and autism have been published since 2001. Committee members concluded that the hypothesis about how the MMR vaccine and thimerosal could trigger autism lacks supporting evidence. Their conclusions were based on a careful review of well-designed studies and other information from researchers and parents.

Five large studies in the United States, the United Kingdom, Denmark, and Sweden done since 2001 found no evidence of a link between autism and vaccines containing thimerosal. And 14 large studies consistently showed no link between the MMR vaccine and autism. The committee also reviewed several studies that did report associations between vaccines and autism and found that these studies had limitations and lacked supporting evidence.

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The committee reviewed potential biological links between vaccines and autism and found them to be only theoretical. Examples of some of the hypothesized links include a suggestion that the measles virus in the MMR vaccine might lodge in the intestines and trigger the release of toxins that could lead to autism. Another hypothesis is that the MMR vaccine might stimulate the release of immune factors that damage the central nervous system. Yet another hypothesis is that thimerosal may interfere with biochemical systems in the brain, thereby causing autism. But according to the IOM report, no evidence has shown that the immune system or its activation play a direct role in causing autism, and autism has not been documented as being a result of exposure to high doses of mercury.

"There is no convincing evidence of serious harm from the low doses of thimerosal in vaccines," says Karen Midthun, M.D., deputy director for medicine in the FDA's Center for Biologics Evaluation and Research (CBER). CBER regulates vaccines in the United States and works with the CDC and the NIH to study and monitor vaccine safety and effectiveness.

Limiting Thimerosal Use

Since the 1930s, small amounts of thimerosal have been used as a preservative in multi-dose vials of vaccines to prevent bacterial contamination. The active ingredient in thimerosal is ethylmercury.

Even though the risk of thimerosal is hypothetical, thimerosal began to be removed from childhood vaccines in 1999. The federal government, the American Academy of Pediatrics, and others agreed that thimerosal should be reduced and eliminated in vaccines as a precautionary measure. The FDA encouraged companies to comply with this recommendation. Currently, all routinely recommended vaccines manufactured for infants in the United States are either thimerosal-free or contain only trace amounts.

"We moved in this direction to address public concern and because it was feasible to eliminate mercury from vaccines," Midthun says. "We could eliminate thimerosal in vaccines as a way to reduce a child's total exposure to mercury, whereas other environmental sources of exposure are more difficult to eliminate."

In its latest report, the IOM's immunization committee reported that it does not dispute that mercury-containing compounds, including thimerosal, can be damaging to the nervous system. But the committee did not find that these damaging effects are related to the development of autism.

For the 2004-2005 flu season, the CDC is recommending that children ages 6 months to 23 months get vaccinated annually against the flu (influenza) with the inactivated flu shot. "The influenza vaccine is available both with thimerosal as a preservative and without it," Midthun says. "But the benefits of flu vaccination outweigh any theoretical risk from thimerosal."

According to the CDC, the amount of flu vaccine without thimerosal as a preservative will increase as manufacturing capabilities expand. "To eliminate thimerosal as a preservative from flu vaccines, manufacturers will have to switch from multi-dose to single-dose preparations, which requires greater filling and storage capacity," Midthun says.

Based on federal guidelines on levels of mercury exposure, a child won't receive excessive mercury from vaccines, regardless of whether their inoculation against the flu contains thimerosal.

Recommendations

The IOM's immunization safety committee did not recommend any changes with the MMR vaccine or with the current schedule of routine childhood immunizations.

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"While the committee strongly supports research that focuses on achieving a better understanding of autism, we recommend that future research be directed toward other lines of inquiry that are supported by current knowledge and evidence, and that offer more promise for finding an answer," McCormick said at a media briefing. "Given the current evidence, the vaccine hypothesis doesn't offer that promise."

The IOM is part of the National Academy of Sciences.

For More Information

Immunization Safety Review: Vaccines and Autism
Immunization Safety Review Committee, Institute of Medicine

Thimerosal in Vaccines

KANSAS HEALTH INSTITUTE

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Senate Public Health and Welfare Committee

March 1, 2006

Senate Bill 537

Gianfranco Pezzino, M.D., M.P.H.
Director of Public Health Studies
Kansas Health Institute

Healthier Kansans Through Informed Decisions

The Kansas Health Institute is an independent, nonprofit health policy and research organization based in Topeka, Kansas. Established in 1995 with a multi-year grant from the Kansas Health Foundation, the Kansas Health Institute conducts research and policy analysis on issues that affect the health of Kansans.

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Mr. Chairman and members of the Committee, thank you for giving me the opportunity to appear before you today. I am Dr. Gianfranco Pezzino. I am a public health physician and the director of public health studies for the Kansas Health Institute. Our organization does not support or oppose specific legislation, but it is glad to provide legislators with the best available information on complex topics to assist them in their decision-making process. I am here today in that role.

The toxicity of mercury has been known for centuries and is not in question. However, the question of whether mercury-containing additives in vaccines (such as thimerosal) are safe is complicated by the fact that mercury can present itself in multiple forms. It can, for instance, be either inorganic or organic. And the complexity does not stop there. In the organic form, mercury contains multiple compounds that are handled and excreted by the human body differently. This complexity helps explain why considerable uncertainty still surrounds the basic biochemistry of mercury, particularly thimerosal, and how tissues and organs in the body process it and are affected by it. In other words, people are still unsure about exactly what happens to the mercury contained in the thimerosal once it is injected through the administration of a vaccine.

Concerns about an association between thimerosal and autism surfaced in the 1990's, and became very public and prominent in July 1999 when the American Academy of Pediatrics and the U.S. Public Health Service issued a joint statement recommending the removal of thimerosal from vaccines.. That statement was based on an analysis from the Food and Drugs Administration (FDA) that showed a child at that time who received all the recommended vaccines could be exposed to cumulative doses of *ethylmercury* that exceeded some federal guidelines for another mercury compound, *methylmercury*. This action was taken only as a precaution. The possibility that some harm could result from this cumulative exposure to ethylmercury was purely speculative. There was no confirmed report of actual injury as a result of such exposure. Thimerosal-free vaccines were introduced following the FDA action. And since 2002, all vaccines used in childhood immunizations have been either mercury-free or contained only traces of mercury. Today, the only vaccines used in children that contain thimerosal are some influenza vaccines and Tetanus-diphtheria booster vaccines used in older children.

In 2004, a committee from the Institute of Medicine, a nonprofit affiliate of the National Academies, published a long report that examined the hypotheses that thimerosal-containing vaccines cause autism. The committee reviewed published and unpublished epidemiologic studies regarding causality and possible biological mechanisms. In particular, the committee found five studies that provided evidence of no association between thimerosal-containing vaccine and autism. Some of these studies were very large, population-based studies conducted abroad, involving hundreds of thousands of children who were followed up for several years. The committee also reviewed seven other studies reporting an association. Six of these studies (one of which unpublished) were conducted by the same two authors, Dr. Mark Geier and his son David, who have for years attempted to demonstrate an association between mercury and autism. The seventh study was an unpublished, uncontrolled study. The committee found that the studies by Dr. Geier had serious methodological flaws and their analytic methods were nontransparent, making their results uninterpretable. Based on the preponderance of evidence, the committee concluded that the evidence favors a rejection of a causal relationship between thimerosal-containing vaccine and autism.

A later review published in the journal Pediatrics in September 2004 examined 12 studies of the potential association between thimerosal-containing vaccine and autism, some of which had not been reviewed by the Institute of Medicine committee. The authors concluded that the four epidemiologic studies reviewed that support an association between thimerosal exposure and autism, all done by Dr. Geier and his son using overlapping data sets, contained critical methodologic flaws that rendered the data and their interpretation noncontributory. The authors of the review stated that the retrospective and prospective cohort studies that do not report an association, despite some limitations, generally were well designed and appropriately analyzed, and that these data supported a conclusion of no association between thimerosal-containing vaccines and autism in children.

So is it possible that mercury is implicated in causing autism? Some researchers have formulated hypotheses based primarily on animal models that in genetically susceptible children who are unable to expel mercury from their bodies the injection of thimerosal-containing vaccine could trigger the onset of diseases such as autism. Unfortunately, there is currently not enough knowledge on biomarkers and risk factors for autism to validate this hypothesis. In its

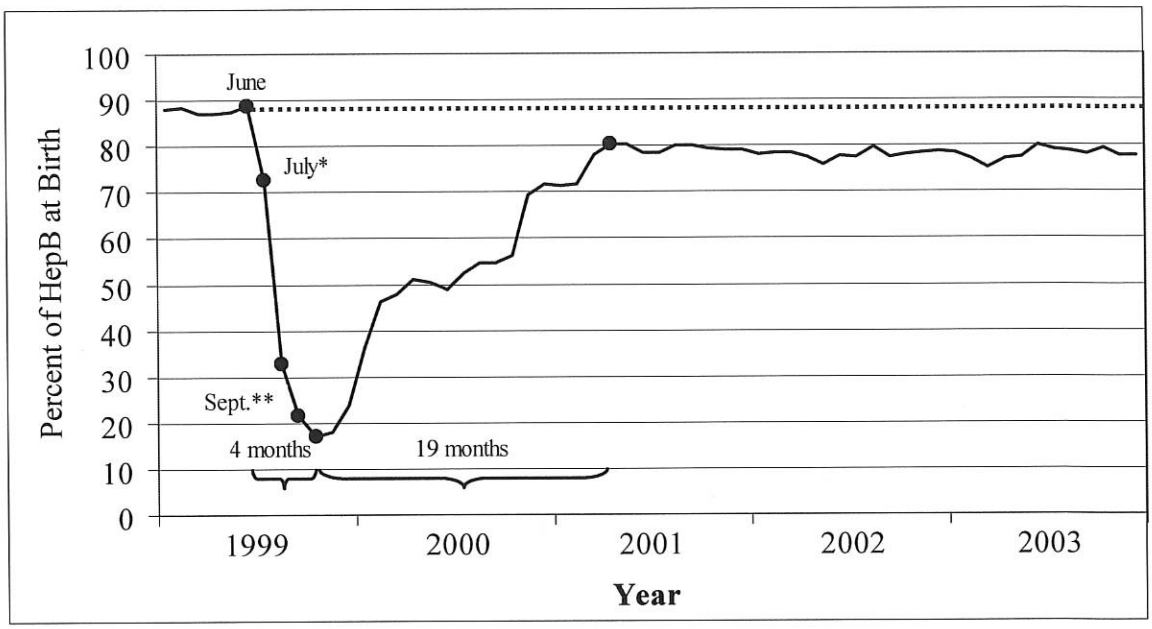
conclusions, the Institute of Medicine committee recommended that much more research be conducted on autism, directed towards those lines of inquiry most supported by the current state of knowledge and that can produce most useful answers. This kind of targeted research, rather than extensive population-based epidemiologic studies, is more likely to validate or rule out these or other hypotheses. Until then, hypotheses remain hypotheses. If we are to accept them and act on them, we need to confirm them first.

By contrast, there can be no doubt about the benefits of population-based childhood vaccination have been long proven. These benefits could be put in danger by premature interventions, as shown by the following examples.

After the decision to remove thimerosal from vaccines and the resulting public concern raised by that decision, the number of hepatitis B vaccinations given to infants after birth dropped considerably in many states. Wisconsin reported a decline from 84 percent to 43 percent; Oklahoma and Oregon experienced a decline of 50 percent. In Michigan, in December 1999, a 3-month old infant born to a mother who was infected with hepatitis B died because he did not receive the hepatitis B vaccine in a hospital that previously has a policy to vaccinate routinely all newborn babies. In Kansas—where childhood immunization coverage rates have been among the lowest in the country—the proportion of newborn babies that received the hepatitis B vaccine at birth plummeted from about 90 percent to less than 20 percent in the months following the announcement. Those rates have not rebounded even years later, after the introduction of mercury-free vaccine, as shown in the figure on the next page.

I hope that this information will help you make the best, informed decision based on the evidence currently available about the link between thimerosal and autism. I will be glad to stand for questions.

Figure: **Percentage of Kansas Children Receiving the Hepatitis B Birthdose by Month, 1999-2003.**



*July 7, 1999—AAP with PHS recommends suspending the hepatitis B birthdose for infants born to mothers without HBV

**September 13, 1999—Single-antigen, thimerosal-free hepatitis B vaccine available for distribution.

Data Source: KDHE, Center for Health and Environmental Statistics

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Thimerosol is a Developmental Neurotoxicant

George W Lucier, Ph.D
Toxicologist

Biosketch: Dr Lucier's credentials and record of accomplishments in the field of toxicology are documented in the attached CV. He is currently a consultant in toxicology and a Senior Adjunct scientist for Environmental Defense. Dr Lucier retired from the National Institute of Environmental health Sciences in 2000 where he was Director of the Environmental Toxicology program and Associate Director of the National Toxicology Program. In that capacity, Dr Lucier was responsible for coordinating toxicological research and testing across Federal agencies including the U.S Environmental Protection Agency, the Food and Drug Administration, the Occupational Safety and Health Administration and parts of the Centers for Disease Control. Dr Lucier was head of a research group in molecular epidemiology and risk assessment and has authored approximately 250 scientific publications. His research focused on the use of basic biology to reduce uncertainty in human risk assessments and to improve the tools used in exposure assessment. His work has made major contributions to risk assessments for dioxins, endocrine disrupters and methylmercury and he is frequently asked by Federal agencies to assist them in high visibility risk assessments. Dr Lucier chairs the Science Advisory Board for hazardous air pollutants for the State of North Carolina which makes recommendations on safe exposure levels on air pollutants of concern to North Carolina. He is also an advisor to the National Institutes of Health, a member of the NAS Committee on Toxicity Testing and a member of the Science Advisory Board for EPA. Dr Lucier was editor of the scientific journal, Environmental Health Perspectives, for 28 years.

Summary of report on thimerosal: The vaccine preservative, thimerosal contains 50% ethylmercury. Its structural analog methylmercury, is a potent and well known developmental neurotoxin and substantial evidence exists that ethylmercury is also a developmental neurotoxin. Based on studies that mercury reaches the brain after thimerosal or ethylmercury exposure, the knowledge that the amount of ethylmercury in vaccines exceeds safe levels and the results from a number of health effects and mechanism studies, it is highly probable that the use of thimerosal as a preservative has caused developmental disorders, including autism, in some children. All opinions expressed herein are based on a reasonable degree of scientific certainty using the information contained in the attached bibliography. I may also rely on my review of the testimonies of others at the trial. Illustrations used at three of my presentations on alkylmercury and thimerosal toxicity have previously been provided to the defendants.

Reimbursement: I was paid $250 per hour for my time.

Senate Public Health & Welfare committee
Date: March 1, 2006
attachment # 7

Alkylmercurial compounds are developmental neurotoxins: Organic mercury is a potent developmental neurotoxin based on numerous scientific studies in humans, experimental animals and cell systems. Much of the information is from studies on methylmercury(summarized by NAS, 2000) but there is considerable evidence that ethylmercury is also a developmental neurotoxin. Methylmercury is ubiquitous in the environment and it is known to bioaccumulate in fish. It's potency as a developmental neurotoxin coupled with its retention in fish has led the FDA and numerous state health agencies to advise women of child bearing age to limit their consumption of fish (NAS 2000, EPA 1997). Methylmercury is formed from the conversion of inorganic mercury to organic mercury by microorganisms present in aquatic environments (NAS 2000). Mercury emissions come from a number of sources including coal-fired power plants, chloralkali plants, paper pulp processes, gold mining and many others. Methylmercury is extraordinarily persistent in the environment and it is cleared slowly from the human body (EPA 1997, NAS 2000 and ATSDR 1999). Because of these properties, it is likely that every person in the United States has some amount of methylmercury in their bodies including fetuses, infants and children as well as adults. In fact the Centers for Disease Control and Prevention has estimated that 8% of the women of child-bearing age have mercury levels in their bodies higher than those considered safe by the EPA and the NAS (Schober et al 2003). Therefore, at least 60000 babies are born each year in the U.S who are already at risk for developmental disorders from mercury (NAS 2000). A recent publication provides additional data on mercury burdens of the U.S. population (McDowell et al 2004). In some regions of the U.S. the percentage of women with higher than safe mercury levels is much greater than 8% (Hightower and Moore 2003).

The developing brain is approximately 5-10 times more sensitive to the developmental neurotoxic effects of organic mercury than is the adult brain in humans and experimental animals. The first convincing evidence of the special susceptibility of the developing brain to organic mercury came in the 1950's and 1960's from reports that pregnant women exposed to methylmercury gave birth to infants with severe brain damage. These poisoning episodes occurred in Japan, Iraq and other countries (Bakir et al 1973,summarized by Risher et al 2002, NAS 2000; Clarkson 2002 and Myers and Davidson 2000). The Iraq episode also included exposure to ethylmercury. The symptoms observed in infants and children revealed a broad array of developmental disorders including visual disturbances, mental retardation, confusion, deafness, delayed achievement of developmental milestones. Autopsy samples from the Japan outbreak indicated widespread damage to all areas of the brain including altered arrangement of neural cells and changes in brain cell division and migration (Choi, 1989). Moreover, these evaluations demonstrated that more areas of the infant and fetal brain were damaged than the adult brain following equivalent exposures.

In the last 10 years a series of studies were conducted on the effects of low levels methylmercury exposures on the developing nervous system (Grandjean et al 1997, 1998, 1999a, 1999b, 2004) which demonstrated that low levels of exposure were harmful. These studies were conducted in the Faroe Islands in children whose mothers consumed whale meat contaminated with methylmercury. Neuropsychologic testing indicated

mercury-related dysfunctions in the domains of language, attention, memory , cognitive function, visualspatial and motor function. These studies demonstrate that alkylmercurials can have widespread effects on cerebral function and that several domains of brain function are affected. Some of these effects were associated with hair mercury concentrations less than 10 ug/g, a level previously considered to be safe. Some of the neurological/neurobehavioral effects caused by mercury are similar to the traits defined in autism. Evidence in support of the Faroe studies was summarized as part of EPA's risk assessment for methylmercury (Rice et al 2003)

There is ample evidence in humans and animal models to conclude that there are critical windows of vulnerability for the developing nervous system from exposure to environmental agents (summarized by Rodier, 1995 and Rice and Barrone 2000). Furthermore, various clinical disorders including autism, may be the result of interference with normal ontogeny of developmental processes in the nervous system. Unlike many organs, brain development and differentiation occurs during both the prenatal and postnatal periods. Studies in experimental animals and humans demonstrate multiple periods of vulnerability of the developing nervous system from early gestation to adolescence. The processes of cell proliferation, migration, differentiation, synaptogenesis, myelination and apoptosis are all occurring during both prenatal and postnatal development. In addition, the blood brain barrier is not fully formed until the first year of life and there is important development of various neurotransmitter pathways during postnatal development. Therefore, infants are vulnerable to chemical insult during early postnatal development because any disruption in the carefully programmed sequence of neural development can lead to neurological disorders that are not immediately expressed. In general, adverse effects are less likely if exposure occurs before or after an organ is fully developed. Therefore, the vulnerability of the developing brain is dependent on two factors, the first is whether a toxic substance can reach the developing brain and the second is the timing of exposure(Selevan et al Environmental Health Perspectives; 108, supplement 3, 451-462, 2000). This means that the pattern of exposure can have a profound influence on developmental toxicity outcomes and that the peak exposure during a critical window of development is more important than the total or cumulative exposures spread out over time.

The principle of exposure timing for developmental toxicants has been used to explain the apparent discrepancy between studies of the developmental neurotoxicity of mercury compounds. While, Grandjean et al have reported that methylmercury is a developmental toxicant in the Faroe Islands, another group has reported that similar total mercury exposures had no effect on children in the Seychelles Islands (Clarkson 2000, Myers and Davidson 2000). This apparent discrepancy was examined in great detail by an independent panel of 28 scientists who had access to the raw data from both sets of studies (NIEHS, 1999). This panel concluded that both studies were credible and that a reasonable explanation for the different results was that exposures in the Faroes occurred in intermittent bolus doses while the Seychelles exposure were consistent over time. Therefore, peak exposure during a critical window of brain development rather than cumulative exposure is more determinative of developmental neurotoxicity.

Comparison of ethyl and methylmercury: There is a vast amount of scientific evidence, some of it published over 50 years ago, that ethylmercury like methylmercury penetrates the brain and/or is a neurotoxicant (Warkany et al 1953, Hook et al 1954, Dahhan and Orfally 1962, Miller et al 1961, Clarkson 1972, Mukai, 1972, Tryphonas et al 1973, Derban, 1974, Yonaha et al 1975, Cinca et al, 1979,Zhang 1984, Dumitrescu 1979, Fagan et al 1979, Mukhtarova 1977, Magos et al 1985, Winship 1986, Chang and Verity 1995, Lowell et al 1996 ,Ball et al 2001, Eli Lilly 1999, Smith-Kline 1999 and Kramer et al 2004, Ueha-Ishibashi et al 2004). Other publications in the reference list support the notion that ethyl and methylmercury have similar toxicological properties but the ones listed illustrate that information on the neurological toxicities of ethylmercury and thimerosal are similar. Futhermore, the U.S EPA has established criteria for determining whether or not high production volume (HPV) chemicals can be grouped together for the purpose of evaluating health hazard data used in risk assessments (EPA HPV program 1999). When those criteria are applied to ethyl and methylmercury, it is clear that they would be grouped together because they have common physiochemical properties (Tan and Parkin 2000)and would be expected to cause a common pattern of toxicity operating through a common mode of action. Accidental ingestion by children of meat contaminated with ethylmercury led to severe neurological symptoms and autopsy data showed nerve cell loss, glial proliferation in the central cortex, demyelination, granule cell loss in the cerebellum and other pathologies of the central nervous system (Cinca et al 1979). Similar findings were observed in an accidental case of methylmercury poisoning (Davis et al 1994). Recent studies have demonstrated that Purkinje cell loss is a common neurological abnormality in autism and these cells are vulnerable to mercury exposures (Kern et al 2003; Sorensen et al 2000).

Both ethyl and methylmercury are dealkylated to form inorganic mercury (Magos 2003). Inorganic mercury does not pass the blood brain barrier as easily as alkylmercury but alkylmercurials once in the brain can be converted to inorganic mercury. Inorganic mercury formed in the brain cannot easily leave and therefore, it will be trapped and accumulate in the brain (Magos et al 1985, ATSDR 1999, NAS 2000 and Risher 2002). In fact, several studies have demonstrated that following ethylmercury exposure inorganic mercury is retained in the brain to such an extent that it is difficult to calculate a brain half life (Suzuki et al 1973, Platonow, Magos et al 1985, Brooks et al 1986, Clarkson 2004). These studies indicate that ethylmercury may be more neurotoxic than methylmercury although firm conclusions regarding relative potencies are difficult to make because dealkylation enhances overall clearance but at the same time it provides a mechanism for increased brain retention. The blood half life of methylmercury is highly variable among individuals, ranging from 35-190 days (al Shahristani and Shihab 1974, EPA 1997). It is assumed that there is at least an equal variation for ethylmercury although insufficient data are available to make firm conclusions on the blood half life of ethylmercury in humans. In one case of human poisoning (Pfab et al 1996) by thimerosal, the half life appeared to be in the range of 30-40 days. In any event, predictions of health risks from thimerosal or ethylmercury exposure must assume at least a 6-fold variation in blood and brain half life. Some data are available in rodents which indicate that the half

life of methylmercury in the blood is 2-3 times longer than for ethylmercury or thimerosal (Magos 2003). However, the difference in brain half life appears to be less. Sager and Burbacher (Sager,Immunization Safety review 2004; Burbacher 2004) presented information from monkey experiments indicating that mercury from thimerosal is preferentially retained in the brain compared to methylmercury. These data indicate that the brain to blood mercury ratios steadily increase over time following thimerosal exposure and that mercury residues would still remain in the brain several months after a single thimerosal injection. Based on these data it is reasonable to conclude that ethyl and methyl are equitoxic to the brain. This conclusion is strengthened by a report that a man receiving hepatitis-B immune globulin containing thimerosal experienced significant neurological toxicity at a blood mercury level of only 100 ug/L (Lowell et al 1996). If infants are 5-10 times more sensitive than an adult male then blood levels of 10-20 ug/L could be associated with neurotoxicity in infants.

Two studies have investigated the distribution of mercury following vaccination of infants using thimerosal as a preservative (Stajich et al 2000 and Pichichero 2002). These studies demonstrate elevated levels of mercury following vaccination but the experimental design did not permit estimation of a reliable half life nor could they provide any data on brain levels. In addition to the lack of information on the brain concentrations of mercury , peak levels were not achieved and the blood mercury measurements were not made for a sufficient period of time to estimate a half life. Surprisingly, Pichichero did estimate a half life for mercury following thimerosal injections although such estimates are not supported by a reasonable scientific foundation. Moreover, the Pichichero study was based on a dose of 37.5 ug mercury although many infants received 62 ug mercury in thimerosal-containing vaccines. Nevertheless, these findings were reviewed by Magos (2003) but conclusions drawn are flawed because of data inadequacies as described above. Based on the above considerations and analyses, the Pichichero 2002 and Stajich 2000 data indicate that safe levels of mercury compounds are exceeded following the use of thimerosal containing vaccines.

Alkylmercury Risk Assessments: The EPA routinely establishes reference doses for hazardous agents under its regulatory purview. Exposure levels below the reference dose are generally considered safe. Exposure levels greater than the reference dose do not necessarily cause toxicity but such exposure levels do increase the probability of a toxic response (EPA 1997). The greater the reference dose is exceeded the greater the probability of toxicity or disease. EPA has established a reference dose of 0.1 ug/kg/day for methylmercury based primarily on the Iraq and Faroe Island developmental neurotoxicity data (EPA 1997, Rice et al 2003). No reference dose is available for ethylmercury so based on the available information ethylmercury exposures are considered equivalent to methylmercury exposures (Ball et al 2001, preceeding discussion on pharmacokinetics). The NAS convened an expert panel in 1999 to review the scientific foundation for EPA's reference dose. After deliberating for one year the NAS releases a report which reaffirmed EPA's reference dose (NAS 2000). As part of the report, the NAS conducted an exhaustive analysis of all available data and they

concluded that The Faroe Islands data should be used for risk assessment. A benchmark internal dose of 58 ug/l was derived from the data which corresponds to a daily intake of 0.1 ug/kg/day. The benchmark dose is considered the blood level which corresponds to 5% of children suffering from neurological deficits as a consequence of methylmercury exposure. The reference dose was derived by dividing the benchmark dose by 10. Grandjean et al (2004) have since published data to indicate that methylmercury risks may have been underestimated due to exposure misclassification. In addition, Gilbert and Grant-Webster (1995) concluded that the safe exposure level should be 0.06 ug/kg/day. This means that many more infants than previously thought may be already at risk and that any additional alkylmercurial exposure from thimerosal or other sources would enhance their probability of a developmental neurotoxic response.

Risk assessments for thimerosal in infants must reflect the knowledge that peak exposures are more relevant to toxic outcome than are cumulative exposures (described earlier in this document) and that every infant has an existing body burden of alkylmercury compounds (NAS 2000, EPA 1997, Schober et al 2003, McDowell et al 2003). Many infants already have blood mercury levels in excess of 1 ug/l. Thimerosal-containing vaccines have significantly added to the organomercurial burden of infants. On vaccination day, a 2-monthold infant received 3-18 ug/kg ethylmercury. This number is 30-180 times greater than EPA's reference dose for methylmercury. For developmental neurotoxicants, the most scientifically credible measure of exposure is the amount of chemical in the body during critical windows of neural development. Therefore, it is not appropriate to average ethylmercury exposures over a 6 month period as was done by the FDA (Ball 2001. Even if this was done, the average daily exposure still exceeds the safe level established by EPA.

The ATSDR established a safe dose of 0.3 ug/kg for methylmercury (ATSDR 1999) but this assessment was based on the Seychelles not the Faroe Islands data. The Faroe Island-based approach is more relevant for risk assessment (NAS 2000) because it is a positive study that was judged as sound after a rigorous review by an independent panel of 28 scientists who had access to the raw data from both the Seychelles and Faroe Islands (NIEHS 1999). Even if the ATSDR risk assessment is used, thimerosal exposures on vaccination day still exceeded safe levels by 10-60 fold. The magnitude of alkylmercury exposure from thimerosal-containing vaccines placed in the context of well-founded risk assessments strongly indicates that ethylmercury exposures from thimerosal caused neurodevelopmental disorders in some children. The precise nature of the developmental disorders would likely vary between individuals and the array of expected disorders includes some symptoms associated with autism. It is difficult to establish a firm quauntitative measure of probability for an adverse outcome but it is likely between 1 and 10% for infants injected with thimerosal-containing vaccines would have neurological disorders.. Moreover it is very likely that some individuals are at greater risk than others for the reasons described in the following section.

Susceptible Individuals: It is generally accepted that not all individuals react alike to the toxic properties of chemical exposure; some are highly sensitive whereas others are resistant. Dramatic differences among individuals in their response to chemical toxicants are commonly observed in day to day living. For example, not all people who smoke get lung cancer although cigarette smoke is a known human carcinogen. Likewise, some individuals experience adverse side effects from specific pharmaceuticals while most do not although the dose is the same for everyone. Some of the factors responsible for differing sensitivities are genetic predisposition, age gender, diet, co-exposure to other chemicals and different sources of exposure to the same class of chemicals (Lucier,1996). These factors are also described in various documents and risk assessments on alkylmercurials (NAS 2000, EPA 1997, ATSDR 1999). This means that thimerosal could cause severe toxicity in some individuals and not others. For example, individuals with the same blood levels of organic mercury in the Iraq poisoning episode exhibited vastly different outcomes (Bakir et al 1973)

Merthiolate and thimerosal are well known sensitizing agents in adults and children and it has been shown that thimerosal causes delayed hypersensitivity (Forstrom et al 1980, Wohrl et al 2003). These findings confirm that some individuals are more sensitive than others to adverse reactions from thimerosal and they suggest that background exposures to methylmercury may have sensitized some infants to ethylmercury in vaccines. Various susceptibility factors for thimerosal are summarized below:

1. **Background exposures to alkylmercury:** The levels of mercury in infants and children vary at least 10-fold (Schober et al 2003, McDowell et al 2004). This is likely a consequence of different levels of exposure and different clearance rates (al Shahristani and Shihab, 1974) between individuals. This means that some infants will be more vulnerable to additional mercury exposure from vaccines than others simply because of their preexisting mercury body burden.

2. **Gender:** Several articles including the assessments of Gerlai and Gerlai (2003), Yeargin-Allsopp et al (2003) and the Institute of Medicine (Immunization Safety review 2001) have concluded that the prevalence of Autism in boys is approximately four times the prevalence in girls. The mechanisms responsible for the gender difference are not clear although there are indications that the presence of testosterone may be a risk factor (Harber 1965) and Sager (1984) demonstrates sex differences in response to alkylmercurials.

3. **Genetic predisposition:** There is a growing recognition by pharmaceutical industries, regulatory agencies and the scientific community that human disease is caused by gene-environment interactions and that by understanding how chemical substances interact with molecular and biological pathways we will be better able to predict the consequences and potential for adverse side effects from exposure to pharmaceuticals and chemicals. In the case of autism Gerlai and Gerlai (2003) have provided a long list of molecular mechanisms suspected to play a role in autism but the interactions of organomercurials with those pathways is unclear. However, studies on one pathway have implicated the glutathione pathway which

is involved in the detoxication of organomercurials (Westphal et al 2000, Muller et al 2001, Bradstreet Immunization Safety Review 2004, James et al 2004, James et al 2005). Taken together these studies indicate that individuals with deficiencies in the glutathione transferase pathways are at increased risk for the neurotoxic actions of thimerosal. There is a vast body of scientific literature to support the contention that the glutathione metabolism plays a key role in wide variety of chemically-induced toxicities in numerous organ systems. This knowledge is consistent with the results of Holmes et al (2003) which showed reduced levels of mercury in hair of autistic children and the results of Bradstreet et al. (2003) on urinary mercury levels in autistic children. A recent study (Hornig et al 2004) has demonstrated a link between autoimmunity and autism based on the effects of thimerosal on inbred strains of mice. This study along with the results of Voldani et as (2003) provide evidence for genetic susceptibility to thimerosal-mediated neurodevelopmental disorders. In fact, Havarinasab et al (2004) has demonstrated that thimerosal is more effective in inducing autoimmune reactions than is methylmercury.

4. **Diet:** The rate of mercury elimination from the body is significantly influenced by diet (Rowland et al 1980, Rowland et al 1984), gut flora and biliary excretion (Ballatori and Clarkson, 1982). The key event appears to be the role of the gut flora in dealkylation of organomercurials. Thus, differences in diet would likely exert an influence on levels of mercury in the brain and since the human diet is highly varied there should be corresponding differences in susceptibility based on those dietary differences. Likewise, dietary differences in selenium are likely to cause variation among children in brain mercury levels (Brzeznicka and Chmielnicka 1985). Infant weights vary considerably depending on diet and other factors. If each infant received the same absolute amount of mercury in vaccines regardless of weight, some infants received higher doses than others on a ug/kg body weight basis.

5. **Co-exposure to other chemicals:** Humans are never exposed to chemicals in isolation and different chemicals can interact to potentiate their toxic effects. Therefore, another source of susceptibility is the nature of the chemical world in which we live. In relation to thimerosal, studies have shown that aluminum (Jones 1972) and antibiotics (Crook and Freeman 1983) can dramatically increase toxic reactions from thimerosal exposures. Therefore, if infants are exposed to aluminum or antibiotics they may be more susceptible to the toxic effects of thimerosal.

The above information on susceptibility demonstrates that some infants would be at far greater risk than others for developmental disorders as a consequence of thimerosal exposure in vaccines. In general, the greater the number of risk factors the greater the risk.

Effects of Thimerosal in cells: The use of mechanistic data in risk assessments is increasingly recognized by regulatory agencies around the world. The reason for this is

that mechanistic studies help us understand the basic biology responsible for chemically-mediated toxicities and to better determine if observed results are biologically plausible. The utility of mechanistic studies is enhanced when the molecular/biochemical event being measured is relevant to the toxic endpoint in question and the amount of chemical needed to alter the biochemical event is consistent with the amount to which people are exposed. Based on these criteria molecular/biochemical events were selected for comment in this report only if they are relevant to mercury exposures from thimerosal-containing vaccines. In general, treatment of cells with thimerosal concentrations of 1 uM or less provides data relevant to estimated safe exposure levels for thimerosal.

1. Leong et al 2001 have reported that inorganic mercury at low concentrations (0.1 uM) is capable of altering nerve development and increasing the rate of neurodegenerative processes. The degeneration of nerves caused by mercury is visible on video (commons.ucalgary.ca/mercury). Since inorganic mercury is retained preferentially in the brain following thimerosal or ethylmercury exposure this finding indicates that infants receiving thimerosal are at risk for neurotoxicity.

2. Waly et al (2004) have reported that concentrations of thimerosal as low as 0.001 uM inhibited dopamine-stimulated methylation activity in human neuroblastoma cells. This inhibition could lead to adverse consequences on gene expression essential for normal brain development and therefore increase the risk of neurodevelopmental disorders.

3. Makani et al (2002) demonstrated that thimerosal induces apoptosis in human T cells via a mitochondrial pathway involving oxidative stress and glutathione depletion. This effect was evident at all concentrations tested, the lowest being 0.5 uM. Apoptosis is an essential pathway for the progression of normal brain development so this study enhances the biologic plausibility that thimerosal in vaccines increase the risk of developmental disorders. In a related study Baskin et al (2003) reported that thimerosal can induce DNA damage, cell membrane damage and programmed cell death pathways at low concentrations in human neurons.

4. Comparative studies on the ability of thimerosal and methylmercury to disrupt normal cellular calcium levels indicated that thimerosal and methylmercury were equipotent and effects occurred in rat cerebral neurons at concentrations below 1 uM (Ueha-Ishibashi et al 2004). This effect is related to cytotoxicity and like the above studies it enhances the plausibility that thimerosal causes neurodevelopmental disorders.

5. Several other mechanism studies demonstrate that thimerosal is capable of interfering with cellular pathways critical for normal development of the brain (Brunner et al 1991, Wallin and Hartley-Asp 1993, Song et al 2000).

Vaccine manufacturers ignored scientific data on the toxicity of thimerosal for 50years: In 1999, when I was Chair of the White House-directed interagency review of methylmercury toxicity and exposure, it was revealed that ethylmercury was used as a preservative in vaccines injected into infants. It seemed unbelievable to me and many of my colleagues that infants would be deliberately injected with alkylmercury, known for decades to be a developmental neurotoxin. It is very troubling that this practice could continue year after year and that parents had no knowledge that the vaccine program was unnecessarily placing their children at risk. The vaccine program has made immense contributions to public health but it clearly would have been better if thimerosal was not used as the preservative. I have reviewed some of the early literature used to justify the use of thimerosal as a preservative and subsequent publications on the toxicity of merthiolate, ethylmercury and thimerosal. Based on this information, I conclude that the justification for considering thimerosal or merthiolate as safe was inadequate and flawed, information on alternative preservatives was ignored, the vaccine manufacturers ignored a significant body of knowledge on health effects for at least 50 years and that the vaccine manufacturers did not conduct necessary toxicology studies to establish safety. The basis for these conclusions are as follows:

1. The key publication cited by Lilly in their statements of safety for thimerosal was a 1931 publication (Powell and Jamieson 1931). This paper reported studies in which adult experimental animals were injected with merthiolate and followed for up to seven days. Some animals lived and some died. No attempt was made to follow the animals longer than seven days and no attempt was made to determine if merthiolate caused neurological or developmental toxicity. Limited data were presented from studies in dogs but these data were inadequate for toxicity assessment. This paper falls miles short of a scientifically-justifiable claim of the safety of thimerosal use in vaccines.

2. Another paper (Smithburn et al 1930) used to claim safety of thimerosal and merthiolate reported on the injection of merthiolate to 22 people suffering from meningitis. Many of the people died. The ones that lived were followed for a brief period of time although the scope of the clinical evaluations was not documented in the paper. This paper falls far short of a scientific justification that thimerosal was safe for use in infant vaccines.

3. In a letter to Lilly Company (Pitman-Moore Company 1935) concern was expressed that merthiolate was more toxic to dogs than claimed by Lilly and that other preservatives were more effective. This letter was apparently ignored as no additional studies were conducted.

4. Herrell and Heilman (1943) stated that that merthiolate might be too toxic for use as a preservative and that other preservatives appeared to more efficacious. Similar conclusions were made by Engley (1953)

5. Two papers in the 1940's (Ellis 1943, Cogswell and Shoun 1948) reported on the dangers of using merthiolate. Other early papers (Epstein 1963, Nelson and Gottshall 1966) also reported that merthiolate was toxic.

6. Over 50 years ago, several publications (Hunter et al 1940, Hunter and Russell 1954, Hook et al 1954) reported that alkylmercury compounds crossed the blood brain barrier and caused neurological toxicity yet Lilly did not conduct additional studies nor did they change their claim that mercury containing preservatives were safe.

7. From 1950 to the mid 1970's numerous studies in Iraq, Japan and other countries (already referred to in this document) plus others (Jalili and Abbasi 1961, Damulji 1962) reported on the neurotoxicty of ethylmercury and alkylmercurials. These studies demonstrated that alkylmercurials were potent neurotoxins and that the developing brain was more sensitive than the adult brain. In the face of such overwhelming scientific evidence to the contrary, how could vaccine manufacturers persist in their claim that the use of mercury-containing preservatives was safe? It wasn't until 1967 that Lilly removed the non-toxic (Lilly 1967). They did not acknowledge until much later that mercury-containing preservatives were neurotoxic to the developing brain.

8. In 1971 (Lilly 1971) Lilly said in a letter to Dr Sigel that merthiolate was cytotoxic and must be diluted to less than 1/1000000 in order to be non toxic to cells. Knowing this how could thimerosal be marketed as a preservative in infant vaccines?

9. In 1972 (Axton 1972) reported on six cases of merthiolate poisoning in which 5 of the 6 patients died yet Lilly claimed in a 1976 letter to a drug company (Lilly 1976) that the ethylmercury in preservatives does not pose a toxic risk. Moreover, Gasset et al (1975) had previously reported that after topical application of thimerosal, mercury was detected in the blood and tissues of rats and their offspring demonstrating that mercury from thimerosal crossed the placental and brain barriers.

10. Blair et al (1975) reported that mercury was detected in the brains of Squirrel monkeys receiving thimerosal and the authors warned that thimoseral might pose a risk when used in vaccines.

11. Fagan et al (1977) reported that the application of thimerosal to infants with omphalocoeles had blood and organ levels of mercury well in excess of minimally toxic levels. This publication stated that organic mercurial antiseptics should be heavily restricted or withdrawn from hospital use. Similarly, Heyworth and Truelove (1979) said that merthiolate treatments might lead to mercury accumulation and toxic effects.

12. In the 1980's numerous publications questioned the safety and efficacy of merthiolate and thimerosal including reports of delayed hypersensitivity and additional studies on neurotoxicity (Forstrom et al 1980, Sheth et al 1983, Rohyans et al 1984, Stetler et al 1985, Winship 1986, Cox and Forsyth 1986, Sunderman 1988).

13. In 1982 the FDA (Federal Register 1982) in an advance rule-making document proposed to classify mercury-containing drug products for topical antimicrobial use as neither safe nor effective.

14. In 1989 a European working group reviewed thimerosal and concluded that ethyl and methylmercury were equitoxic and that the use of thimerosal-containing vaccines in infants and toddlers should be discouraged.

15. In the early 1990's European countries banned the use of thimerosal (Madsen et al 2003, Hviid et al 2003) because it was considered neurotoxic. A strong case against thimerosal use was made in 1991 by Seal et al (1991) who was concerned about both safety and preservative efficacy.

16. The vaccine manufacturers admitted in 1991 (Merck Exhibits 285 and 286) that the mercury dose in vaccines was 87 fold over the safe value yet they continued to market thimerosal. This information was not made public until FDA was forced to release it because of the FDA Mordernization Act of 1997. Moreover, the VAERS program documented 83 cases of autism related to thimerosal exposure between 1990 and 1999 (Exhibits 171 ands 172)..

Autism trends, epidemiology studies on associations between autism and thimerosal and conflict of interest issues: Several studies provide strong evidence that the prevalence of autism has increased dramatically over the last 20 years (Gerlai and Gerlai 2003, Gurney et al 2003, Yeargin-Allsopp 2003, Bertrand et al 2001, Yazabak 2003, Bernard 2001). The increase in trends provides convincing evidence that a significant proportion of autism cases are caused by environmental factors and that although genetic factors may predispose to autism there must be an environmental (diet, pharmaceutical and/or chemical) trigger. The only plausible explanation for the rise in autism supported by a strong scientific foundation is that thimerosal causes some cases of autism. The scientific foundation for this statement is described earlier in this report. Autism spectrum disorder is likely caused by more than one factor because of the wide array of symptoms used to classify the disease and not all of these symptoms are completely shared by all individuals diagnosed with autism.

During the last two years numerous studies have been published on the relationship between exposure to thimerosal-containing vaccines and autism (Verstraeten et al 2003,

Stehr-Green et al 2003, Hviid et al 2003, Madsen et al 2003, Geier and Geier 2003a, Geier and Geier 2003b, Geier and Geier 2003c, Geier and Geier 2004a, Geier and Geier 2004b, Andrews et al 2004, Heron et al 2004). Many of the results presented in these papers were discussed at the Institute of Medicine (Immunization Safety Review transcript 2004). Each of the papers has serious methodological flaws that limit their use in risk assessment. Flaws identified include inappropriate use of trend data, questionable criteria for exclusions, questionable designation of control populations, questionable characterization of doses, inclusion of doses much lower than experienced in the U.S. population, implied assumptions that all autism cases are caused by thimerosal, use of different diagnostic criteria in the same study, confusing use of hospital records and inappropriate comparisons across studies. It is important to note that a recent publication (Geier 2004b) prior analyses were updated using the VAERS database and methods developed by the National Immunization Program. This publication found statistically significant effects of thimerosal on the incidences of autism, speech disorders, mental retardation, personality disorders and thinking abnormalities. Taken together, the Geier publications demonstrate that thimerosal causes increased incidences of a number of neurodevelopmental disorders, including autism, in a dose dependent manner. These studies have been published following peer review in five separate scientific journals and they paint a picture consistent with other experimental studies on the neurotoxic actions of ethylmercury and thimerosal.

Several of the studies conclude that there is no association between thimerosal exposure and risk for autism (Stehr-Green 2003, Hviid et al 2003, Madsen et al 2003, Andrews et al 2004, Heron et al 2004). This seems like a rush to conclusion given the weakness of the data and the presence of serious confounders. None of the papers indicated disclosed either a financial conflict of interest nor an appearance of conflict of interest. Such disclosures are common practice for scientific journals because of concerns that industries might have influenced outcome of the studies or experiments (Bekelman et al 2003, Johns et al 2003, Melander et al 2003, Lexchin et al 2003, Bhandari et al 2004, Lancet 2004). The U.S House of Representatives Committee on Government Reform (2000 and 2003) has determined that the FDA and CDC routinely allow those with conflicts of interest to influence vaccine policy making. Because, the thimerosal issue is of great public health interest, the authors of the so-called negative studies should reevaluate their lack of disclosure statements. The authors of the papers that reported a positive association between thimerosal exposure and autism did make a full disclosure of financial interests and this should be done by the others. In addition, the Pichichero 2002 paper indicated that the authors did not declare any conflict of interest although there clearly was the appearance of conflict (New York Times 2002).

The Verstraeten paper, representing the United States population, was essentially neutral in its conclusions regarding thimerosal exposure and autism risk. However, the paper must be questioned for several reasons. First, the author presented a draft of his results in 2000 at a meeting in Georgia (Simpsonwood Transcript 2000) which indicated a high risk of neurodevelopmental disorders from thimerosal exposure. However, in subsequent drafts the strength of the association diminished and the paper eventually published in

Pediatrics (Verstraeten 2003) was neutral. Dr Verstraeten left CDC in 2001 and went to work for a vaccine manufacturer yet his employment with the vaccine manufacturer was not disclosed in the 2003 publication; it appeared as he was still working for CDC. This situation is a serious appearance of conflict and raises the possibility that the data might have been manipulated to make the relationship between autism and thimerosal in the 2000 draft disappear. Dr Robert Davis, who worked for vaccine companies (Immunization Safety Review 2004), advised Dr Verstraeten on the CDC paper between 2000 and 2002 when many of the changes were made that diminished the relationship between thimerosal and neurodevelopmental disorders. Some of these issues with the CDC study are discussed by Halsey and Geier in their letters to the Editor of Pediatrics (2003).

The IOM 2004 report on thimerosal-containing vaccines was funded by the CDC. The record shows that the IOM was inappropriately influenced by the CDC. Transcripts of an early organizational meeting in (IOM transcript Jan 2001) reveal statements to the effect that the Committee would not conclude that thimerosal caused neurodevelopmental disorders because the CDC did not want the IOM to conclude a causal association. This kind of prejudicial push to a particular conclusion is totally inappropriate for as funding agency requesting an objective evaluation by an IOM Committee or any Committee for that matter. Moreover, the Committee Chair stated, before any evidence was presented, that the Committee would never determine that autism was a true side effect. Statements like this would not be made if the deliberations were intended to be objective and based on scientific facts. The IOM concluded in 2004 that thimerosal does not cause autism but this conclusion is tainted because of the prejudicial statements made by the Committee at the onset of deliberations and the undue reliance on research conducted by scientists who did not disclose conflicts of interests in their publications. Inexplicably, the IOM Committee seemingly ignored a vast body of science, including epidemiology studies, indicating that thimerosal causes neurodevelopmental disorders. In fact, Congessman Weldon (Weldon 2004) expressed concern that the committee members were biased and had conflicts of interests and that the IOM report did not constitute an objective evaluation of the facts.

The 2003 Mercury in Medicine Report by the U.S. House of Representatives noted that CDC and the National Immunization Program are conflicted in their ability to monitor the safety of vaccines because they are also trying to increase immunization rates. The report criticized FDA and CDC for being asleep at the switch regarding safety data for thimerosal and for having a misplaced protectionism for the pharmaceutical industry. CDC ranks its priorities as follows (Plaintiffs exhibit 82):

1. disease prevention
2. immunization coverage
3. partnerships
4. science

5. systems

6. vaccine safety

7. NIP work environment

Clearly, the CDC is more concerned with immunization coverage and partnerships with industry than it is with vaccine safety. In response to the growing criticism concerning CDCs ability to monitor vaccine safety, CDC recently separated the National Immunization Program which advocates vaccination from the Vaccine Safety Branch which monitors the potential risks from vaccines (New York Times 2005). This step appears to recognize that vaccine safety has received short shrift in the past.

Unfortunately, the CDC has not made all the data available that was used to assess the relationship between thimerosal exposure and autism. The withholding of non-classified scientific information obtained from the expenditure of public funds and used in public health policy is not defensible in this case (Weldon 2004) especially in light of the circumstances described above. Independent scientists must have the opportunity to analyze all the datasets used by Verstaeten and CDC in their investigation of the relationship between autism and thimerosal use before the 2003 paper can be considered of use in public health policies and assessments. Availability of raw data to anyone who wants it is common practice in many Federal research agencies including components of the National Institutes of Health when such data has any impact on public health policy.

Thimerosal and Causation of Neurodevelopmental Disorders: The criteria for evaluating whether or not a chemical exposure causes a particular disease in humans is often contentious. In 1965, Bradford Hill articulated guidelines for assessing causation and those guidelines are still used today. The guidelines are comprised of nine considerations; strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment and analogy. These are not meant to be strict criteria for determining causality but they do provide a framework for such assessments. I will briefly discuss these considerations based on the information and references already referred to in my report;

1. Strength: There are numerous publications and exposure circumstances that clearly demonstrate that alkylmercury compounds are potent developmental neurotoxins. Develomental neurotoxicty is a sensitive endpoint for alkylmercurials, effects occur following low doses in humans, experimental animals and in isolated cells and ethylmercury and methylmercury have similar potencies. The evidence is strong that thimerosal is a developmental neurotoxin including several positive epidemiological studies.

2. Consistency: There are several positive epidemiological studies in the peer-reviewed scientific literature demonstrating that thimerosal-containing vaccines in the U.S. have caused increased incidences of neurodevelopmental disorders. Several studies have not shown an association but they were not conducted in the

U.S., doses employed were less than in the U.S., the so-called negative studies were conducted by scientists who did not disclose conflict of interests and they are fraught with methodological problems. One U.S study conducted by the CDC was neutral but it was seriously confounded by conflict of interest issues.

3. Specificity: Episodes in Japan, Iraq and other countries have shown that alkylmercurials cause neurological disorders and children, infants and the unborn fetus are at special risk. The array of developmental disorders caused by alkylmercurials is very wide and symptoms vary among individuals exposed to the same dose. The pattern of developmental neurological symptoms caused by alkylmercurials are likely influenced by timing of exposure, preexisting mercury levels in the body, genetic factors and dietary factors.

4. Temporality: The developing nervous system is at risk and the reported effects of thimerosal on neurological functions occurred after injections of ethylmercury-containing vaccines in a manner consistent with the principles of developmental neurobiology including latency of effects.

5. Biological gradient: Alkylmercury compounds cause developmental disorders in a dose dependent manner in humans, experimental animals and in isolated cells and effects occur at low doses. In fact, the CDC estimates that 8% of the women of child bearing age have mercury levels that are considered unsafe.

6. Plausibility: Ethylmercury-containing vaccines were administered to infants at doses much higher than those considered safe during a time when the central nervous system is especially vulnerable to developmental neurotoxins. There is clear biologic plausibility that thimerosal has caused neurodevelopmental disorders in some children.

7. Coherence: The evidence that thimerosal causes neurodevelopmental disorders is coherent based on assessment of human studies, the known exposures to ethylmercury and expectations based on dose, neurological damage and mechanistic considerations. It would be reasonable to predict that the use of thimerosal-containing vaccines would cause developmental disorders.

8. Experiment: The positive epidemiology studies on thimerosal are supported by a consistent and convincing scientific literature in experimental animals and in in vitro systems.

9. Analogy: There is a strong scientific foundation for the contention that ethylmercury and methylmercury are similar in their neurotoxic properties and that data from studies on methylmercury can be used to assess the risks from ethylmercury exposures.

It is important to note that EPA (EPA revised cancer risk assessment guidelines), the National Toxicology program (NTP 2002) and the WHO (WHO 2005) have established

criteria for determining chemical causation of disease for cancer and other diseases. These criteria require that data from human studies, mechanistic studies and animal studies be considered in determining causation.

The CDC has published (CDC 2005) case definitions for chemical poisoning. They state that laboratory criteria for the diagnosis of organic mercury poisoning is a case in which blood mercury levels exceed 10 ug/L. They do not distinguish between ethyl and methyl mercury in this case definition. A case classification of probable poisoning is defined as "*a clinically compatible case in which a high index of suspicion (credible threat or patient history regarding location and time) exists for organic mercury exposure, or an epidemiologic link exists between this case and a laboratory confirmed case.*" Based on these criteria it appears that use of thimerosal in infant vaccines would constitute mercury poisoning as defined by the CDC if consistent with clinical findings.

The vaccine industry has also established criteria for determining if adverse events are related to vaccine administration (Plaintiffs exhibit AP 218). According to these criteria an adverse event is considered to be related to vaccine administration with a high degree of certainty if the adverse event followed a reasonable temporal sequence after administration of the vaccine and it could not be reasonably explained by the known characteristics of the patients clinical state, environmental or toxic factors or other modes of therapy administered to the patient. It follows that many neurodevelopmental disorders in children who had received thimerosal-containing vaccines were caused, in part, by the mercury in vaccines unless another cause is demonstrated.

Conclusions: Companies using thimerosal in their products failed to conduct adequate studies on the toxicity of thimerosal and they did not use or develop safe substitutes for preservatives in vaccines. They failed to warn that thimerosal was unreasonably dangerous because of its neurotoxic properties. The manufacturers failed to heed a vast body of scientific information indicating that thimerosal was toxic. Therefore, thimerosal was more dangerous than would have been anticipated by pregnant parents bringing their child to the doctor for vaccinations because of the negligence of the manufacturers.

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AFFIDAVIT OF BOYD E. HALEY, PROFESSOR AND CHAIR, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF KENTUCKY, 13 August 2002

Thimerosal-Containing Vaccines and Neurodevelopment Outcomes

FORWARD: Thimerosal or merthiolate is a derivative of thiolsalicylate where ethyl-mercury is attached though the sulfur. It is defined as a preservative or anti-microbial in medical use. This anti-microbial action is dependent on thimerosal breaking down releasing ethyl-mercury that can penetrate cell membranes and bind to intracellular enzymes, inhibiting them, and causing cell death. Further, in certain biological environments the ethyl-mercury can further break down releasing mercury cation (Hg2+). Hg2+ is also very reactive with enzymes and proteins inhibiting their biological functions and causing cell injury or death. Both ethyl-mercury and Hg^{2+} are very neuro-toxic compounds.

However, ethyl-mercury is more rapidly partitioned into the hydrophobic (fatty) tissues of the central nervous system and is a more potent neuro-toxin than Hg^{2+} based on this "partitioning factor". It is this partitioning factor that makes organic-mercurials such as dimethyl-mercury so neuro-toxically lethal (this is the compound that caused the death of a Dartmouth University chemistry professor after she was exposed to a drop or two on her gloved hand). The concern with organic-mercurials, such as thimerosal, is that such compounds can be perceived as "pro-toxicants" just as certain pharmaceuticals can be classified as "pro-drugs". This means that the original compound, e.g. thimerosal, is less reactive giving the compound time to partition into certain areas of the body before it breaks down releasing the ethyl-mercury and then further releasing Hg^{2+}. However, while attaching ethyl-mercury to thiolsalicylate makes the ethyl-mercury less reactive it most likely allows increased partitioning into the central nervous system before the ethyl-mercury is released and thereby, increases the neuro-toxicity per unit ethyl-mercury involved.

Considerable caution must be taken when stating what is the "toxic level" of mercury and any mercury containing compound. Humans are not rats in a pristine cage where their environment can be controlled to ensure that other toxicities and infections are not occurring. The level of mercury that would cause toxicity in a healthy individual is much higher than what would be needed to cause a toxic effect in an individual that is ill, aged or under oxidative stress. This is because additional stresses and increased age lower the amount of protective compounds that bind mercury and render it less harmful. If an individual is low on these protective compounds, then less mercury or thimerosal would be needed to cause a clinical effect. Below I will present my interpretation of our research and that from other laboratories that focus on the potential toxicity of injected thimerosal in the vaccine mixture. The conclusion I have reached after both personal laboratory research and a thorough evaluation of the research literature is that the injection of thimerosal into expectant mothers and newborn infants represents without a doubt a severe, major toxic exposure and is most likely causal in autism spectrum disorders.

BIOCHEMICAL TOXICITY STUDIES: In my laboratory we have recently done an evaluation of the potential *in vitro* toxicity of vaccines containing thimerosal as a

"preservative" versus those vaccines not containing thimerosal. In these preliminary studies, vaccines with thimerosal added consistently demonstrated in vitro toxicity that was markedly greater than the non-thimerosal or low thimerosal containing vaccines. We also compared the toxicity of the vaccine solutions with solutions of pure thimerosal and with solutions of mercury chloride. Mercury is a known neurotoxin and its mechanism of neurotoxicity has been studied in our laboratory for the past 10 years. To determine the relative toxicity we used two different biological testing systems: (i) brain homogenates and (ii) a mixture of four purified mammalian enzymes. In human brain homogenates we had earlier observed that mercuric ion rapidly inhibited tubulin viability at low micromolar levels, mimicking the situation in Alzheimer's diseased brain, but was less toxic to actin **(see Figures 1& 2)**. Both tubulin and actin are polymerizing proteins that are actively involved in neurite growth cone activity. In contrast to mercuric ion, vaccines containing thimerosal inhibited both tubulin and actin viability **(see Figure 3)**. This would indicate that thimerosal has the potential to be much more damaging to neurite development than equivalent levels of mercuric ion. It is my hypothesis that thimerosal releases ethyl-mercury which most certainly interferes with neurite growth and neuronal development in infants through rapid inhibition of several thiol-sensitive enzymes/proteins including actin, tubulin and creatine kinase. This supports the concept that thimerosal in biological solutions injected into the human body could cause a number of systemic problems identified as disease states. Recently, in preliminary studies using rat hippocampal neurons in culture we observed that toxicity started in the low nanomolar level.

CELL CULTURE WORK ON THIMEROSAL TOXICITY: The toxicity results obtained in our biochemical toxicity studies were not at all unexpected since thimerosal and other compounds containing a similar thiol-organic mercury group are widely known to be especially potent neurotoxic agents. Our biochemical toxicity results are very consistent with the reported toxicity of thimerosal containing vaccines versus non-thimerosal containing vaccines as observed in cell culture studies (*Kravchenko et al., Evaluation of the Toxic Action of Prophylatic and Therapeutic Preparations on Cell Cultures III. The Detection of Toxic Properties in Medical Biological Preparations by the Degree of Cell Damage in the L132 Continuous Cell Line. Zh. Mikrobiological Epidemiol. Immunobiol. (3):87-92, 1983*). The results of this research demonstrated the toxicity of thimerosal (merthiolate) by showing cell damage of the 1:10,000 concentration found in vaccines after dilution of this mixture to 1 part per 128. The conclusion was that thimerosal use for medical and biological preparation (i.e. vaccines) manufacturing is inadmissible, especially in pediatrics. Other studies on cytotoxicity of thimerosal compared it to another mercury containing preservative (phenylmercuric acetate) and thimerosal was 5 times more toxic with only a two minute exposure to the cells. The LD50 for thimerosal was 2.2 micrograms/ml for a 24 hour exposure to human conjunctival cells and the comment was made that "the longer the contact time of these preservatives, the severer the damage to the ocular tissue".

In collaboration with another professor in our department we have now included toxicity studies using human brain neurons in culture. Our initial studies have shown that thimerosal is quite toxic to these neurons in culture with neuron death being observed at

as low as 10 nanomolar concentration of thimerosal with 50 nanomolar thimerosal causing 43% neuron death in 24 hours. 100 nanomolar thimerosal caused about 83% death occur in 24 hours.

Studies using vaccines with and without thimerosal present demonstrated that the presence of thimerosal greatly enhanced the neurotoxicity of the vaccine. Further, the vaccines seemed more toxic than the level of thimerosal they contained should have caused. This would be expected as the vaccines also contain aluminum that is in itself neurotoxic (see section on synergistic toxicity below). However, the neuron toxicity studies on the pure thimerosal and vaccines mirror the results we observed in the enzyme toxicity studies mentioned above with the thimerosal being equally or more toxic than inorganic mercury to many critical enzymes. Further studies are underway at the present time.

SYNERGISTIC TOXICITIES WITH THIMEROSAL: Since about 1989 my laboratory has been actively involved in research regarding the toxic effects of elemental mercury and the relationship of this toxicity to neurological diseases, primarily Alzheimer's disease. One fact that has become extremely obvious to me during this past 11 years is that it is impossible to determine the exact toxic level of mercury or mercury containing compounds that is safe for all humans. There are several reasons why mercury should not be considered safe for humans at the measurable levels currently reported as "safe" by current government monitoring agencies. One of these is the obvious effects of other metals on increasing the toxicity of identical levels of mercury. An example is that of zinc ion, an essential metal for normal cell function. Yet, in the presence of mercuric ion, the addition of zinc enhances the toxicity level significantly **(see Figure 4)**. Cadmium and lead are even more potent at enhancing the toxicity of mercuric ion. This concept of synergistic toxicity of mercury with other metals is supported by prior research that demonstrated that a mixture of mercury at LD-I level with lead at 1/20th the LD-1 level produced a mixture with an LD-100 effect, at least 50 to 100 times the additive effect minimally expected (*Schubert, J., Riley, E.J. and Tyler, S.A., Combined Effects in Toxicology—A Rapid Systematic Testing Procedure: Cadmium, Mercury and Lead. J. of Toxicology and Environmental Health, 4:763-776, 1978*).

Using pure thimerosal and aluminum solutions the possible synergistic effects of combining these two toxicants was studied. Levels of thimerosal that caused about 50% neuron death gave nearly 90% death in the presence of non-toxic levels of aluminum hydroxide. This represents a significant synergy of the toxicity as shown in **Figure 5**. Therefore, mixing thimerosal with aluminum does enhance toxicity and likely follows the basic chemistry described where aluminum with thimerosal effected severe skin burns in patients (*H.T. Jones, Danger of Skin Burns from Thiomersal, British Medical J. #2, p504-505, 1972*).

The synergistic effects of different compounds with thimerosal are not all known but some do exist. For example, the commonly used antibiotic, tetracycline, is known to enhance thimerosal toxicity. *Crook and Freeman, Reactions Induced by the Concurrent Use of Thimerosal and Tetracycline, American J. of Optometry & Physiological Optics v60,#9, pp759-7611983*, reported that the use of tetracycline in humans induced and increased the irritation and inflammation of the ocular tissues caused by thimerosal. These results were confirmed in studies using rabbits. Therefore, it is obvious that

concurrent treatment of infants with other drugs and/or antibiotics has the possibility to enhance the toxic effects of thimerosal exposures. Further, it was postulated that the synergistic effects of tetracycline was due to the metal binding properties of this antibiotic that may have delivered the toxic metal more effectively to the site(s) inducing enhanced toxicity.

Studies were done to see if various antibiotics enhanced the toxicity of thimerosal against the neurons in culture system. Tetracycline, amphicillin and neomycin all enhanced the toxicity to somewhat different extents. However, using this system it would be difficult to prove the effects in a whole body animal without the appropriate studies. This data clearly demonstrates that there is no know level of safety for the use of thimerosal, especially in infants being treated with other medicinals that would enhance the toxicity of the ethyl-mercury released such as occurred with tetracycline (a commonly used antibiotic).

One of the conundrums of autism is the explanation of the 4:1 ratio of boys to girls that get the disease. It has been reported that estrogen therapy reduces the risk of females to Alzheimer's disease, a clinical condition we hypothesize is exacerbated by mercury. We therefore decided to test the effects of both female and male hormones on the neurotoxicity of thimerosal. The results were eye-opening. For example, 50 nanomolar thimerosal causes less than 5% neuron death within the first three hours incubation and 1 micromolar testosterone causes no significant death within this time frame. However, mix these two together and 100% neuron death was observed at the earliest time point checked. This represents a severe enhancement of thimerosal toxicity **(see Figure 6)**. Further, at 12 hours the neuron death effected by 50 nanomolar thimerosal alone could be reversed by 1 micromolar estrogen. Estrogen also significantly reduced the testosterone enhanced toxicity of thimerosal. While much research is yet to be done it is apparent that these results fit into the "thimerosal being causal" hypothesis as it may be used to explain the high rate of boys being affected. Interestingly, a Dr. Simon Baron Cohen of London has reported in a meeting that, in a study of the amniotic fluid of mothers who gave birth to autistic children, the major anomaly was an increased level of testosterone in their amniotic fluid when compared to that of mothers who gave birth to non-autistic children.

The data above on the effects of antibiotic, other heavy metals and hormones on thimerosal toxicity imply that it would be impossible to predict the exact level of mercury that would induce observable toxicity in each human. Many environmental toxicants could work synergistically with ethyl-mercury rendering the ethyl-mercury much more toxic than it would be in the absence of these other toxicants (e.g., elemental mercury from dental amalgams, cadmium from smoking, lead from paint and drinking water, aluminum, etc.). Humans are not rats in a pristine cage, eating rat chow carefully prepared to eliminate any toxicants. Humans smoke, drink alcohol, have numerous mercury emitting amalgam fillings, eat questionable food, and drink water known to contain other toxicants. Finally, it is impossible to state the toxic effect of any injection of thimerosal unless one knows the toxic exposure of the individual to other heavy metals or other environmental toxicants.

CASE HISTORIES ON THE TOXICITY OF THIMEROSAL AND OTHER ETHYL-MERCURY RELEASING COMPOUNDS: A recent review covers much of

the case history literature on the little that is known about ethylmercury toxicity (*L. Magos, Review on the Toxicity of Ethylmercury, Including its Presence as a Preservative in Biological and Pharmaceutical Products, J. Applied Toxicology 21, 1-5, 2001*). The conclusions reached by the author of this review is that "ethylmercury may present a risk when blood mercury concentrations approaches or exceeds 1.0 microgram per ml and severe intoxication occurs when blood mercury concentration approaches or exceeds 2 micrograms per ml."
In the context of the literature reviewed the conclusions by Dr. Magos seems reasonable. However, this conclusion was based primarily on ethylmercury and methylmercury exposures from occupational exposures, dietary intake, externally applied tinctures along with vaccination data on adults. It should be noted that in considering deceased patients the one infant had a blood mercury (from an externally applied tincture) that was measured at 1.34 micrograms per ml, a young boy had a blood mercury of 5 micrograms per ml (from eating pork from a pig feed ethylmercury) and adults had 15 micrograms per ml (from eating bread made with seed treated with a compound that generated ethylmercury). Without the needed extensive data to make a conclusion, it appears as if the younger the patient the more deadly or toxic the ethylmercury is at a lower concentration. This is further supported by the other (Kostial, K., et al. Influence of Age on Metal Metabolism and Toxicity, Environmental Health Perspectives, v25, 81-86, 1978) who state "results obtained in sucklings show a very high intestinal absorption of all metals which is partly attributed to milk diet; a higher whole body retention, higher blood levels and a much higher accumulation in the brain". Certainly, no conclusion of safe levels of exposure to ethylmercury on infants could be made from the data reviewed by Dr. Magos.

The exposures reviewed were from different delivery modalities and there is a considerable difference in the toxicity of many materials when oral intake is compared to injections via the vaccine route. Total mercury in the blood stream does not distinguish between bound mercury (e.g. that coupled with glutathione and being removed from the body) and unreacted mercury (that available to cause further damage). Ratios of bound and free ethylmercury are likely to be different if ethylmercury is eaten or inhaled versus injected, bypassing the protective systems available in the intestines. It was also pointed out in the review that the blood/urine ratios varied from 3.4 to 18 indicating that urine mercury levels are inferior for monitoring ethylmercury exposures. However, since ethylmercury should partition between blood and urine at a consistent ratio this data could also be interpreted to indicate that the mercury in some of these patients is coming from more than just ethylmercury (e.g. dental amalgams that are the major source of human mercury body burden). In a report on mercury levels in squirrel monkeys treated intranasally with thimerosal (*Blair, A., Clark, B., Clarke, A and Wood, P., Tissue Concentrations of Mercury After Chronic Dosing of Squirrel Monkeys with Thimersal, Toxicology,v3, 171-176, 1975*) it was shown that exposure to 0.002% thimerosal daily for 6 months, with a total of 2,280 μg given, lead to a 174/29 or about 6.0 ratio of mercury in the brain/blood ratio indicating that thimerosal leads to a more rapid build up of brain versus blood mercury. However, it was pointed out that the highest brain total (250ng/g) was still below the 3-9 μg/g where neurological symptoms appear, but this later value would depend on the oxidative stress of the patient and could be much lower.

The review states that "ethylmercury in medicinal preparations declines with time" and gave examples of 38%, 64% and 85% decreases in ethylmercury in plasma and immunoglobin G samples. This mercury did not disappear and the loss of ethylmercury has to be due to ethylmercury reacting covalently with the protein-thiols in the medicinal prepartions. In aged medicinal preparations, increased ethylmercury reaction with protein-thiols in the preparations would likely change the neurotoxity effects of the resulting mercury complexes compared to pure ethylmercury. How this pre-reacted ethylmercury would contribute to blood levels of mercury appears unknown, but it is likely to be quite different from pure ethylmercury. However, what is known is that ethylmercury retains its severe toxicity after prolonged exposure in living animals. This is supported by a case mentioned in the Magos review where ethylmercury obtained by "consumption of meat from a pig fed with ethyl-mercury" caused severe damage to adults and killed two young boys. It seems as if ethylmercury can retain its severe toxicity after a period of incubation time in a living pig, butchering and storage of meat, followed by cooking. Then the concept that the faster decomposition of ethylmercury, relative to methylmercury, decreases its toxicity compared to methylmercury seems to be such a small difference as to be insignificant. What is solidly observed is that ethylmercury (and other organic-mercurials) can withstand considerable exposure to a living system, storage in a biological environment, exposure to high heat in the presence of muscle tissue, and still produce a lethal toxicity when taken orally.

In a 1972 a (*National Geographic , Quicksilver and Slow Death, v142, #4, 507-527, 1972*) a similar report was presented where the pig was fed seed coated with Panogen, a methylmercury pesticide. The family ate the pig as above and the four children suffered severe neurological damage. But, in contrast to the ethylmercury poisoning above, they all lived. One of the children was *in utero* during the consumption of the pork, suffered the most and was born blind and mentally retarded. Again, this supports the concept that the younger the human the more detrimental the toxic effect the organic mercury compounds will have.

It appears certain that much of the blood level mercury in these patients presented in the Magos review could be from sources other than pure ethylmercury. In my opinion, I do not believe that a safe level of ethylmercury can be arrived at by only comparing blood levels of mercury if we do not know the chemical nature of all of the contributing mercury sources, the initial source of the mercury or if the presence of other compounds were involved (e.g. antibiotics that bind heavy metals such as tetracycline and enhance thimerosal toxicity:see below in Synergistic Toxicity).

It is of major concern that ethylmercury from thimerosal in vaccines is a special situation. It is injected with millimolar levels of aluminum and it is probable that thimerosal, a negatively charged molecule, has formed a salt compound with the positively charged aluminum cation that would change its partitioning, breakdown rate, and may have a synergistic effect on the toxicity of any mercuric ion produced from the ethylmercury. Aluminum is a known neurotoxin and to be causally involved in macrophagic myofasciitis. The enhanced toxicity of ethylmercury in the presence of

other toxic agents is to be expected. Few of the clinical cases included in the Magos review were from vaccine but the one that was discussed problems which occurred in a 44 year old adult with a blood mercury of 0.104 μg per ml, so low that Dr. Magos called the diagnosis "unconvincing". Perhaps co-administration of thimerosal with aluminum in the Hepatitis-B vaccine represents the "other etiological factors than ethylmercury" that might have been responsible for his mercury like induced symptoms at such low concentrations. The authors of the report on this patient state "this patient had evidence of previous environmental exposure to mercury" and this data can imply that thimerosal is more toxic in patients previously exposed to materials that sensitize them.

DR. MAGOS REPORT TO THE IOM, SUMMER 2001: Dr. Magos makes several statements that reasonable individuals with scientific experience could disagree about. First, "The consequence of faster decomposition is that, compared with methylmercury, the neurotoxic potential of ethylmercury declines faster." This requires the assumption that ethylmercury breaks down to Hg^{2+} as a toxic factor. What if the breakdown product was a conjugate of cysteine known to enhance the toxicity of mercuric ion? What if the breakdown was caused by reactive oxygen species generated in response to an infection? It is known that ethylmercury breaks down 10 times faster in the presence of reactive oxygen species (*Suda, I, and Takahashi, H., Degradation of methyl and ethyl mercury into inorganic mercury by other reactive oxygen species besides hydroxyl radical. Arch. Toxicol. 66, 34-39, 1992*) making the production of toxic Hg^{2+} occur more rapidly at sites of high level of reactive oxygen, and in the body this would be at sites of infection or inflammation or within mitochondria, the important energy producing organelle. In my opinion, the enhanced chemical ability to breakdown ethylmercury versus methyl mercury at sites of reactive oxygen production (usually sites of oxidative stress) makes ethylmercury a much more dangerous compound than methylmercury as it attacks chemically at a site of infectious damage.

In section 2.b.a Dr. Magos quotes his research as showing that methylmercury treated rats had 1.55 (males) and 2.4 (females) the mercury in their brains as did ethylmercury treated rats. In addition, the ethylmercury treated rats had 3.4 fold more inorganic mercury in their brains. He states that this "excludes the possibility that the cleavage itself of the formed inorganic mercury is responsible for the brain damage. If this were the case, the brain ethylmercury treated rats would be more affected than the brain of methylmercury treated rats (which didn't occur by his analysis)." The problem with this conclusion is that Dr. Magos expects the mechanism of damage caused by methylmercury to be the same as that caused by a combination of ethylmercury and 3.4 fold extra Hg^{2+}. This is not likely as methyl and ethyl mercury would partition into the hydrophobic areas of the brain whereas Hg^{2+} would most likely react in the hydrophilic aspect of the brain. The inhibition of specific brain enzymes by thimerosal (ethylmercury) compared to Hg^{2+} are markedly different. Further, our data on the effects of thimerosal on pure enzymes shows rapid inhibition at times that would not allow the breakdown of the ethylmercury to inorganic mercury.

THE EFFECTS OF AGE AND HEALTH ON THIMEROSAL TOXITICY: The detrimental effect of any specific level of mercury or mercury containing compound

would have on any one individual's metabolic system would be directly proportional to both the level of "protective bio-compounds" (e.g., glutathione, metallothioine) that exist within that person on the time of exposure and, the ability to physiologically clear such toxicants from the body. The level of the protective compounds would certainly be directly dependent on two factors, age and health. Infants, with their immature physiology and metabolism would not be expected to handle mercury as efficiently as mature adults. The elderly have been shown to have decreased "protective" glutathione levels compared to middle aged and young adults. Melatonin, a hormone, is known to be decreased in the aged and melatonin is known to increase the neuron and cellular concentration of glutathione. Glutathione is the natural compound that binds mercuric ion and aids in its removal from the body. This explains partly why the aged are also more susceptible to oxidative toxicants such as mercury.

The elderly also have weakened immune systems and are more susceptible to microbial infections are known to lower their chemical energy levels and, further, to reduce their ability to synthesize the proteins that protect them from heavy metals. Infants have their own weaknesses regarding toxic exposures. Infants do not make much bile in their early months of life and are less able to remove mercury through bilary transport, the major route for mercury removal. They also do not have a fully developed renal system that would remove other heavy metals (e.g. aluminum) as effectively as adults. The age factor must always be considered for response to heavy metal exposure as well as spurious microbial infections.

THE EFFECTS OF GENETIC SUSCEPTIBILITY ON MERCURY TOXICITY: Genetically susceptibility is of critical importance. For example, other researchers have shown that genetic carriers of the brain protein APO-E2 are protected against Alzheimer's disease (AD) whereas genetic carriers of the APO-E4 genotype are at enhanced risk factor for developing AD. APO-E proteins are synthesized in the brain with the assigned physiological task of carrying waste material from the brain to the cerebrospinal fluid, across the blood-brain barrier into the plasma where the material is cleared by the liver. The biochemical difference between APO-E2 and APO-E4 is that APO-E2 has two additional thiol groups, capable of binding and removing mercury (and ethyl-mercury) that APO-E4 does not have. The second highest concentration of APO-E proteins is in the cerebrospinal fluid. Therefore, it is my opinion that the protective effects of APO-E2 is due to its ability to protect the brain from exposure to oxidants like mercury and ethyl-mercury by binding these toxicants in the cerebrospinal fluid and keeping them from entering the brain. I strongly object to labeling those "genetically susceptible" as "having a genetic disease" because they are the first injured on exposure to modern toxicants. Humans did not evolve breathing mercury vapor or having organic-mercury compounds injected in them as infants.

SIMILARITY TO ACRODYNIA: The argument that the thimerosal containing vaccines could not deliver the amount of mercury to cause a systemic illness is somewhat refuted by the history of the disease classified as acrodynia. Perhaps autism will end up like acrodynia, where the removal of the causative material (i.e. the mercury containing teething powders) lead to cessation of the disease and the identification of the cause. Due

to the perceived low levels of mercury in the teething powders and the wide-spread use of mercury in medicine at that time it was 10 years after the removal of the mercury containing teething powders before medicine acknowledged that mercury exposure was the causal factor. It is significant to notice that many of the symptoms of acrodynia are similar to the clinical symptoms of children identified today as autistic, with attention deficit disorder, etc. that have no family history of such diseases or illness classifications.

SUMMARY: It is the inability to see the effects of chronic, low level toxicities on human health that has been, and remains, our greatest failing as intelligent beings. For example, within the past year two publications in refereed scientific journals have emerged from major foreign research universities demonstrating that mercury can induce the formation of three major pathological diagnostic hallmarks of Alzheimer's disease. The production of these diagnostic hallmarks occurred at non-lethal concentrations near or below the levels of mercury reportedly found in most human brains. First, mercury has been shown to induce an increase in amyloid protein secretion (the component of amyloid plaques) and to increase the phosphorylation of a protein called Tau {*see Oliveri et al., J. of Neurochemistry, V 74, p231, 2000*}, and to produce neurofibillary tangles {*Leong et al., NeuroReports V12(4), 733, 2001*}. All of this was done with neurons in culture and represent observations found and considered diagnostic of Alzheimer's disease. Further, in a very recent article by Dr. Ashley Bush in the journal Neuron it is implied that Alzheimer's disease may be caused by heavy metal buildup. This article focused on removal of zinc and copper by chelation decreasing amyloid plaque formation in rats---mercury was not studied. However, these metals, along with silver, are the components of dental amalgams. This work is in agreement with data published earlier from my laboratory in refereed articles and summarized in one single article {*Pendergrass and Haley, Metal Ions in Biological Systems V34, Cahpter 16, Mercury and Its Effects on Environment and Biology, Siegel and Sigel EDS., Marcel Dekker, Inc. 1996*}. This data basically demonstrated that addition of very low amounts of mercury to normal human brain homogenates inhibited critical thiol-sensitive enzymes (creatine kinase, glutamine synthetase and tubulin) that are also dramatically inhibited in Alzheimer's diseased brain. Research in our laboratory clearly demonstrates that thimerosal rapidly inhibits these enzymes as well as several other metabolically important enzymes.

Further, data presented in *Aschner et al. in Methylmercury Alters Glutamate Transport in Astrocytes, Neurochemistry International, v37, #2-3, pp 199-206, 2000* indicate that organic-mercury compounds dysregulate excitatory amino acid homeostasis and may cause glutamate-mediated excitotoxic mechanisms to be involved on exposures that cause neuron death or injury. Glutamate toxicity is one hypothesis proposed to explain the slow deterioration of AD as it was reported that the enzyme, glutamine synthetase, that removes toxic glutamate was elevated in AD cerebrol spinal fluid (*D. Gunnersen and B. Haley, PNAS, USA, v89, 11949, 1992*) and inhibited in AD brain (*Butterfield et al., J. Neurochemistry, v68, 2451, 1997*). Glutamine synthetase is rapidly inhibited by the divalent mercuric ion as it has two divalent metal ion (manganese) binding sites required for activity. It is obvious that ethyl-mercury from thimerosal would have the same effect on glutamine synthetase as mercury and methyl-mercury and

impair nervous system glutamate metabolism. Consistent with this concept is the reported ability of astrocytes (the brain cells that contain glutamine synthetase that converts toxic glutamate to non-toxic glutamine) to preferentially concentrate brain organic-mercury (*Ashner, Astrocytes as Modulators of Mercury-Induced Neurotoxicity, Neurotoxicology v17, #3-4, pp663-669, 1996*). The straight-forward conclusion is that any exposure to mercury or mercury containing compounds (e.g. thimerosal) would exacerbate any medical condition affected by the inability to metabolize glutamate.

The chemical rationale for the neurotoxicity of thimerosal is that this compound would release ethyl-mercury as one of its breakdown products. Ethyl-mercury is a well-known neurotoxin. Further, combining thimerosal with the millimolar levels of aluminum cation plus significant levels of formaldehyde, also found in these vaccines, would make the vaccine mixture of even greater risk as a neurotoxic solution. The synergistic effects of mercury toxicity with other heavy metal toxicities (Pb, Cd, Zn) has been established in the literature for many years. Further, using this vaccine mixture on infants who are ill and do not have fully developed bilary (liver) and renal (kidney) systems could greatly increase the toxic effects compared to that observed in healthy adults.

The toxic effects of exposure to thimerosal to adults and infants and always been reported to have dire consequences, including death. Similar exposures, even at lower level, in infants should have more severe consequenses compared to those observed in adults made toxic by exposure to similar ethyl-mercury containing compounds. Mercury is primarily removed through the bilary system and aluminum is removed by the renal system. Inability to rid the body of these toxicants would greatly increase the damage they are capable of doing.

While one can understand the necessity of using an anti-microbial "preservative" in vaccines to prevent contamination it represents poor judgement to use a "preservative" that breaks down into a well-known neurotoxin when safer "preservatives" were available. Further, it has come to my attention through several parents that a significant number of physicians encourage mothers to have their infants receive multiple vaccinations during one visit. In one report a 13 pound baby was given 4 vaccinations. This would result in the equivalent of a 130 pound adult receiving 40 vaccinations in one day. This is quite unreasonable in my opinion, but appears to happen with a great deal of regularity in practice. Physicians do this as they are not warned of the possible consequences and are regularly informed by vaccine providers that the vaccines are totally safe. No steps were taken to recommend against this procedure.

It is very difficult to prove that mercury or organic-mercury compounds cause any specific disease that is identified by its related symptoms. This is due to the fact that mercury toxicity from various types of mercury containing materials may be considerably different and the genetic susceptibility and age of the victim would alter the response. This difficulty is further compounded due to the high numbers of confounding factors presented in the current human environment. However, since infants get autism and related disorders, and many of our aged are afflicted with AD, we know that they have

crossed the thin-red line into the neurologically diseased state. There can be no doubt that the purposeful use of mercury in medicine and dentistry, especially if it was prolonged and excessive, would significantly contribute to the onset of their disease. In my opinion, this is especially true in the case of the injection of thimerosal via vaccines in expectant mothers, day old infants and toddlers. With our current experimental results, especially the testosterone enhanced and estrogen reduction of thimerosal neurotoxicity, I strongly feel that thimerosal released ethylmercury is the most likely cause of autism and related disorders.

_____ _____

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Figures accompanying this presentation are on power point but consist of the following titles.

FIGURE 1: COMPARISON OF THE VIABILITY OF BRAIN TUBULIN IN CONTROL (NON-DEMENTED) VERSUS ALZHEIMER'S DISEASED BRAIN.

FIGURE 2: A COMPARISON OF THE EFFECTS OF MERCURIC ION ADDITION ON CONTROL (NON-DEMENTED) AND ALZHEIMER'S DISEASED BRAIN.

FIGURE 3: A COMPARISON OF THE EFFECTS OF THIMEROSAL ADDITION ON CONTROL (NON-DEMENTED) AND ALZHEIMER'S DISEASED BRAIN.

FIGURE 4: ZINC ENHANCEMENT OF MERCURY TOXICITY.

FIGURE 5: ALUMINUM ENHANCEMENT OF THIMEROSAL TOXICITY.

FIGURE 6: TESTOSTERONE ENHANCEMENT OF THIMEROSAL TOXICITY.

Mercury toxicity: Genetic susceptibility and synergistic effects

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Abstract

Mercury toxicity and intoxication (poisoning) are realities that every American needs to face. Both the Environmental Protection Agency and National Academy of Science state that between 8 to 10% of American women have mercury levels that would render any child they gave birth to neurological disorders. One of six children in the USA have a neurodevelopmental disorder according to the Centers for Disease Control and Prevention. Yet our dentistry and medicine continue to expose all patients to mercury. This article discusses the obvious sources of mercury exposures that can be easily prevented. It also points out that genetic susceptibility and exposures to other materials that synergistically enhance mercury and ethylmercury toxicity need to be evaluated, and that by their existence prevent the actual determination of a "safe level" of mercury exposure for all. The mercury sources we consider are from dentistry and from drugs, mainly vaccines, that, in today's world are not only unnecessary sources, but also sources that are being increasingly recognized as being significantly deleterious to the health of many.

Keywords: mercury toxicity, ethylmercury toxicity, thimerosal toxicity, amalgams, antibiotic susceptibility to neurotoxicity, hormone susceptibility to neurotoxicity

1. Introduction

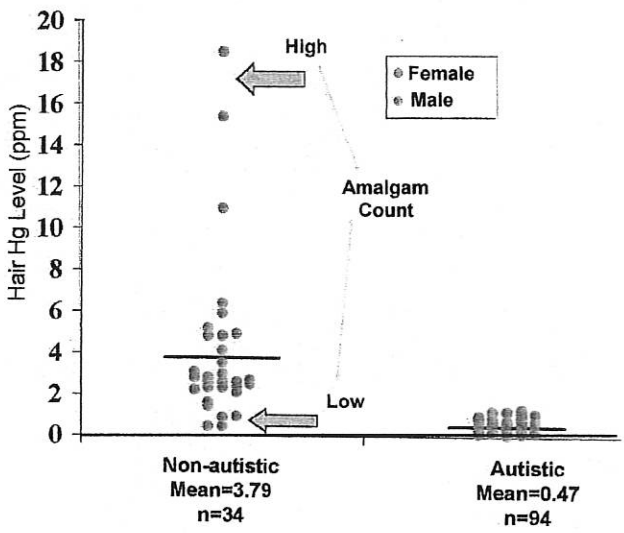
Mercury toxicity and intoxication (poisoning) are realities that every American needs to face. This article discusses mercury intoxication and several normally appearing factors that increase the susceptibility to mercury toxicity. The sources considered are dentistry and mercury from drugs, mainly vaccines, that, in today's world are not only unnecessary sources, but also sources that are being increasingly recognized as being significantly deleterious to the health of many who are so exposed.

2. Mercury from dentistry

Let us begin by discussing mercury exposure from dental amalgams. Figure 1 is a segment from a movie showing the emission of mercury vapors from a 50 year old amalgam; it is still releasing mercury at the temperature of a cup of coffee. The point of this figure is to provide visual evidence that mercury is indeed released by dental amalgams. It has been reported in a World Health Organization review of mercury that 80% of the mercury vapors inhaled are retained by the human body [1]. This is why dental amalgams have been found to be the major contributor to human body mercury burden. The visualization of mercury emitting from amalgams presents irrefutable evidence that spokespersons for the American Dental Association (ADA) are exceptionally deceptive when they state there is no danger of mercury exposure from dental amalgams.

Figure 1. Visualization of mercury emitting from a dental amalgam. The filling is 50 years old. The tooth was extracted 15 years ago. (Credits: www.unin formedcosent.com)

Figure 2. Birth-hair mercury of autistic vs. control groups [2].



This data in Figure 2 show that normal children have birth hair levels of mercury that correlate with the number of amalgam fillings in the birth mother; whereas, in sharp contrast, the autistic children have exceptionally low levels of birth hair mercury, no matter what the number of amalgam fillings are found in the birth mother. This data strongly implies that autistic children represent a subset of the population that does not effectively excrete mercury from their cells.

Mercury vapor, when it enters the body spends a very short time in the blood. Mercury vapor (Hg^o) is a hydrophobic entity and is rapidly absorbed through cell membranes into cells where certain enzymes, such as catalyase, rapidly converts it to Hg^{2+}, the reactive and toxic form of mercury called inorganic mercury. It would be nearly impossible for the body to substantially excrete either Hg^o or Hg^{2+} from the body in their original form. To rid the body of Hg^{2+} it must first be taken intracellular

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where it can be complexed with glutathione. It is primarily the mercury-glutathione complex that is excreted from the cells into the blood to be cleared by the bilary transport system in the liver. Therefore, it is primarily the mercury-glutathione complex that is measured in the blood, urine, feces and hair as elevated after mercury exposures. It is not the original Hg^o as it would prefer partioning into the more hydrophobic cells of the body.

Therefore, the lack of mercury in the birth hair of autistics strongly implies that they cannot effectively excrete mercury most likely by not being able to effectively couple Hg^{2+} with glutathione. Research by Dr. Jill James of the University of Arkansas has partially explained this phenomenon by demonstrating that autistics are quite low in glutathione, the sequester of mercury that exists intracellular and used by the body in the normal excretion process [3].

Figure 3 demonstrates that considering the mercury exposures from dietary fish, vaccines and amalgams versus the predicted birth hair mercury levels that again the normal children have the predicted birth hair mercury levels; whereas, the autistic children show no significant increase. Considering the data from birth mothers with 8 to 15 amalgams the mercury hair ratio was 12 to 1 in normals versus autistics. There can be little doubt that in this cohort group, the autistics do not biochemically excrete mercury in a similar fashion as do normal children.

Also, as expected, amalgams are the major contributor to mercury body burden, not the mother's fish diet. In considering different exposures as contributing to mercury body burden one should consider the reactive potential of the mercury. Mercury in fish has already reacted with proteins and other protective molecules or atoms in fish (e.g., glutathione, selenium, and other proteins); this is why the fish does not die of mercury toxicity. This bound mercury, or methylmercury, is not as toxic as an equal amount of the pure equivalent. Therefore, while there may be an equal exposure to mercury from a tuna fish sandwich as from an amalgam or vaccine, the mercury from the amalgam or vaccine has much more toxic potential. The thimerosal containing vaccine given in the past to infants on the day of birth would be safe by EPA standards, based on adolescents eating fish, if the infant weighed 275 pounds.

Figure 3. Actual versus predicted birth hair mercury levels [2]

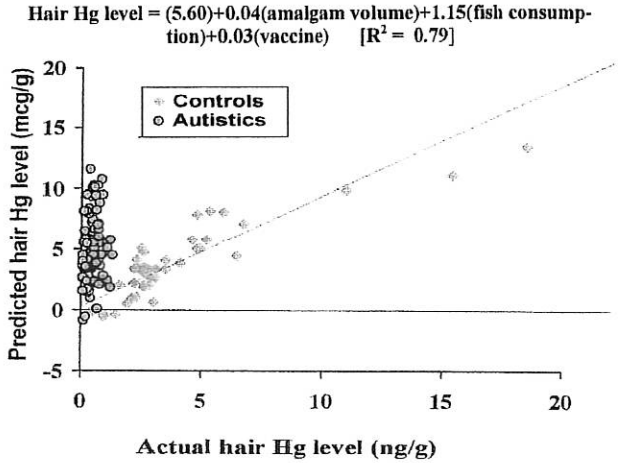


Figure 4. Mercury birth hair levels vs. amalgam in autistics and control groups [2]

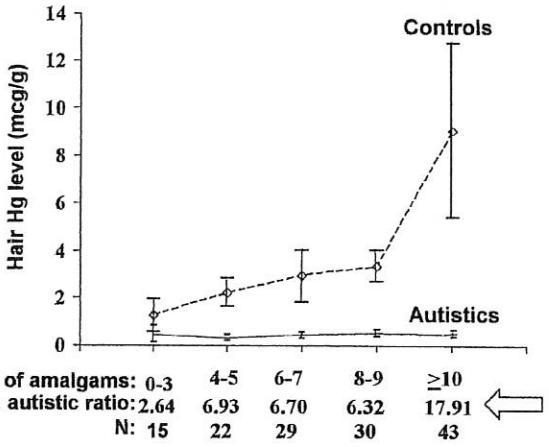
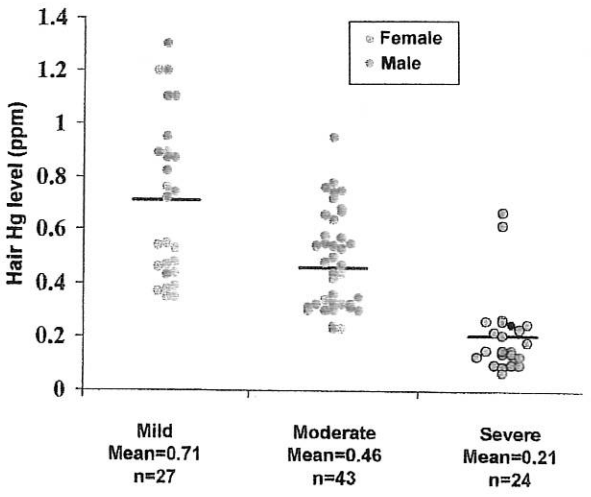


Figure 4 shows that, as expected, the birth hair mercury levels in normal children are determined more by their birth mother's number of amalgams than by any other exposure, such as fish in the mother's diet. In contrast, autistic children born of mothers with greater than 10 amalgam fillings still do not have significant levels of mercury in their birth hair. This confirms that autistic children do not handle mercury biochemically like normal children. The most likely explanation is they are poor excretors. Work from Dr. Jeff Bradstreet [4] and others have shown that autistics do have higher body burdens of mercury than normals. This supports the hypothesis that autistics are in reality poor mercury excretors who retain mercury and are thusly more severely affected by low dose exposures.

Figure 5. Birth-hair mercury by severity of autism [2]



The major observation of this data is that the lower the birth hair mercury level the more likely the severity of the autism. This fits into the hypothesis as follows: the lower the ability to excrete mercury the more mercury that is retained by the cells of the body and the more toxic the exposure to the infant (Fig. 5).

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Another observation is that of comparing boys to girls. Note that the females mostly fall below the average line in each level of severity and that the "severe category" has only one female (Fig. 5). This indicates that a female must be a much poorer mercury excretor than the males to become autistic at that level. Bottom line, it takes more retention of mercury to make a female autistic than it does for a male. We feel the male/female ratio of about four gives us a hint as to the causal element in autism. We also think that the differential effects of estrogen versus testosterone on mercury toxicity to neurons may explain the increased susceptibility of males to autism.

3. Synergistic effects: Thimerosal, aluminum hydroxide and Neomycin

It is well documented in the literature that mercury toxicity is synergistic with other heavy metals such as cadmium and lead. It is also known that certain antibiotics greatly enhance the toxicity of thimerosal in ocular solutions and that antibiotics prevent test animals from effectively excreting mercury. The major known difference between males and females is their hormones. We therefore investigated the possible involvement of aluminum cation (found in vaccines), antibiotics (neomycin) and male versus female (estrogen versus testosterone) on the toxic effects of 50 nanomolar (nM) thimerosal on neurons in culture. Neurons can be cultured for 24 hours without much death (Fig. 6). Fifty nanomolar thimerosal alone (solid circles [●]) will cause the death of about 70% of the neurons within 24 hours. The synergistic effects of aluminum, neomycin and testosterone are shown (Fig. 6) and are as follows:

Aluminum: Aluminum hydroxide alone (solid triangles [▲]) at 500 nM showed no significant death of cells at 6 hours, and only slight toxicity over the 24-hour period. Thimerosal at 50 nM effected only a slight increase in neuron death at 6 hours. However, in the presence of 50 nM thimerosal plus 500 nM aluminum hydroxide (open triangles [Δ]), the neuronal death increases to roughly 60%, an amazing increase and clearly demonstrates the synergistic effects of other metals on mercury toxicity and certainly thimerosal toxicity.

Neomycin: At 1.75 mcg neomycin alone (solid squares [■]) did not cause a significant increase in neuronal death after 12 hours. In the presence of 50 nM thimerosal (open squares [□]) the rate of death at same point increased from about 40% to 60%, a 20% increase in rate of death.

A report on infants treated topologically with thimerosal for umbilical cord infections resulted in the deaths of 10 of 13 exposed with corresponding increased mercury levels in their internal organs [5]. This lead to the withdrawal of thimerosal as a topical antiseptic available across the counter, but did not prevent the CDC and FDA from approving injection into day old infants on the day of birth.

4. Hormonal effects: Testosterone and Estrogen

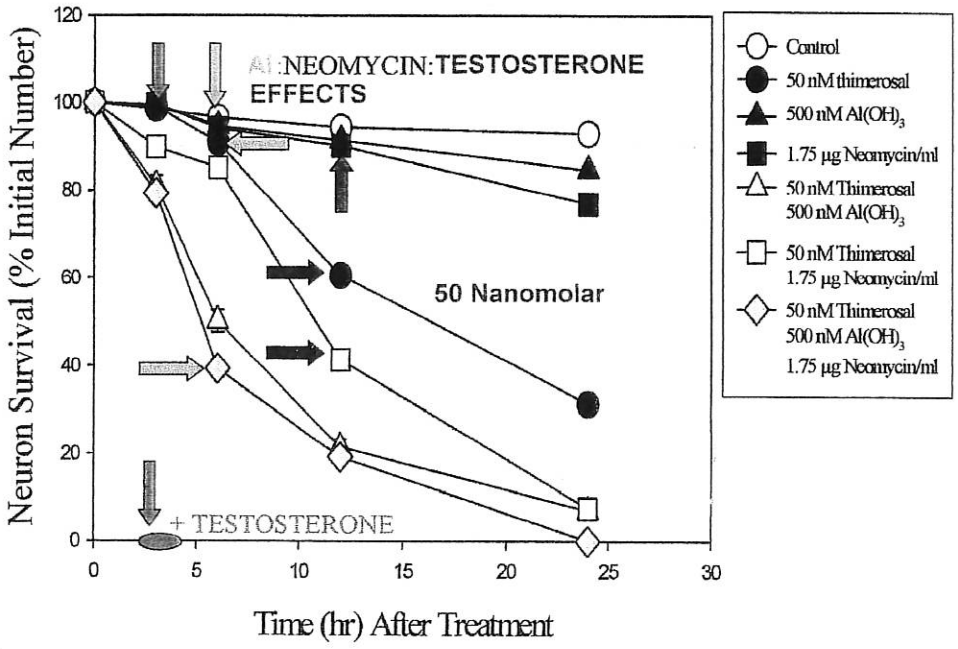
Testosterone and estrogen-like compounds give vastly different results. Using female hormones we found them not toxic to the neurons alone and to be consistently protective against thimerosal toxicity. In fact, at high levels they could afford total protection for 24 hours against neuronal death in this test system (data not plotted). However, testosterone which appeared protective at very low levels (0.01 to 0.1 micromolar), dramatically increased neuron death at higher levels (0.5 to 1.0 micromolar). In fact, 1.0 micromolar levels of testosterone that by itself did not significantly increase neuron death (red flattened oval), within 3 hours when added with 50 nanomolar thimerosal (solid circles) caused 100% neuron death. Fifty nanomolar thimerosal at this time point did not significantly cause any cell death.

These testosterone results, while not conclusive because of the in vitro neuron culture type of testing, clearly demonstrated that male versus female hormones may play a major role in autism risk and may explain the high ratio of boys to girls in autism (4 to 1) and autism related disorders.

5. Thimerosal and ionic mercury: Additive effects

Infants are obviously exposed to mercury from the amalgams of the birth mother and, shortly after birth, from the Hepatitis B vaccines that contained thimerosal. An experiment was done to compare the combined toxicity of thimerosal and inorganic mercury. In this neuron culture system both thimerosal and inorganic mercury were toxic to cells at the low nanomolar levels. Inorganic mercury at 25 nanomolars caused more neuron

Figure 6. Synergistic toxicities. (Dr. Mark Lovell, collaborator)



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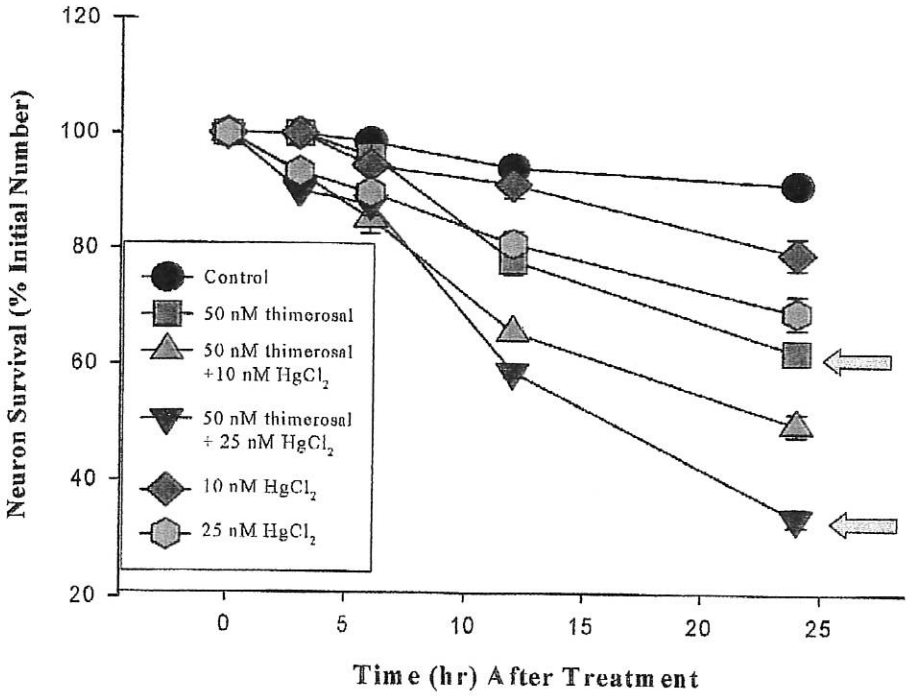
death at the early exposure times but after 12 hours the toxicity of thimerosal was greater. It probably took some time for the ethylmercurihydroxide, the initial thimerosal metabolite that forms rapidly, to be released and it is therefore not as initially as toxic. However, as the thimerosal releases the "ethylmercury" it becomes effectively lethal to the neurons (Fig. 7).

We combined the levels of inorganic mercury and thimerosal at levels which alone gave about 50% neuron death at 24 hours to determine their combined effects (Fig. 7). They appeared to be additive instead of synergistic. This implies that both inorganic mercury(II) ions and the ethylmercurihydroxide from thimerosal cause neuronal death by similar mechanisms.

6. Inorganic mercury poisoning: Acrodynia and Pink Disease

The valid argument against any data obtained using neurons in culture is that the body has protection mechanisms against the toxic exposure that prevents the toxin from getting near the neurons and causing any biochemical abnormalities. However, we have a historical fact that proves a low exposure to mercury can cause a severe neurological disease in infants. Acrodynia, or Pink Disease, was known to affect 1 in 500 children in the late 1800s into the early 1940s. A practicing physician noted that most of the children who suffered from this illness came from the more affluent families, as the disease was much less prevalent in the poorer populations in his area. He also noted that the use of teething powders containing calomel (mercurous chloride, Hg_2Cl_2, 84.98% mercury by weight) was closely associated with the illness and recommended that these teething powders no longer be used. His patients recovered, he reported this and these teething powders were removed from the market and the disease disappeared into history.

Figure 7. Hg and Thimerosal display additive toxicities



Calomel is still used today in many diaper rash treatments and other ointments used to treat skin irritations, though the use of organic mercury compounds, like Thimerosal and phenyl mercuric acetate, was banned in 1998 in such products. Calomel is one of the least toxic forms of mercury, yet its use in teething powders caused a major illness with infants. It is not unreasonable to propose that exposure to ethylmercury from thimerosal (exceptionally toxic) could most likely be involved in autism and related disorders.

7. Mercury from Thimerosal in some vaccines

Our government agencies, the FDA, CDC and NIH routinely ignore the possible involvement of mercury in the cause or exacerbation of any disease. It is my opinion this shunning of mercury based toxicity studies is influenced by organized dentistry and medical interests (vaccine manufacturers) who routinely use mercury in the treatment of patients. An outrageous claim one would rationally think.

But look at the facts. In 1999 a report was published in the highly respected *Journal of the American College of Cardiology* that stated that individuals who die of Idiopathic Dilated Cardiomyopathy (IDCM) had 178,400 nanograms of mercury per gram of heart tissue, an amazing amount (Table 1). Measuring mercury is not rocket science, it is easy to accomplish if you have the proper instrument, which most research universities do. This level was 22,000 times higher than the rest of the tissues in the body, and in the heart tissue of subjects who died of other forms of cardiovascular disease (Table 1). IDCM is the named disease that young athletes unexpectedly die of and is one of the major reasons for heart transplants in many adults. Yet, with this data obviously available, neither the NIH nor the FDA has made any requests for grants to study the possible involvement of, or source of, mercury in IDCM. They have essentially ignored this just as they have ignored the obvious emission of mercury vapors from dental amalgams and the elevated mercury levels found in autistic children.

Table 1. Elevated Mercury in idiopathic dilated cardiomyopathy (IDCM). Where does Hg come from?

LEVELS ng/g	Hg	Sb
Controls[a]	8.0	1.5
IDCM[b]	178,400	19,260

[a]Controls were patients with valvular or ischemic heart disease.
[b]Athletic youth who died from IDCM.
(Frustaci et al., J. of American College of Cardiology, 33(6):1578, 1999.)

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8. Major scientific studies on mercury toxicity

There have been two major studies on mercury toxicity—both involved studying the dietary mercury intake from eating fish and whale. In my opinion, these were likely funded because you cannot sue a fish and it takes the attention away from iatrogenic mercury exposures. In both the Faroe and Seychelles Island studies it was assumed that both blood and hair levels of mercury were indicative of the level of mercury exposure. I don't agree with this assumption because it ignores the fact that a subset of the population studied were possibly poor excretors and did not have a level of mercury in their hair or blood that was indicative of their mercury exposure, as demonstrated for autistic children. In both these studies there were anomalies that indicated that the erroneously assumed exposures were correct.

In the Seychelles study (see comments in M. Bauman and K. Nelson) of more than 700 children, it was implied that boys with the highest hair levels of mercury did better on the Boston Naming test and two tests of visual motor coordination. Spokespersons for the American Dental Association have used this data to claim that a little exposure to mercury is good for your brain. However, in my opinion the boys with the higher hair mercury levels were the boys that effectively excrete mercury and would likely have a lower body burden of mercury.

In the Faroe Island study it was the boys with the lower blood mercury levels (poorer excretors?) that had the blood pressure problems.

I feel it would be important to review the raw data from the Seychelles and Faroe Island studies with the understanding that blood, urine and hair mercury levels do *not* indicate level of exposure. In fact, it is not level of exposure at these low doses obtained in a fish diet that is critical, it is the lack of ability to excrete the mercury these children were exposed to that is critical. Inability to excrete causes the illnesses, not the total exposure.

9. Mercury levels in hair and nails of Alzheimer's diseased patients

I further investigated the theory of low-level mercury toxicity causing problems in just those individuals who were unable to excrete mercury. I was involved in the mercury/autism issue because of my earlier research that showed that exposure of brain tissue to mercury would cause many of the same aberrant biochemical factors found in Alzheimer's disease (AD). Therefore, I did a literature search on any relevant studies regarding mercury retention in tissues of AD versus normal controls. In doing this I found a series of studies that seem to have been forgotten. The references and quotes from the various papers are shown in Table 2.

Table 2. References and quotes regarding mercury retention in tissues

- Ehmann, Markesbery, et al. Neurotoxicology 9(2):197–208. Trace element imbalances in hair and nails of Alzheimer's diseased patients.
- Ehman, Markesbery, et al. Biological Trace Element Research, pp. 461–470. G.N. Schrauzer, ed., 1990 by the Humana Press, Inc.
- "Mercury is decreased in the nail of AD subjects compared to controls."
- "Mercury tended to decrease in nail with increasing age of patient, and with the duration and severity of the dementia."
- "This decrease is counter to the elevated levels of Hg observed in AD brain, as compared to age-matched controls."

It seems as if AD subjects have low mercury levels in their nail tissues when compared to normal age-matched controls. Also, the level of mercury in the nail tissue of AD subjects drops with increasing duration and severity of the dementia. Nail and hair tissue are very similar and it appears as if the subjects suffering from AD may have an impeded ability to excrete mercury similar to autistics.

However, autism and AD are quite different diseases and this needs explanation. First, one has to remember that the mercury exposures in autism and AD would be quite different. First, is the matter of age. In autism the infants are exposed to bolus amounts of the organic mercury compound, ethylmercury. This is while their central nervous system is developing and while they are still on a milk diet (and perhaps antibiotics). Also, their ability to excrete mercury in the bilary transport system is low because the infants are not producing adequate amounts of bile in the first few months. These are factors that prevent excretion of mercury in laboratory animals. Therefore, ethylmercury from early vaccination with thimerosal-containing vaccines likely prevents the development of normal brain neuronal connections. This situation is exacerbated in autistics that appear to be less capable of excreting mercury.

In AD the major mercury exposure is the vapor from dental amalgams and this exposure starts after the individual is mostly mature in regards to mental development and ability to excrete mercury. However, these individuals are exposed to mercury constantly from their amalgams from the time they are placed until they are removed. Mercury vapors enter the brain with a great deal of ease where the Hg^{o} is converted to Hg^{2+}, the toxic form. While Hg^{o} enters the brain with ease the Hg2+ does not cross the blood brain barrier very well in either direction. Therefore, the Hg^{2+} is trapped in the brain and is not effectively excreted. This would be increased in the elderly who seem unable to excrete mercury as easily as when they were younger, based on the mercury levels in nail tissue. Additionally, these older subjects are on the top of the priority list to obtain flu and other thimerosal-containing vaccines. This subjects them to bolus amounts of ethylmercury throughout their lives and cannot help but add to their mercury body burden and the total toxic effects of mercury.

When does the mercury start affecting the AD subject? Recent data show that individuals with mild cognitive impairment (MCI) have already started a build up of amyloid plaques, possibly before any clinical dementia has set in. An earlier study demonstrated that mercury exposure can increase the production of beta-amyloid, the protein that makes up the bulk of the amyloid plaque [6]. At the same time it disassembles tubulin from the neurofibrils [7]. The preceding publications confirm

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the earlier reports of mercury inducing similarities to the AD brain [8].

The bottom line is that exposure to low levels of mercury can cause tubulin to abnormally aggregate and not be found in the supernatant of a brain homogenate, preventing the natural interaction with GTP, all facts that are consistent with observations on AD brain. Since Tau protein binds tubulin protein to neurofibrils the Tau protein is now dislodged from its normal setting and can become abnormally phosphorylated as it is in AD brain. This Tau protein and neurofibrils are major proteins found in neurofibillary tangles, a major pathological diagnostic hallmark of AD. Beta-amyloid protein is produced by two proteases acting on amyloid precursor protein, a large membrane spanning protein. The increased production of beta-amyloid by Hg^{2+} exposure is quite relevant. The produced beta-amyloid peptide forms the aggregates that are called senile plaques, another pathological diagnostic hallmark of AD.

To dissolve amyloid plaques effectively one needs to use a heavy metal chelator. Therefore, the amyloid peptides are held within this plaque by interacting heavy metal linkages. This increase in heavy metals, or metals like Zn^{2+} and Cu^{2+} in the wrong place, is what would be expected if mercury levels have reached the concentration at which it has been shown to obliterate microtubulin structure and to disrupt normal homeostasis of Cu^{2+} and Zn^{2+}, etc.

Also, the disruption of the microtubulin structure impairs the transport of glutamate containing vacuoles down the axon and it is likely that these vacuoles disintegrate releasing glutamate inducing regional "excitotoxicity" and additional neuronal death. This would explain the exceptionally high levels of glutamine synthetase found in the CSF of AD versus other neurological diseases (ALS being the exception) [9]. Additionally, glutamate synthetase is a very sensitive thiol-enzyme that is rapidly inhibited by mercury.

10. Conclusions regarding mercury in brain tissue

In summary, mercury build up in the brain tissue has the ability to cause the equivalent of a biochemical train wreck. Most importantly, the axon, which contains tubulin, is rapidly and effectively disrupted by Hg^{2+}. Many pathways and many supramolecular structures are injured by mercury similar to the aberrancies observed in AD brain pathology and biochemistry. While it is possible that other environmental factors, yet unidentified, could affect brain changes similar to mercury and as observed in AD brain, it seems unquestionable that exposure to mercury vapors for scores of years and high dose vaccine-delivered thimerosal in the aged would exacerbate the disease in those who are afflicted.

Table 3 shows some data that determined the level of brain mercury and any correspondence with the number of dental amalgams in a group of nuns from the same religious order. Mercury collection in the brain of certain individuals at a higher rate than others would be expected if the "retention toxicity" of a subset of the population were a fact. A publication on the mercury levels in the brain tissue of Nuns in a study on Alzheimer's disease gives us some information on this issue. Nuns in a specific, single location were studied as they essentially had the same daily diet and roughly the same exposures to environmental mercury. In this study roughly 6% of the nuns had what would be defined as extremely mercury toxic brains of 1 micromolar level or higher and this percentage increased to about 15% when the cut-off point was a 0.5 micromolar level. This strongly indicates that certain individuals among these nuns did not have the ability to clear mercury from their brains and that this is independent of diet or amalgam exposure. According to the authors, the level of mercury in the brain did not correlate with the number of existing amalgam fillings, the major contributor to human mercury body burden. Therefore, it does appear as if the inability to excrete mercury may play a major role in the build up of brain mercury levels over many years.

Table 3. Mercury levels in the human brain

- Saxe et al., with Ehmann and Markesbery in Alzheimer's Disease, Dental Amalgam and Mercury, JADA v130, p. 191–199, 1999, determined Hg leveles in the brains of 101 human subjects, mostly Nuns, both AD and normals.
- The histogram in this paper showed 6 of 101 subjects with brain Hg leveles about 200 ng/g [wet weight; (ppb)] (C=236, 248, 319: AD=394, 622, 698). This represents between 1.2 and 3.5 micromolar, highly toxic levels of Hg in 6% of these subjects. At 100 ng Hg/g of sample, this increases to about 15% of subjects with highly toxic leveles of brain mercury.
- This indicates that certain adult individuals do not effectively excrete mercury from their brain tissue.

Figure 8 shows that addition of Hg^{2+} in the presence of excess of the chelator ethylenediamine tetraacetic acid (EDTA) still could mimic the effects seen on the brain protein tubulin in AD. This is shown where increasing Hg^{2+} decreased the binding of a GTP analog to the tubulin of normal brain; whereas, the tubulin of AD brain did not bind even in the absence of added Hg^{2+} (see band at red arrow). This is direct confirmation that Hg^{2+} exposure, if not causal, exacerbates a major biochemical flaw found in AD brain.

In earlier studies, publications from my laboratory demonstrated that the major brain protein tubulin, which polymerizes to form microtubules, was aberrant in AD brain with an average of about 80% not being viable. This lack of viability was demonstrated in two ways. First, the tubulin has to bind the natural compound GTP (guanosine-triphosphate) to be viable and polymerize. AD tubulin could not bind the GTP analog (8-azido-GTP), a proven marker for beta-tubulin. This showed the GTP binding sites on tubulin were not available or blocked. Second, normal brain tubulin is a soluble protein at 0°C and remains in the supernatant of a centrifuged homogenate. However, in AD brain the tubulin is over 80% found in the pellet indicating that it is abnormally polymerized, something effectively done by heavy metals.

Since tubulin is well known to be sensitive to heavy metals we tested all possible metals for their ability to mimic the effect seen in AD brain. One has to consider that there are considerable metal "chelation" molecules in the brain, such as citrate

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and other organic acids. We observed that many metals, Hg^{2+}, Pb^{2+}, Cd^{2+}, Zn^{2+}, etc. could mimic the effects we observed in AD brain regarding tubulin. However, only one metal could do this in the presence of huge excesses of organic acid chelators (e.g., EDTA, citrate) and that was Hg^{2+}. Chelation, or binding, of heavy metals by biological organic acids is one way to decrease their toxic effects. This worked for all metals tested except Hg^{2+}.

A major question relative to autism would be the difference in the neurotoxic mechanism of organic mercury toxicity (e.g., ethylmercury) versus inorganic mercury (Hg^{2+}). To investigate this we treated normal human brain homogenates with thimerosal just as we had treated brain in Figure 8 with Hg^{2+}. The results were dramatic, with thimerosal totally inhibiting tubulin viability at very low concentrations and very rapidly (Fig. 9). Further, exposing thimerosal to light (causes a more rapid release of ethylmercury) made the thimerosal mixture more toxic or at least more rapid in its toxic effects on tubulin.

A major difference between thimerosal and Hg^{2+} was on the protein migrating just below tubulin, which was not adversely affected by Hg^{2+} levels (see Fig. 8). Thimerosal effectively prevented this protein from interacting with the GTP analog. The major protein in this band is actin, another cytoskeletal nucleotide binding protein of high abundance in brain axons. Therefore, thimerosal had a major inhibitory effect on a protein that, at the concentrations used, was not significantly affected by Hg^{2+}.

Also, these experiments were exposed to thimerosal at 0°C for only a few minutes. This is too short of a time for the ethylmercury to be converted to Hg^{2+}. Therefore, it appears as if ethylmercury is more toxic to many proteins than is Hg^{2+} and that it does not have to break down to Hg^{2+} to cause extensive enzyme or protein toxicity (Fig. 9).

11. Conclusions

In summary, it appears as if autistics represent a subset of the population that are more susceptible to the toxic effects of mercury and thimerosal because they are not efficient excretors of these toxic materials. Further, it appears as if the sex hormones play a major role in susceptibility with the male hormones increasing susceptibility to the neurotoxicity of ethylmercury and the female hormones affording a good degree of protection. Common sense tells us that a lead toxic person would be more susceptible to mercury toxicity than a healthy, non-toxic person. Research confirms this and we routinely observe that many heavy metals increase the apparent toxicity of low levels of mercury. It is well known that a milk diet will cause the retention of mercury as does the exposure of mammals to certain antibiotics. This would make infants with ear infections prime candidates for mercury retention toxicity. Certainly, the findings of aberrant biochemistries in the autistic child that appear to correlate with mercury sensitive enzymes increases the possibility of mercury involvement in autism causation.

If certain infants are more susceptible to mercury toxicity due to their inability to excrete mercury then it seems plausible that, since this is a genetic susceptibility, older individuals may suffer from the inability to excrete mercury also. Based on the ability of mercury to mimic many of the biochemical aberrancies found in AD brain and to produce aspects of the pathological diagnostic hallmarks of AD it seems plausible that AD is a disease related to mercury toxicity. The published decrease of mercury in the nail tissue of AD versus normal age-matched individuals seems to support this possibility.

Finally, the synergistic effects of other heavy metals, diet, antibiotics, etc. on mercury toxicity make it impossible to define a "safe level of mercury exposure." Therefore it is imperative that we try to eliminate all exposure to mercury; and removal from dentistry and medicines is most important and critical for human health.

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Figure 8. HgEDTA induces aberrant [^{32}P]8N$_3$GTP-β-Tubulin interactions indicative of AD

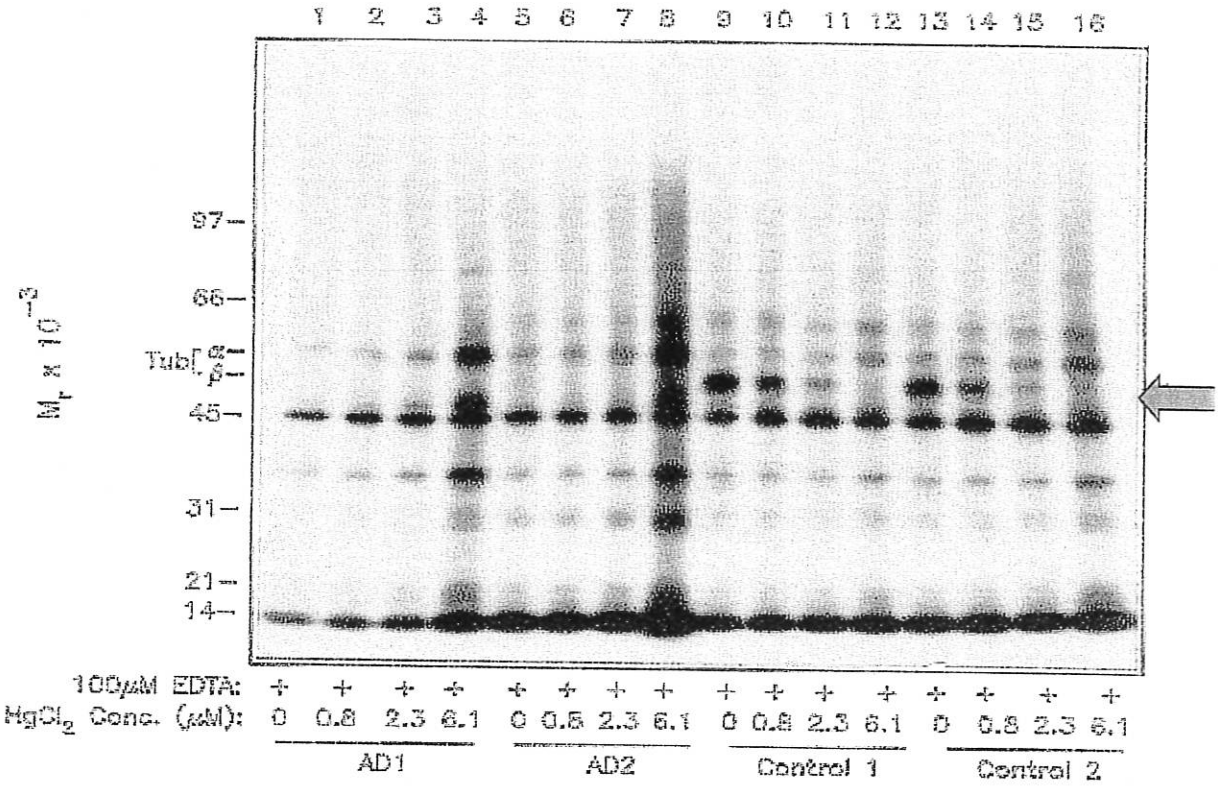
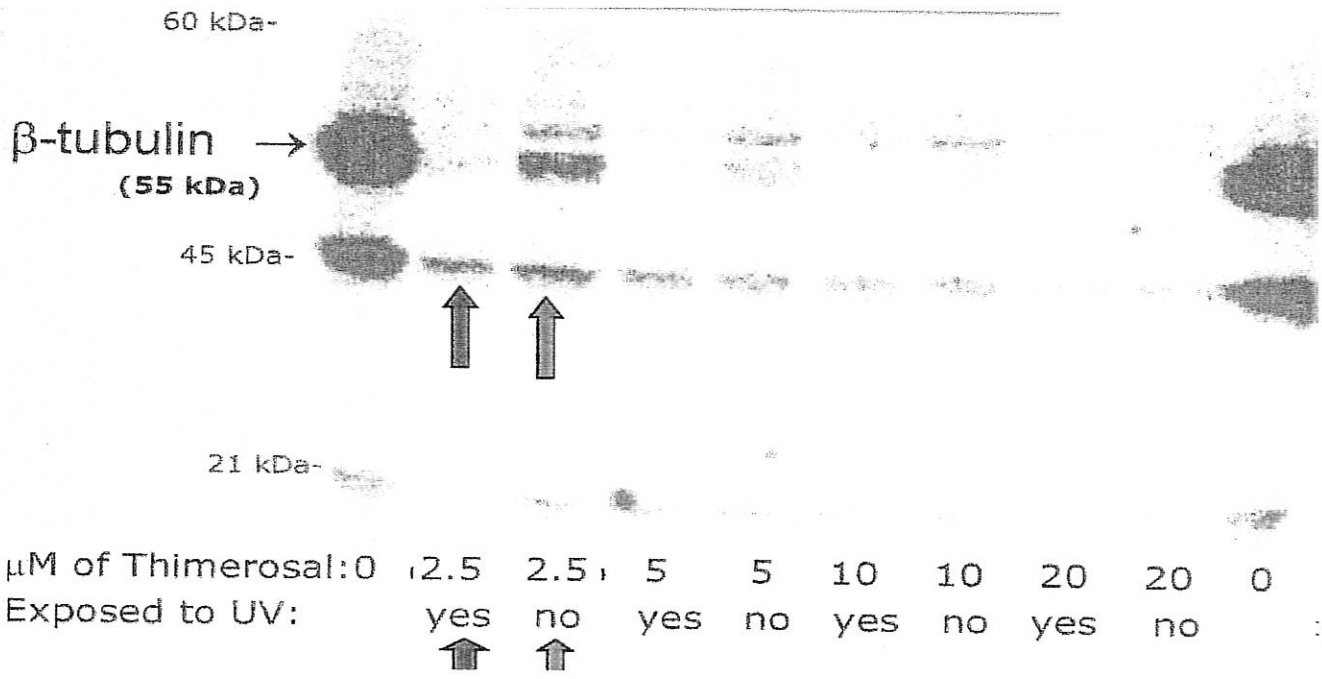
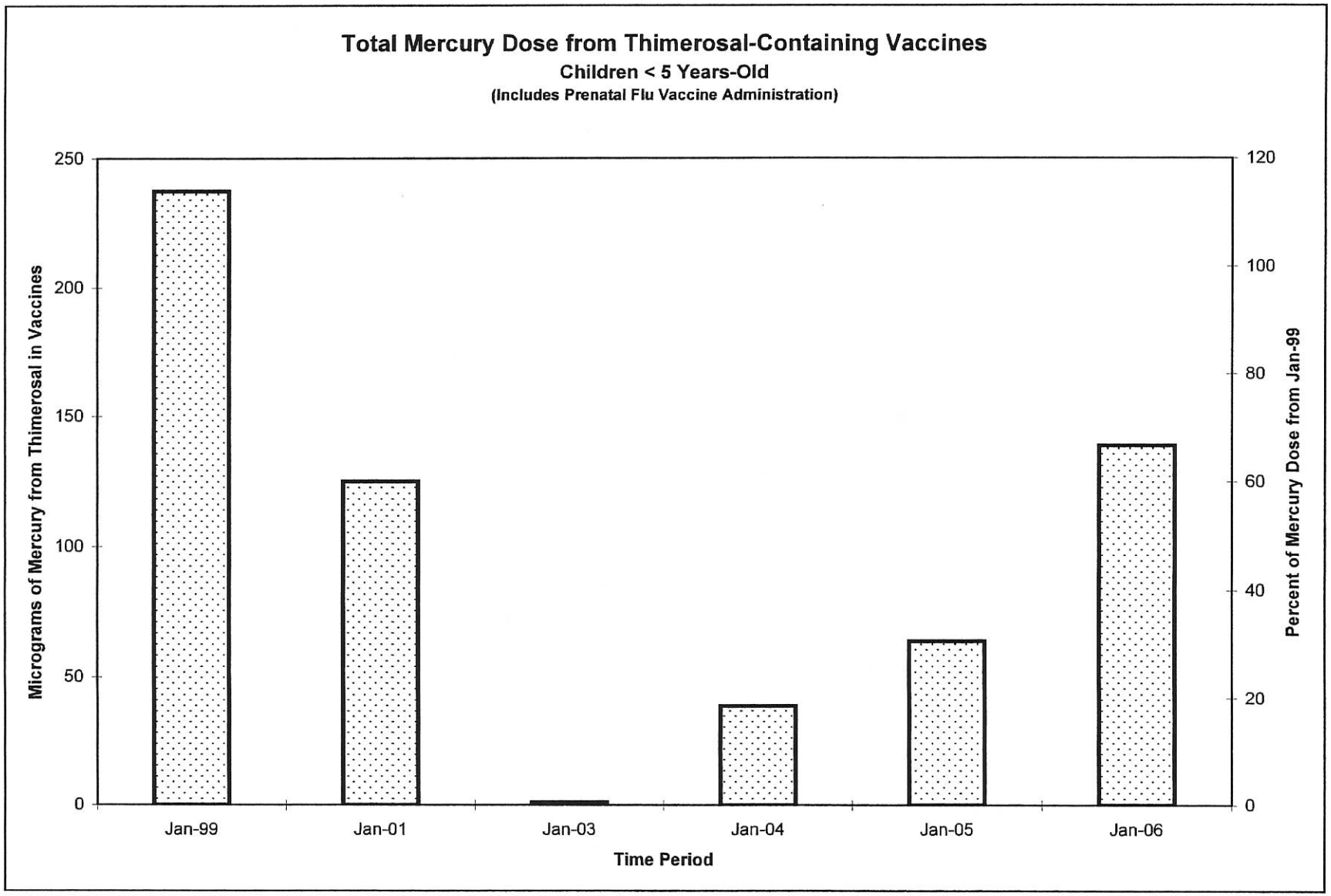
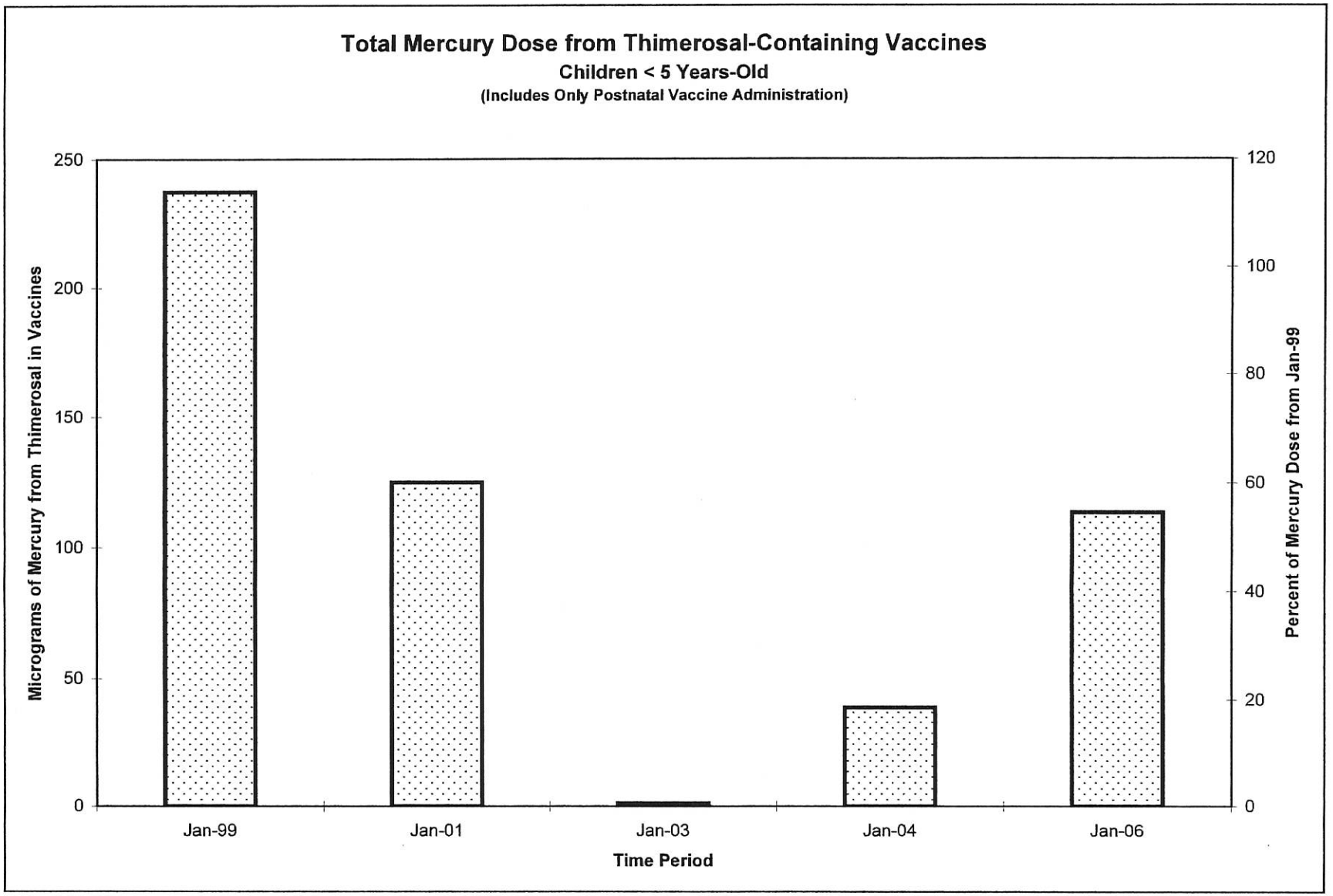


Figure 9. Autoradiogram showing Thimerosal inhibition of [γ^{32}P]8N$_3$GTP photolabeling of brain β-Tubulin



doi: 10.1588/medver.2005.02.00070


Total Mercury Dose from Thimerosal-Containing Vaccines
Children < 5 Years-Old
(Includes Prenatal Flu Vaccine Administration)
Micrograms of Mercury from Thimerosal in Vaccines
Percent of Mercury Dose from Jan-99
250
200
150
100
50
0
120
100
80
60
40
20
0
Jan-99
Jan-01
Jan-03
Jan-04
Jan-05
Jan-06
Time Period


Total Mercury Dose from Thimerosal-Containing Vaccines
Children < 5 Years-Old
(Includes Only Postnatal Vaccine Administration)
Micrograms of Mercury from Thimerosal in Vaccines
Percent of Mercury Dose from Jan-99
250
200
150
100
50
0
120
100
80
60
40
20
0
Jan-99
Jan-01
Jan-03
Jan-04
Jan-06
Time Period

Thimerosal is an Ineffective Vaccine Preservative

" Thimerosal is a weak antibacterial agent that is rapidly broken down to products, including ethylmercury residues, which are neurotoxic. Its role as a preservative in vaccines has been questioned, and the pharmaceutical industry itself considers its use historical."

The case against thimerosal use. Seal D, et.al., Lancet, 1991;338:315-316

" The thimerosal preservative present in DTP vaccine requires substantial time to kill organisms and cannot be relied upon....the most important means of preventing abscesses secondary to DTP vaccination is to prevent contamination by careful attention to sterile technique."

Outbreaks of Group A Streptococcal Abscesses Following Diphtheria-Tetanus Toxoid-Pertussis Vaccination by Harrison C. Stetler, et.al.,Pediatrics, Vol. 75, No.2, February 1985, pg 299-303.

The Food and Drug Administration [FDA] is issuing an advanced notice of a proposed rulemaking that would classify over-the-counter [OTC] mercury-containing drug products for topical antimicrobial use as not generally recognized as safe and effective and as being misbranded.....bacteriostatic action that is capable of being reversed by contact with body fluids.

Advanced notice of proposed rulemaking regarding thimerosal
Federal Register 436. January 5, 1982

"It is not highly germicidal and especially does not possess high germicidal value in the presence of serum and other protein mediums. The loss of antibacterial activity of mercurials in the presence of serum proves their incompatibility with serum."

Morton, HE and Engley, FB Bacetriostatic and bacteriocidal actions of some mercurial compounds on hemolytic streptococci. In vivo and in vitro studies. JAMA 136;37-41, 1948

"...mercurials are ineffective in vivo and may be more toxic for tissue cells than bacterial cells, as shown in mice, tissue culture and embryonic eggs and with leucocytes "

Engley, FB Evaluation of mercurial compounds as antiseptics. Annals of New York Academy of Sciences. 53:197-2-6, 1950.

If Thimerosal is known to be ineffective as a vaccine preservative, could the contamination of Chiron's thimerosal-containing flu vaccine in 2004-05 been predicted, threatening half of the U.S. supply?

"Chiron Corporation announced Tuesday that it will be unable to supply any influenza virus vaccine to the U.S. market for the 2004-2005 influenza season, creating an instant and severe vaccine shortage just as flu season begins."

Am Soc of Health-System Pharmacists News Oct 6,2004

"This week, Chiron's Fluvirin vaccine was pulled after contamination with the potentially dangerous serratia bacteria was found. Chiron used the mercury-based preservative thimerosal as a sterilizing agent in making Fluvirin, to prevent exactly this type of contamination," says Kirby, whose book explores the possibility that thimerosal could have contributed to the rising numbers of cases of autism, ADD and other childhood disorders. "Thimerosal is also used as a preservative in multi-dose vials. By definition, no thimerosal-containing solution should have live bacteria present in its final formula."

FLU VACCINE SHORTAGE – THIMEROSAL TO BLAME? David Kirby.
http://www.evidenceofharm.com/fluvaccine.htm

Removing thimerosal will NOT threaten the US influenza vaccine supply but help assure help assure safety of future vaccines.

In support of Kansas SB 537
Prepared February 20, 2006
David Ayoub, MD

Thimerosal is a Toxic Preservative

"Pertussis vaccines preserved with 0.01% Merthiolate[thimerosal] are more toxic for mice than unpreserved vaccines prepared from the same parent concentration and containing the same number of organisms...An increase in mortality was observed when Merthiolate was injected separately, before or after an unpreserved suspension of pertussis vaccine"

Enhanced toxicity for mice of pertussis vaccines when preserved with Merthiolate. Nelson E, Gotshall RY. Applied Microbiology 1967;15:590-593

"...reactions can be expected in such a high percentage of merthiolate-sensitive persons that merthiolate in vaccines should be replaced by another antibacterial agent."

Thimerosal allergy and vaccination reactions. Cox NH and Forsyth A. Contact Dermatitis 1980;6:241-245.

"Organic mercurial antiseptics should be heavily restricted or withdrawn from hospital use, as the fact that mercury readily penetrates intact membranes and is highly toxic and seems to have been forgotten. Equally effective and far less toxic broad-spectrum antifungal and antibacterial topical antiseptics are currently available."

Organ mercury levels in infants with omphaloceles treated with organic mercurial antiseptic. Fagan, et. al., Arch Dis Child. 1977 Dec;52(12):962-4.

"thimerosal ...has been found to not only render its primary toxic effect, but also capable of changing the properties of cells. That fact suggests the use of thimerosal for the preservation of medical biological preparations, especially those intended for children, is **inadmissible**."

Kravchenko, et. al., The detection of toxic properties in medical biological preparations by the degree of cell damage in the L123 continuous cell line. Z Mik Epid Imm, 1983;3,87-92

"...merthiolate should now be regarded as an inappropriate preservative for anti-lymphocytic globulin preparations and other materials which are intended for administration to human subjects"

Problems associated with the use of merthiolate as a preservative in antilymphocytic globulin. Heyworth MF and Truelove SC, Toxicology 1979;12:325-333.

From the FDA web site, attempts to demonstrate thimerosal safety testing:

Prior to its introduction in the 1930's, data were available in several animal species and humans providing evidence for its safety and effectiveness as a preservative (Powell and Jamieson 1931). Since then, thimerosal has been the subject of several studies (see Bibliography) and has a long record of safe and effective use preventing bacterial and fungal contamination of vaccines, with no ill effects established other than minor local reactions at the site of injection. (*http://www.fda.gov/cber/vaccine/thimerosal.htm*)

But the cited FDA "safety" studies do not support that thimerosal is safe

Batts AH, et al., 1989: thimerosal destroys cilia function in sheep trachea after 40-100 minutes

Gasset AR, et al, 1975: thimerosal causes significant fetal death in rabbits and rats

Powell and Jamieson, 1931: over half of thimerosal exposed rabbits died of mercury poisoning

K.C. Smithburn,1930: twenty-two patients received ethyl mercury to treat meningitis and all died.

THERE IS SIMPLY NO WAY TO DESIGN A SAFETY STUDY WITH ETHYL MERCURY, IT IS SIMPLY TOO TOXIC. PLEASE SUPPORT HB 3836 and CLOSE THIS TRAGIC CHAPTER IN AMERICAN HEALTHCARE OVERSIGHT FAILURE

in support of Kansas SB 537
Prepared February 20, 2006
David Ayoub, MD

Thimerosal is Toxic to Pregnancy

"Animal reproduction studies have not been conducted with Influenza Virus Vaccine. It is not known whether Influenza Virus Vaccine can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Influenza Virus Vaccine should be given to a pregnant woman only if clearly needed."

Influenza vaccine Fluzone Package Insert 2005-06

From The National Institute of Health (NIH):

"For fetuses, infants and children, the primary health effects of mercury are on neurological development. Even low levels of mercury exposure such as result from mother's consumption of methylmercury in dietary sources can adversely affect the brain and nervous system. Impacts on memory, attention, language and other skills have been found in children exposed to moderate levels in the womb." (note striking similarities to autism, ADHD)

http://www.nih.gov/od/ors/ds/nomercury/health.htm

"the number of Rho D immunoglobulin injections received by mothers in the autistic group was significantly higher than the mothers of controls (0.52 versus 0.09; $p < .0000004$). Forty-six percent of the autistic mother received Rho D immunoglobulin injections as compared to 9% of the control mothers." (Rho D contained high levels of thimerosal)

Reduced Levels of Mercury in First Baby Haircuts of Autistic Children
AS Holmes,1 MF Blaxill, and BE Haley, International Journal of Toxicology, 22:277–285, 2003

"the scientific evidence that... thimerosal causes reproductive toxicity is clear and voluminous. Thimerosal dissociates in the body to ethyl mercury. The evidence for its reproductive toxicity includes severe mental retardation or malformations in human offspring who were poisoned when their mothers were exposed to ethyl mercury or thimerosal while pregnant, studies in animals demonstrating developmental toxicity after exposure to either ethyl mercury or thimerosal, and data showing interconversion to other forms of mercury that also clearly cause reproductive toxicity."

Proposition 65, California EPA

"One published teratological study of thimerosal was located in the literature...While there were no teratological effects observed, dose-related embryo and fetal lethality was observed...A comparison of topical and subcutaneous administration of thimerosal to rabbits showed measurable mercury in blood and tissues of the treated animals and their offspring...Thimerosal was found to cross the blood-brain and placenta barriers."

Nomination of Thimerosal to National Toxicology Program, April 2001

From the Vaccine Adverse Event Reporting System, Centers for Disease Control.

VAERS ID 217805 **Vaccination Date:** 2001-11-20
Age 19.0 **Date filed:** 2004-03-12
Sex F **Where Administered:** UNK
State AK **Purchased by:** UNK

	Vaccinations	Manufacturer	Lot	Dose	Route	Site
1	FLU	UNKNOWN MFR	Unknown	0	RA	

Onset Date: 2001-11-22 **Days since Vaccination:** 2
Symptoms: ABORTION HEADACHE LAB TEST ABNORM NAUSEA PAIN BACK VOMIT WBC ABNORM
Headache, lower back pain, nausea, vomiting, loss of unborn child. Lasted for two weeks; resulted in hospitalization.

One of 11 cases of fetal death following flu vaccine during pregnancy, reported on VAERS as of 12/1/05

Thimerosal is an experimental abortifacient, untested in humans. It does not belong in any drug given during pregnancy.

in support of Kansas SB 537
Prepared February 20, 2006
David Ayoub, MD

Impact of Kansas SB 537 on Influenza Immunization Coverage Rates

Assessment of infant influenza vaccine supply

CDC vaccine recommendations: All 6-23 month old infants, 2 doses for first vaccination
Immunization coverage rate: 48% in 2004-05 (from CDC)
Size of this age group in the U.S. Approximately 7.5 million (per US Census Bureau)
Number of doses pediatric doses available from Sanofi-Aventis 2005-06: up to 8 million
Number of pediatric doses need to vaccinate all US infants this age (at least 2 doses): 7.2 million
Projection for 2006-2007: GlaxoSmithKline will also produce pediatric doses containing 1.25 mcg mercury per dose or less.

Review of effectiveness of influenza vaccination in children.

"Inactivated influenza vaccine did not reduce the attack rate of influenza A infection in 6-24 month old children."

Failure of inactivated influenza A vaccine to protect healthy children aged 6-24 months. Maeda T, et al., Pediatr Int. 2004 Apr;46(2):122-5.

"We conclude that influenza vaccination did not result in a significant reduction of the number, severity, or duration of asthma exacerbations caused by influenza. Additional studies are warranted to justify routine influenza vaccination of children with asthma. "

Influenza vaccination in children with asthma: randomized double-blind placebo-controlled trial. Bueving HJ, et al. Am J Respir Crit Care Med. 2004 Feb 15;169(4):488-93,2003

"Inactivated vaccines had lower efficacy (65%) than live attenuated vaccines, and in children aged 2 years or younger they had similar effects to placebo....If influenza immunisation in children is to be recommended as public-health policy, large-scale studies assessing such important outcomes and undertaking direct comparisons of vaccines are urgently needed."

Assessment of the efficacy and effectiveness of influenza vaccines in healthy children: systematic review. Jefferson T, et. al., Lancet. 365(9461):773-80, 2005.

"This study failed to provide evidence that the influenza vaccine prevents paediatric asthma exacerbations."

Effectiveness of influenza vaccine for the prevention of asthma exacerbations. Christy C, Aligne CA, Auinger P, Pulcino T, Weitzman M. Arch Dis Child. 2004 Aug;89(8):734-5.

Assessment of vaccine supply for pregnancy:

CDC vaccine recommendations: all pregnant women, regardless of trimester or risk factors
Immunization coverage rate: 12% in 2004-05 (from CDC).
Size of this age group in the U.S. Approximately 6.2 million pregnancies per year (National Vital Statistics, 1996)
Number of adult doses need to vaccinate US pregnancies: 750,000 doses
Number of doses (thimerosal-free) available from Sanofi-Aventis 2005-06: unknown
Current thimerosal-free supply: no remaining adult dosages from manufacturers or distributors.
Projection for 2006-2007: GlaxoSmithKline will produce adult doses for the US market containing 1.25 mcg mercury per dose or less. The capacity of Sanofi-Aventis is unknown. Chiron may produce adult, thimerosal-free formula.

Review of the effectiveness of influenza vaccination in pregnancy.

"Women who received influenza vaccine during pregnancy had the same risk for ILI [influenza-like illness] visits compared with unvaccinated women... Hospital admissions for influenza or pneumonia for women in the study population were quite rare and no women died of respiratory illness during pregnancy. Infants born to women who received influenza vaccination had the same risks for influenza or pneumonia admissions compared with infants born to unvaccinated women... Maternal influenza vaccination was also not a significant determinant of risk of ILI (excluding otitis media) outpatient visits for infants, nor did it significantly affect the risk of otitis media visits. Influenza vaccination during pregnancy did not significantly affect the risk of cesarean section, adjusting for the woman's age. It also did not affect the risk of preterm delivery. ... we were unable to demonstrate the effectiveness of influenza vaccination with data for hospital admissions and physician visits."

Effectiveness of influenza vaccine during pregnancy in preventing hospitalizations and outpatient visits for respiratory illness in pregnant women and their infants. Black SB, et al., Am J Perinatol.;21(6):333-9, 2004

In support of Kansas SB 537
February 20, 2006
Prepared by David Ayoub, MD

Thimerosal, Influenza Vaccine and Pregnancy: Key Points

Manufacturers have had 6 years to expand the U.S. supply of thimerosal-free influenza vaccine, in spite of supporting similar policies in Britain, Scandinavian countries and Russia. Why?

Influenza Immunization in pregnancy has only recently been recommended for all pregnancies and any trimester. Is this policy supported?

Influenza has not been shown to be more dangerous or prevalent during pregnancy compared with nonpregnant counterparts.

The CDC supports its immunization policy although hospitalization rates during pregnancy have been reported in only 1.8/10,000 women.

No study has ever demonstrated higher maternal deaths or other serious untoward outcomes for deliver or perinatal health in women who become infected during pregnancy.

Influenza in pregnant women was not more serious or frequent than nonpregnant women during the pandemics of 1918 and 1957.

There is no improved outcome in vaccinated women vs unvaccinated during pregnancy, even those with asthma.

No clinical study has ever been performed that assessed safety of influenza vaccination during pregnancy with regards to fetal viability, childhood neurodevlopmental disorders, chronic childhood conditions (asthma, autoimmunity) or affects on future reproductive capacity. This fact is contained within all of the manufacturers package inserts. But..

1) thimerosal has been shown to cause abortions in animal species
2) numerous studies have shown other forms of mercury, including methylmercury, cause birth defects and fetal death
3) thimerosal has been shown experimentally to be toxic to cilia, which could directly impair female and male fertility
4) the only study that assessed the link of prenatal thimerosal via Rho-D shots and neurodevelopmental disorders showed nearly six times more Rho-D used in mothers of autistic children vs mothers of neurotypical children.
5) VAERS has shown 11 cases of miscarriage or stillbirth following flu vaccination and six cases of fetal malformation.

Summary: Influenza is not a more frequent or more severe illness during pregnancy and the influenza vaccine has had no impact on health outcomes. The vaccine has not been adequately tested, its preservative implicated in serious adverse complications.

Please vote S 537 out of committee so the bill can be discussed by the full senate. We have three son's. Philip 19, Kyle 17 and Adam 14. Adam is mercury poisoned from the Thimerosal containing RhoGAM shot given during my 28th week of pregnancy and his childhood vaccines. He is suffering from combination of endocrine dysfunction, pituitary dysfunction, hyperlipidemia, hyperinsulinemia, hypothyroidism, low growth hormone, metabolism disorder, severe chronic constipation, high testosterone, and developmental delays all due to adverse effect of thimerosal.

Parents and teachers are concerned by the increasing number of sick children in the past decade . This increase puts a heavy burden on parents, teachers and the taxpayers in providing services for these children. These damaged children are not only costing the tax payers millions in special education services, but many will not be able to hold jobs and will have to be taken care of for the rest of their lives putting even more of a burden on parents and society. This bill will cost nothing to implement, but will save us millions in tax dollars. If this nation is to stay competitive with other nations, we need to protect our next generation. If not, then our country's hard work at remaining a leader in the free world will have been in vain because we have damaged our own children who are to carry on that work.

It is not a coincidence that the rise in neurologically damaged children coincides with the addition of the Hib and Hepatitis vaccines in the late 80's and early 90's. The amount of exposure to thimerosal, which is made up of 49.6% mercury by weight, increased the mercury body burden of infants to levels far exceeding government safe standards. The EPA's limit for mercury exposure is 0.1 mcg. per kilogram of weight per day. After the Hepatitis-B vaccine was implemented in 1991, depending on the weight of a 2 month old child, they could receive up to 62.5 mcg of mercury in one day from vaccinations. Meaning a baby would need to weigh 1375 pounds to be at a safe level of ingestion. How did our government allow children to be injected with this neurotoxin so far above the EPA and FDA's limit of safety? Mercury has no business being injected into adults, let alone babies and small children. The KDHE department web site warns against mercury and are warned of the dangers of eating seafood while pregnant, but then are still being injected with this neurotoxin in our flu and tetanus booster vaccines? We have in the manufacturer's own words a statement saying that pregnant women and children should not be exposed to this neurotoxin.

At this point, our children will not receive another vaccine until I know that this neurotoxin is taken out of Kansas vaccines. Those vaccines of special concern are the flu shot, tetanus boosters and meningitis vaccines, now given to college freshman. Flu shots containing thimerosal and are being promoted to pregnant women and children. In order to save the vaccination program, I urge you to pass S 357 and restore the public's confidence in our state's vaccine supply.

Kerry and Linda Weinmaster
5216 Stonecreek Court
Lawrence, KS 66049

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Mercury Information Page

What is Mercury?
Mercury (also known as quicksilver) is a silvery white, poisonous, metallic element which is an extremely heavy liquid at room temperature. Metallic mercury is used in thermometers, batteries, some children's sneakers that light up, some household thermostats, some heirloom clocks, barometers, vapor lamps, and blood pressure cuffs. While mercury in thermometers poses little threat, a portable blood pressure gauge may hold 2-1/2 pounds of mercury. That is enough to cause great concern if spilled. Commercial uses of mercury include the manufacture of chemical pesticides and mercury compounds.

How Toxic is Mercury?
Metallic mercury is highly toxic. Young children and fetuses are the most vulnerable. Mercury can enter the body through inhalation of mercury vapors or by skin absorption. Mercury will accumulate in body tissues and organs and cause adverse health problems.

How to Protect Yourself From Mercury Exposure
Mercury contamination results from exposure to mercury through air, water, food, soil or direct contact. Exposure to metallic mercury occurs when the mercury is not stored in a closed container. Contamination will result where ever metallic mercury is spilled. Metallic mercury and its vapors are extremely difficult to remove from such items as clothes, furniture, carpet, floors, walls and electronic equipment such as computers. The vapors can also accumulate in walls and other structures in rooms. Contamination from mercury spills can pose a risk for many months or years. The threat exists not only to persons currently residing in that structure, but also to those who subsequently occupy that dwelling.
It is important to avoid using metallic mercury. Appropriate substitutes are available for nearly all uses of metallic mercury. If it is necessary to use metallic mercury, make sure it is safely stored in a leak proof container and kept in a secure place.
Mercury Information Page

Main Symptoms
Once exposed to mercury, one can experience any of the following symptoms: Coughing, shortness of breath, chest pain, vision problems, erratic behavior, vomiting, diarrhea, fever, tremors, rashes, mouth sores, itching, swelling, flushing, kidney problems, loose teeth, hearing problems, nausea, impaired judgment, memory loss, increased blood pressure, increased heart rate, sleeplessness, restlessness, irritability, shyness, fretfulness, joint pains, and weakness. Incidents of mercury contamination occur in Kansas and across the nation.

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Mercury Information Page

Health Effects

Elemental mercury and mercury compounds pose an extreme health hazard, particularly to developing fetuses, young children and frail persons of any age. Long-term exposure to mercury can cause permanent damage to the brain, kidneys and the development of unborn babies. Mercury has not been shown to cause cancer in humans. Organic mercury from eating contaminated fish or grain may cause greater harm to the brain and to developing fetuses than to the kidneys. Mercury vapors may cause greater harm to the brain, while inorganic mercury salts in water supplies or in contaminated foods may cause greater harm to the kidneys.

At high levels, metallic mercury can affect the nervous system and the developing fetus. Short-term exposure to high levels of inorganic or organic mercury produce similar health effects, but full recovery is more likely once the body is free of contamination. Long-term exposure to lower levels of mercury is a greater threat to overall health, and may be more insidious because it causes harm before symptoms are evident. The detrimental effects of low-level, long-term exposure may be irreversible, particularly to the brain and kidneys.

Mercury has not been shown to cause cancer.
Mercury easily enters the body through several routes, but it may take many months for the body to purge itself of the poisonous metal. Mercury vapors can be breathed - among the most hazardous exposures to elemental mercury. Handling the liquid metal also allows mercury to enter the body through pores of the skin. Mercury leaves the body mostly through the urinary and digestive tracts.

Different forms of mercury and the way in which people are exposed will determine how severe and what kind of effect the poisoning produces. Organic mercury, ingested by eating contaminated fish or grain, may cause greater harm to the brain and to developing fetuses than to kidneys. Exposure to elemental mercury and its vapor may cause greater harm to the brain, while inorganic mercury salts in water supplies and contaminated foods may affect kidneys to a greater extent.

Medical professionals test for mercury poisoning by drawing blood and taking urine samples, then examining the specimens with special laboratory equipment. The tests are reliable, accurate and easily available. In some cases - particularly when mercury levels in the body are extremely high "chelation" therapy is necessary to speed the expulsion of the toxic metal from the body. Chelation therapy involves introducing a chemical into the bloodstream that combines with mercury to aid in removing the metal from the body.

Kelly Kerns' Statement:

I am the parent of three children with autistic disorders, and I strongly support the present bill to ban Thimerosal from childhood vaccines administered in the state of Kansas. I support immunizing children, but injecting mercury from Thimerosal-containing vaccines into pregnant women and newborn babies is TOTALLY UNACCEPTIBLE.

Thimerosal is approximately 50% mercury by weight, and is a known neurotoxin. Mercury is among the toxic elements on the earth. Mercury from Thimerosal has been shown to cross the blood-brain and placental barriers and result in significant mercury levels in the tissues including the brain. It has even been shown that Thimerosal exposure by a fetus in utero can cause fetal abortions and malformations.

In July of 1999, the American Academy of Pediatrics and the US Public Health Service recommended removing Thimerosal from all vaccines as soon as possible. Yet, now more than 6 years latter, full-doses of Thimerosal (25 µg of mercury per dose) remains in many vaccines administered to infants and pregnant women, when the Environmental Protection Agency (EPA) has established a limit for exposure to mercury of 0.1 µg of mercury / Kg bodyweight / day. As a result, an infant following the routine childhood immunization schedule, may receive a full-dose Thimerosal-containing influenza vaccine at 6 months of age, and receive more than 20-fold in excess of EPA safety guidelines.

Now, the Advisory Committee on Immunization Program (ACIP) in the last several days has made the new recommendation, that in addition to recommending that Thimerosal-containing influenza vaccine be administered to all pregnant women and to infants three times during the first two years of life, as recommended that Thimerosal-containing influenza vaccine be administered to all children on a yearly basis from 2 to 5 years-old. All told, between prenatal and postnatal exposure to mercury from Thimerosal-containing influenza vaccines, infants may be exposed to more than 137 µg of mercury. Additionally, pregnant women, infants, and children may be exposed to additional doses of mercury from full-dose Thimerosal-containing vaccines such as tetanus toxoid (25 µg of mercury), meningitis (25 µg of mercury), Japanese Encephalitis virus (37.5 µg of mercury).

I can remember being the faithful parent ensuring that my children were vaccinated against life-threatening infectious diseases. I can understand the desire to eliminate infectious disease and maintain confidence in the vaccine program. I have significant trouble reconciling with myself that I knowingly injected hundreds of micrograms of mercury from Thimerosal-containing vaccines into my children. My children have been damaged, and through treating them for mercury toxicity I have watched them significantly improve. I CANNOT standby, knowing what I know about the mercury in vaccines from listening to researchers studying this issue and from my own experience in watching my children be damaged by mercury from Thimerosal-containing vaccines, to continue to allow fetuses, infants and children to be injected with toxic levels of mercury. More than six years is too long to wait for Thimerosal to be removed from vaccines, NOW IS THE TIME TO ACT TO BAN THIMEROSAL!!

"Protecting Children from Mercury-Containing Drugs"

A Resolution submitted to the East Kansas Annual Conference

of the United Methodist Church

June 2005

Sponsor:

Mrs. Kelly Kerns

7-49

Whereas,

As indicated in its Social Principles, The United Methodist Church affirms[1]:

> "It is imperative...that governments and the medical profession carefully enforce the requirements of the prevailing medical research standard, maintaining rigid controls in testing new technologies and drugs utilizing human beings. The standard requires that those engaged in research shall use human beings as research subjects only after obtaining full, rational, and uncoerced consent."
>
> and
>
> "We encourage wise policies relating to the availability of potentially beneficial or potentially damaging prescription and over-the-counter drugs; we urge that complete information about their use and misuse be readily available to both doctor and patient."

Whereas,

Mercury, a known poison, is the second most toxic element on earth, after plutonium,

Whereas,

Thimerosal (synonyms include: Thiomseral, Merthiolate, Thimerasol) is a severely toxic organic mercury compound[2] (approximately 50% mercury by weight) that has been added to some vaccines and pharmaceutical products since the 1930s[3],

Whereas,

There are some presently marketed vaccines and pharmaceutical products[3] that use safe, effective, and economical methods to eliminate the need for Thimerosal (mercury) preservatives,

Whereas,

Despite numerous peer-reviewed scientific/medical studies published over many decades, at least since the 1940s, that have recommended removing or restricting the use of Thimerosal in medicinal products[4], the recommendation of the Food and Drug Administration (FDA) in 1982, that Thimerosal be banned from topical over-the-counter products, and calls for its removal from all childhood vaccines by the American Academy of Pediatrics (AAP) and United States Public Health Service in July of 1999, and by the Institute of Medicine of the United States National Academy of Sciences in 2001, Thimerosal (mercury) still remains in some vaccines (including childhood vaccines and the flu shot), and many other pharmaceutical products,[5,6]

Whereas,

The Environmental Protection Agency (EPA) of the State of California has officially declared that Thimerosal is a developmental toxin, meaning that it can cause birth defects, low birth weight, biological dysfunctions, or psychological or behavior deficits that become manifest as the child grows, and that maternal exposure during pregnancy can disrupt the development or even cause the death of the fetus[7] (*The State of California has banned administration of Thimerosal-containing vaccines to children and pregnant women*[8]),

Whereas,

The Subcommittee on Human Rights and Wellness, Government Reform Committee, United States House of Representatives, following a three year investigation into Thimerosal, issued a report, "*Mercury in Medicine*" on May 21, 2003 that concluded [emphasis added]:

"Mercury is hazardous to humans. Its use in medicinal products is undesirable, unnecessary and should be minimized or eliminated... Manufacturers of vaccines and Thimerosal have never conducted adequate testing on the safety of Thimerosal. The FDA has never required manufacturers to conduct adequate safety testing on Thimerosal...Studies and papers documenting the hyperallergenicity and toxicity of Thimerosal (ethylmercury) have existed for decades."[5]

Whereas,

The Counsel Scott Bloch of the United States Office of Special Counsel (OSC) has called for a Congressional Inquiry into the use of Thimerosal in vaccines and published on May 20, 2004 [emphasis added]:

*"I have recently received hundreds of disclosures from private citizens alleging a widespread danger to the public health, specifically infants and toddlers, caused by childhood vaccines which include Thimerosal, a mercury-containing preservative...**I hasten to add, however, that based on the publicly available information as discussed briefly below, it appears there may be sufficient evidence to find a substantial likelihood of a substantial and specific danger to public health caused by the use of Thimerosal/mercury in vaccines because of its inherent toxicity.***"[9]

Whereas,

Pregnant women and children are advised not to consume excessive levels of fish due to possible mercury exposure, yet are given no opportunity of informed consent as they incur comparable or greater levels of mercury exposure through mandated injections and from many other pharmaceutical products,

Whereas,

The Scandinavian countries and the United Kingdom have already removed Thimerosal (mercury) from their pediatric immunizations, citing, among other things, the risk of Thimerosal-induced autism[10],

Whereas,

The mercury content of vaccines intended for use in developing nations, as well as those vaccines manufactured there, has not been reduced, and remains well in excess of Federal Safety Guidelines,

Whereas,

It is a violation of the sanctity of human life to inject poison into any being, especially a pregnant woman or a newborn baby,

And whereas,

John Wesley modeled a faith lived out in good works, and advocated for social justice and the reform of the nation, and the spread of scriptural holiness across the land,

and

Jesus Christ told his disciples, "**Let the little children come to me, and do not hinder them for to such as these belongs the kingdom of God**," (Luke 18:16)

Be it resolved, that the East Kansas Annual Conference of the United Methodist Church does hereby call upon the Secretary of Health and Human Services, the Food and Drug Administration, and the Centers for Disease Control and Prevention to come quickly to the protection of the people, especially the unborn and the children, by:

Immediately advocating that mercury-free stocks of vaccines and other pharmaceutical products be prioritized for pregnant women, newborn infants, and children,

Providing an opportunity of informed consent to individuals about to receive mercury exposure through their drugs/pharmaceutical products/biologics/vaccines, detailing the known risks of its toxicity and Federal Safety Guidelines for Exposure to mercury,

Moving to ban the presence of any mercury compound in a drug/pharmaceutical product/biologic/vaccine, prescribed or over-the-counter, **unless** the presence of that mercury compound has been proven clinically to have **no** adverse effects,

And that the East Kansas Conference of the United Methodist Church refers this resolution to:

the General Board of Global Ministries and the General Board of Church and Society for further action,

the Interfaith Center for Public Policy for further action,

the Council of Bishops for their examination.

It is requested that a copy of this resolution be sent to:

The Honorable George W. Bush, President of the United States of America,
Mike O. Leavitt, The Secretary of Health and Human Services,
Dr. Julie Gerberding, Director of the CDC,
Dr. Lester Crawford, Acting Commissioner of the Food and Drug Administration (FDA),
Dr. Jesse L. Goodman, Director of the FDA's Center for Biologic Research and Development (CBER),
Dr. William Egan, Deputy Director of the Office of Vaccine Research and Review (OVRR) in CBER,
Dr. Marie McCormick, former chair of the Institute of Medicine,
The Honorable Kathleen Sebelius, Governor of Kansas, and Kansas Attorney General Phill Kline.

References

[1] The Book of Discipline of the United Methodist Church, 2004 , Para. 162-L & 162-J, pp. 108-109.

[2] Pfab R, Muckter H, Roider G, Zilker T. **Clinical course of severe poisoning with thiomersal.** J Toxicol Clin Toxicol. 1996;34(4):453-60.

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Fagan DG, Pritchard JS, Clarkson TW, Greenwood MR. **Organ mercury levels in infants with omphaloceles treated with organic mercurial antiseptic.** Arch Dis Child. 1977 Dec;52(12):962-4.

Rohyans J, Walson PD, Wood GA, MacDonald WA. **Mercury toxicity following merthiolate ear irrigations.** J Pediatr. 1984 Feb;104(2):311-3.

Nascimento LO, Lorenzi Filho G, Rocha Ados S. **Lethal mercury poisoning due to ingestion of merthiolate.** Rev Hosp Clin Fac Med Sao Paulo. 1990 Sep-Oct;45(5):216-8.

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Hornig M, Chian D, Lipkin WI. **Neurotoxic effects of postnatal thimerosal are mouse strain dependent.** Mol Psychiatry. 2004 Sep;9(9):833-45.

[3] Ball LK, Ball R, Pratt RD. An assessment of thimerosal use in childhood vaccines. Pediatrics. 2001 May;107(5):1147-54.

[4] Ellis FA. The sensitizing factor in merthiolate. J Allergy 1947;18:212-13.

Ellis published in 1947, "...it may be dangerous to inject a serum containing merthiolate into a patient sensitive to merthiolate."

Nelson EA, Gottshall RY. Enhanced toxicity for mice of pertussis vaccines when preserved with Merthiolate. Appl Microbiol. 1967 May;15(3):590-3.

Nelson and Gottshall published in 1967, "Pertussis vaccines preserved with 0.01% Merthiolate are more toxic for mice than unpreserved vaccines prepared from the same parent concentrate and containing the same number of organisms...An increase in mortality was observed when Merthiolate was injected separately, before or after an unpreserved suspension of pertussis vaccine."

Fagan DG, Pritchard JS, Clarkson TW, Greenwood MR. Organ mercury levels in infants with omphaloceles treated with organic mercurial antiseptic. Arch Dis Child. 1977 Dec;52(12):962-4.

Fagan et al. published in 1977, "Organic mercurial antiseptics should be heavily restricted or withdrawn from hospital use, as the fact that mercury readily penetrates intact membranes and is highly toxic seems to have been forgotten. Equally effective and far less toxic broad-spectrum antifungal and antibacterial...antiseptics are currently available."

Heyworth MF, Truelove SC. Problems associated with the use of merthiolate as a preservative in anti-lymphocytic globulin. Toxicology. 1979 Mar-Apr;12(3):325-33.

Heyworth and Truelove published in 1979, "For many years, merthiolate has been known to have anti-microbial activity. When it was first introduced as an anti-microbial preservative, little information about the fundamental biological effects of organic mercury compounds was available. We would like to suggest that merthiolate should now be regarded as an inappropriate preservative for anti-lymphocytic globulin preparations and other materials which are indented for administration to human subjects."

Forstrom L, Hannuksela M, Kousa M, Lehmuskallio E. Merthiolate hypersensitivity and vaccination. Contact Dermatitis. 1980 Jun;6(4):241-5.

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Kravchenko et al. published in 1983, "Thus thimerosal, commonly used as preservative, has been found not only to render its primary toxic effect, but also capable of changing the properties of cells. This fact suggests that the use of thimerosal for the preservation of medical biological preparations, especially those intended for children, is inadmissible."

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Cox and Forsyth published in 1988, "However, individual cases of severe reactions to thiomersal demonstrate a need for vaccines with an alternative preservative."

Seal D, Ficker L, Wright P, Andrews V. The case against thiomersal. Lancet. 1991 Aug 3;338(8762):315-6.

Seal et al. published in 1991, "Thimerosal is a weak antibacterial agent that is rapidly broken down to products, including ethylmercury residues, which are neurotoxic. Its role as a preservative in vaccines has been questioned, and the pharmaceutical industry itself considers its use as historical."

van't Veen AJ. Vaccines without thiomersal: why so necessary, why so long coming? Drugs. 2001;61(5):565-72.

Van't Veen published in 2001, "The very low thiomersal concentrations in pharmacological and biological products are relatively non-toxic, but probably not in utero and during the first 6 months of life. The developing brain of the fetus is most susceptible to thiomersal and, therefore, women of childbearing age, in particular, should not receive thiomersal-containing products."

Schumm WR, Reppert EJ, Jurich AP, Bollman SR, Webb FJ, Castelo CS, Stever JC, Sanders D, Bonjour GN, Crow JR, Fink CJ, Lash JF, Brown BF, Hall CA, Owens BL, Krehbiel M, Deng LY, Kaufman M. Self-reported changes in subjective health and anthrax vaccination as reported by over 900 Persian Gulf War era veterans. Psychol Rep. 2002 Apr;90(2):639-53.

Schumm et al. published in 2002, "We also recommend that safer alternatives to thimerosal (a mercury sodium salt, 50% mercury) be used to preserve all vaccines."

[5] Subcommittee on Human Rights and Wellness, Government Reform Committee. Mercury in Medicine Report. Washington, DC: Congressional Record, May 21, 2003:E1011-30.

[6] See Appendix 1

[7] California Environmental Protection Agency – Office of Environmental Health Hazard Assessment. Response to the petition of Bayer Corporation for clarification of the Proposition 65 listing of "Mercury and Mercury Compounds" as chemicals known to cause reproductive toxicity. February 2004.
[8] California Legislation – Bill AB2943. CHAPTER 837. An act to add Article 9 (commencing with Section 124172) to Chapter 3 of Part 2 of Division 106 of the Health and Safety Code, relating to vaccinations. Approved by Governor September 28, 2004. Filed with Secretary of State September 28, 2004. **This bill, with certain exemptions, would prohibit, on and after July 1, 2006, a person who is knowingly pregnant or who is under 3 years of age from being vaccinated with a mercury-containing vaccine or injected with a mercury-containing product that contains more than a specified amount of mercury.** The bill would require notice to be given to the Legislature and interested parties regarding any exemptions and requests for exemptions.
[9] United States Office of Special Counsel. Special Counsel Scott Bloch's Letter to Congress, May 20, 2004.
[10] **Vaccine Scrapped Over Autism Fear**. BBC News – UK Edition, August 7, 2004.

Appendix 1

Thimerosal Content in Currently Manufactured U.S. Licensed Vaccines

Listing of Pharmaceutical Products Containing Thimerosal (Mercury)

Vaccine	Trade Name	Manufacturer	Thimerosal Concentration[1]	Mercury
Anthrax	Anthrax vaccine	BioPort Corporation	0	0
DTaP	Tripedia[2]	Aventis Pasteur, Inc.	< 0.0012%	0.3 µg/0.5 mL dose
	Infanrix	GlaxoSmithKline	0	0
	Daptacel	Aventis Pasteur, Ltd.	0	0
DTaP-HepB-IPV	Pediarix	GlaxoSmithKline	< 0.000005%	< 0.0125 µg/0.5 mL dose
DT	No Trade Name	Aventis Pasteur, Inc.	< 0.00012% (single dose) 0.01% (multi-dose)	< 0.3 µg/0.5mL dose 25 µg/0.5mL dose
		Aventis Pasteur, Ltd.	0.01%	25 µg/0.5 mL dose
Td	No Trade Name	Mass Public Health	0.0033%	8.3 µg/0.5 mL dose
	Decavac	Aventis Pasteur Inc.	<=0.00012%	0.3 µg mercury/0.5 ml dose
Td	No Trade Name	Aventis Pasteur, Ltd	0	0
TT	No Trade Name	Aventis Pasteur Inc.	0.01%	25 µg/0.5 mL dose
Hib	ActHIB/OmniHIB[3]	Aventis Pasteur, SA	0	0
	HibTITER	Wyeth-Lederle	0	0
	PedvaxHIB liquid	Merck	0	0
Hib/HepB	COMVAX[4]	Merck	0	0
Hepatitis B	Engerix-B	GlaxoSmithKline	< 0.0002%	< 0.5 µg/0.5 mL dose
	Recombivax HB[5]	Merck		
	Pediatric/adolescent		0	0
	Adult (adolescent)		0	0
	Adult (adolescent)		0.005%	25 µg/1.0 mL

	Dialysis		0.005%	dose 25 µg/1.0 mL dose
Hepatitis A	Havrix	GlaxoSmithKline	0	0
	Vaqta	Merck	0	0
HepA/HepB	Twinrix	GlaxoSmithKline	< 0.0002%	< 1 µg/1mL dose
IPV	IPOL	Aventis Pasteur, SA	0	0
	Poliovax	Aventis Pasteur, Ltd.	0	0
Influenza	Fluzone[6]	Aventis Pasteur, Inc.	0.01%	25 µg/0.5 mL dose
	Fluvirin	Evans	0.01%	25 µg/0.5 ml dose
	Fluzone (Preservative Free)	Aventis Pasteur, Inc.	≤ 0.0004%	≤ 0.5 µg/0.25 mL dose
	Fluvirin (Preservative Free)	Evans	< 0.0004%	< 1 µg/0.5 mL dose
Influenza, live	FluMist	MedImmune	0	0
Japanese Encephalitis[7]	JE-VAX	BIKEN	0.007%	35 µg/1.0mL dose 17.5 µg/0.5 mL dose
MMR	MMR-II	Merck	0	0
Meningococcal	Menomune A, C, AC and A/C/Y/W-135	Aventis Pasteur, Inc.	0.01% (multidose) 0 (single dose)	25 µg/0.5 dose 0
Pneumococcal	Prevnar (Pneumo Conjugate)	Lederle Laboratories	0	0
	Pneumovax 23	Merck	0	0
Rabies	IMOVAX	Aventis Pasteur, SA	0	0
	Rabavert	Chiron Behring	0	0
Typhoid Fever	Typhim Vi	Aventis Pasteur, SA	0	0
	Typhoid Ty21a	Berna Biotech, Ltd	0	0
Varicella	Varivax	Merck	0	0

Yellow Fever	Y-F-Vax	Aventis Pasteur, Inc.	0	0

Table Footnotes

1. Thimerosal is approximately 50% mercury (Hg) by weight. A 0.01% solution (1 part per 10,000) of thimerosal contains 50 µg of Hg per 1 ml dose or 25 µg of Hg per 0.5 ml dose.
2. Aventis Pasteur's Tripedia may be used to reconstitute ActHib to form TriHIBit. TriHIBit is indicated for use in children 15 to 18 months of age.
3. OmniHIB is manufactured by Aventis Pasteur but distributed by GlaxoSmithKline.
4. COMVAX is not licensed for use under 6 weeks of age because of decreased response to the Hib component.
5. Merck's Hepatitis B vaccine for adults(adolescents) is available in both preservative-free and thimerosal-containing presentations.
6. Children under 3 years of age receive a half-dose of vaccine, i.e., 0.25 mL (12.5 µg mercury/dose.)
7. JE-VAX is manufactured by BIKEN and distributed by Aventis Pasteur. Children 1 to 3 years of age receive a half-dose of vaccine, i.e., 0.5 mL (17.5 µg mercury/dose).

Source: FDA website: http://www.fda.gov/cber/vaccine/thimerosal.htm

[accessed on 23 January 2005]

Mercury in Drug and Biologic Products

The information in this list is derived from submissions made by manufacturers[+] in response to the agency's call-for-data notices of December 14, 1998 (63 FR 68775), April 29, 1999 (64 FR 23083) and February 3, 2003 (68 FR 5299), the agency's Drug Registration and Listing System, and other agency sources. Products submitted in response to any of the call-for-data notices are preceded by an asterisk (*). The mercury ingredients are abbreviated as TM for thimerosal, PMA for phenylmercuric acetate, PMN for phenylmercuric nitrate, MA for mercuric acetate, MN for mercuric nitrate, MB for merbromin, and MOY for mercuric oxide yellow. The list includes nonhomeopathic human and veterinary drug products and human biological products. Homeopathic drug products are not included because of the low amounts of mercury present in the products. The abbreviation NS under the % column means that the information was "not stated" in the agency's Drug Registration and Listing System.

[+] manufacturers, repackers, relabelers, and distributors

	Manufacturer	Name of Product	Ingredient	%
	Akorn Inc.	AK Spore Ophthalmic Solution	TM	.001
	Akorn Inc.	AK Spore HC Ophthalmic Combo Drops	TM	NS
	Akorn Inc.	Fluoracaine Ophthalmic Solution	TM	NS
	Akorn Inc.	AK Spore HC Otic Suspension	TM	NS
*	Alcon Laboratories	Profenal 1% Ophthalmic Solution	TM	.005
*	Alcon Laboratories	Adsorbonac 2% Ophthalmic Solution	TM	.004
*	Alcon Laboratories	Adsorbonac 5% Ophthalmic Solution	TM	.004
	Allergan America	Ocufen Ophthalmic Solution	TM	.005
	Allergan America	Poly Pred Ophthalmic Suspension	TM	.001
	Allergan Inc.	Blephamide SOP Ophthalmic Ointment	PMA	.0008
	Allergan Inc.	Bleph-10 Ophthalmic Ointment 10%	PMA	.0008
	Allergan Inc.	FML SOP Ophthalmic Ointment 0.1%	PMA	.0008
	Allergan Inc.	Poly Pred Ophthalmic Suspension	TM	.001
	Altaire Pharmaceuticals	Nasal Relief 12 Hour Spray	PMA	NS
	American Assn. Retired Persons	Oxymetazoline Nasal Spray	PMA	.002
	American International Chemical	Thimerosal (bulk chemical)	TM	100
	American International Chemical	Thimerosal (bulk chemical)	TM	100
	American International Chemical	Thimerosal USP 97% (bulk chemical)	TM	97
	American Pharmaceutical	12 Hour Nasal Solution	PMA	NS
	Appletree Markets	Long Lasting Nasal Spray	PMA	NS
*	Bausch & Lomb	Flurbiprofen Sodium Ophthalmic Solution	TM	.005
*	Bausch & Lomb	Neomycin & Polymyxin B Sulfates & Gramicidin Ophthalmic Solution	TM	.001

*	Bausch & Lomb	Neomycin & Polymyxin B Sulfates & Hydrocortisone Otic Suspension	TM	.01
*	Bausch & Lomb	Sulfacetamide Sodium & Prednisolone Sodium Phosphate Ophthalmic Solution 10%/.23%	TM	.01
*	Bristol-Myers Squibb	Fungizone Lotion	TM	.01
*	Bristol-Myers Squibb	Fungizone Cream	TM	.01
	C.O. Truxton Inc.	Bio-Cot Otic Suspension	TM	.01
	C.O. Truxton Inc.	Decongest Nasal Spray	PMA	NS
	Cheshire Pharmaceutical	Otocort Otic Suspension	TM	.01
	Cheshire Pharmaceutical	Ocutricin Ophthalmic Solution	TM	.01
	Cheshire Pharmaceutical	Sulfapred Ophthalmic Solution	TM	NS
	CVS	Nasal Spray Pump	PMA	NS
	CVS Revco DS Inc.	12 Hour Decongestant Pump Nasal Spray	PMA	NS
	Dolder Ltd.	Thimerosal (bulk chemical)	TM	100
	Dorex International Corp.	Long Acting Nasal Spray	PMA	.002
	Drug Guild Distributors	Long Acting Nasal Spray Kolex LA	PMA	.002
	DRX Pharmaceutical	Blephamide Ophthalmic Ointment	PMA	NS
	DRX Pharmaceutical	Cortisporin Ophthalmic Suspension	TM	.001
	DRX Pharmaceutical	Neomycin Polymyxin B Sulfates Hydrocortisone Ophthalmic Suspension	TM	NS
	DRX Pharmaceutical	Neomycin Polymyxin B Hydrocortisone Otic Suspension	TM	.01
	DRX Pharmaceutical	Neomycin Polymyxin B Gramicidin Ophthalmic Solution	TM	.01
	DRX Pharmaceutical	Vasocidin Ophthalmic Solution	TM	NS
	DRX Pharmaceutical	Colymycin S Otic Suspension	TM	.002
	DRX Pharmaceutical	Pediotic Otic Suspension	TM	NS
	Dysers Sal	Thimerosal (bulk chemical)	TM	NS
	Family Independent Pharmacy	12 Hour Nasal Decongestant Spray	PMA	NS
	Family Independent Pharmacy	Long Acting Nasal Spray	PMA	NS
	Farm Fresh Inc.	Hemorrhoid Relief Ointment	PMN	.01
	Fays Drug Services	12 Hour Nasal Spray Pump	PMA	NS
	Federated Foods	Long Acting Nasal Spray	PMA	.002
	Fleming Companies	12 Hour Nasal Spray	PMA	.002
	Foxmeyer Drug Co.	Nasal Spray Pump	PMA	NS
	Global Source	Nasin Long Acting Nasal Spray	PMA	NS
	Harco Drug	Mercurochrome Aqueous Solution	MB	2
	Harris-Teeter	Oxymetazoline Nasal Spray	PMA	.002
	Hi Tech Pharmacal Co.	Long Acting Nasal Spray	PMA	.002
	Hudson Corp.	Nasal Spray Extended Relief	PMA	NS

	Hurst Pharmaceutical	Duomycin-HC Otic Suspension	TM	.01
	K and B Distributors	Mercurochrome Aqueous Solution	MB	2
*	King Pharmaceuticals	Cortisporin Ophthalmic Suspension	TM	.001
*	King Pharmaceuticals	Neosporin Ophthalmic Suspension	TM	.001
*	King Pharmaceuticals	Viroptic Ophthalmic Solution	TM	.001
	King Pharmaceuticals	Neomycin Polymyxin B Sulfates Hydrocortisone Otic Suspension	TM	NS
*	King Pharmaceuticals	Pediotic Suspension	TM	.001
*	King Pharmaceuticals	Cortisporin Otic Suspension	TM	.01
	Kinray	Oxymetazoline Nasal Spray	PMA	.002
	Laboratori Derivati	Adrenal Cortex Injection	TM	.01
	Leader	12 Hour Nasal Spray	PMA	NS
	Leader	Nasal Pump Spray	PMA	NS
	Longs Drug Stores	Nasal Spray Pump	PMA	NS
	LS Raw Materials Ltd.	Mercurochrome NF 12 100% (bulk chemical)	MB	100
	Major Pharmaceuticals	Cortomycin Ophthalmic Suspension	TM	NS
	Major Pharmaceuticals	Sulfacetamide Sodium & Prednisolone Sodium Phosphate Ophthalmic Solution	TM	.01
	Major Pharmaceuticals	Cortomycin Otic Suspension	TM	.01
	Major Pharmaceuticals	Neocidin Ophthalmic Solution	TM	.01
	Martin Surgical Supply	Testosterone Injection Suspension 50 mg	TM	.008
	Martin Surgical Supply	Testosterone Injection Suspension 100 mg	TM	NS
	Mays Drug Stores	Hemorrhoid Relief Ointment	PMN	.01
	Medalist Laboratories	Long Lasting Nasal Spray Pump	PMA	NS
	Meyers Supply Inc.	Long Acting Nasal Spray	PMA	.002
	Navresso	Long Acting Nasal Spray	PMA	NS
	Omicron Quimica SA	Thimerosal USP 97% (bulk chemical)	TM	97
	Parade (Grocer's Supply)	Oxymetazoline Nasal Spray	PMA	.002
*	Parkedale Pharmaceuticals	Coly-Mycin S Otic Suspension	TM	.002
	Pay N Save Corp.	Decongestant Nasal Spray	PMA	NS
	Pharmedix	Bleph 10 Ophthalmic Solution 10%	TM	.005
	Pharmedix	Viroptic Ophthalmic Solution 1%	TM	.001
	Pharmedix	Blephamide Ophthalmic Ointment	PMA	NS
	Pharmedix	Triple Antibiotic Ophthalmic Solution	TM	.01
	Pharmedix	Colymycin S Otic Solution	TM	.002
	Pharmedix	Neo Poly with HC Otic Suspension	TM	.01
	Physicians Total Care Inc.	Neomycin Polymyxin B Sulfates Hydrocortisone Ophthalmic Suspension	TM	NS

	Physicians Total Care Inc.	Viroptic Ophthalmic Solution	TM	.001
	Physicians Total Care Inc.	Cortisporin Ophthalmic Suspension	TM	.001
	Physicians Total Care Inc.	Ocufen Ophthalmic Solution	TM	.0005
	Physicians Total Care Inc.	Vasocidin Ophthalmic Solution	TM	NS
	Ping On Ointment Co. Ltd.	Ping On Topical Ointment	Mercury	NS
	Prime Natural Health	12 Hour Nasal Spray	PMA	NS
	Primedics Laboratories	Testerone Injection Suspension 50 mg	TM	.008
	Publix Inc.	Long Acting Nasal Spray	PMA	NS
	Publix Supermarkets	Long Acting Decongestant Nasal Spray	PMA	NS
	Qualitest Pharmaceuticals	Nasal Spray Solution	PMA	NS
	Qualitest Pharmaceuticals	Antibiotic HC Otic Suspension	TM	NS
	RDS Acquisition Corp.	12 Hour Nasal Spray	PMA	NS
	Republic Drug Co.	12 Hour Nasal Spray	PMA	.002
*	Schering-Plough Animal Health	Gentocin Durafilm Ophthalmic Solution (for dogs only)	PMN	.002
	Scrivner, Inc.	Hemorrhoid Relief Ointment	PMN	.01
	Sight Pharmaceuticals	Neomycin Polymyxin B Sulfates Hydrocortisone Otic Suspension	TM	NS
	Sight Pharmaceuticals	Sulfacetamide Sodium & Prednisolone Sodium Phosphate Ophthalmic Solution	TM	.01
	Spectrum Quality Products	Merbromin (bulk chemical)	MB	100
	Spectrum Quality Products	Mercuric Oxide Yellow (bulk chemical)	MOY	100
	Spectrum Quality Products	Thimerosal (bulk chemical)	TM	100
	Spectrum Quality Products	Thimerosal (bulk chemical)	TM	100
	Super Laboratories	Long Acting Nasal Spray	PMA	NS
*	Taro Pharmaceuticals	Taro Nasal Decongestant Spray	PMA	.002
	Teral Laboratories	Oticin HC Otic Suspension	TM	.01
	Thames Pharmacal Co.	12 Hour Nasal Spray	PMA	NS
	Thrifty Payless Inc.	Nasal Spray Pump Formula	PMA	NS
	Thrifty Payless Inc.	Decongestant Nasal Spray Pump	PMA	NS
	United Research Labs	Antibiotic Ear Suspension	TM	.01
	United Research Labs	Neomycin Polymyxin B Sulfates Gramicidin Ophthalmic Solution	TM	.01
	US Ophthalmics	Fluorescein Sodium Ophthalmic Solution	TM	NS
	US Ophthalmics	Sulf-10 Ophthalmic Solution	TM	NS
	US Ophthalmics	Vasocidin Ophthalmic Solution	TM	NS

	US Ophthalmics	Phenylephrine HC1 Ophthalmic Solution 10%	TM	NS
	USCO Logistics	Procofen Ophthalmic Solution	TM	.005
	USCO Logistics	Profenal Ophthalmic Solution	TM	.005
	VEDCO Inc.	Tribiotic Ophthalmic Solution	TM	NS
	Waldbaum Inc.	Hemorrhoidal Ointment	MN	NS
	Weeks and Leo Co. Inc.	Long Acting Nasal Spray Solution	PMA	.002
*	Whilehall-Robins	Dristan 12-Hour Nasal Spray	TM	.002

Date created: August 5, 2003; updated September 14, 2004

Source: FDA website: http://www.fda.gov/cder/fdama/mercury300.htm

[accessed on January 23, 2005]

Kathy L. Madison, Ph.D.
7602 Oakview Lane
Lenexa, Kansas 66216
913-631-8568

March 1, 2006

Honorable Senator Barnett and Committee,

It often happens in medicine, as in other industries, that ideas and practices are grandfathered in. When this occurs those ideas and practices are not subjected to the usual scrutiny that we expect from the industry. And we expect a very high degree of scrutiny in the medical and pharmaceutical industries because we are so vulnerable and so easily injured when mistakes are made.

When mercury was first used in vaccines in the 1930's it was a poorly conceived idea. As a tremendously potent toxin mercury is an antimicrobial and so it was added to vaccines to prevent contamination. And I presume those original users thought that a little bit of this poison would not be too harmful. And in fact since vaccines were such a rare occurrence in a person's life the exposure to mercury from vaccines was not great. (Still not a good idea, but not catastrophic.) Some of you will remember the time before we were aware of the extent of Mercury's toxicity. A few decades ago teachers would pour mercury onto table or desk tops to demonstrate its unique properties, its tremendous viscosity and its beauty. But now that we understand even better how very unique mercury is as the second most toxic substance known to man we are much more cautious about its use. Now a mercury spill in a school would shut down that school and a hazmat team would be called.

Unfortunately our slow learning curve in regards to mercury has lead to practices in several industries that endangers our health, that of our children and that of our wildlife. Mercury contaminates our food supply, our water and the air we breathe. In Texas a recent study demonstrated that proximity to coal burning plants (which release mercury into the air) was correlated to learning disabilities in children. Mercury is an extremely potent neurotoxin. There is no debate about that. Even seemingly small doses of mercury exert a toxic effect. That effect is seen in all living creatures, but is most pronounced in the young who are the most vulnerable in terms of neurological development.

Mercury being used in vaccines in the 1930's was a bad idea. That it is still used in vaccines today is inexcusable. We know it is a potent neurotoxin and we know that even small doses exert an effect. There is no legitimate reason to continue this practice. Continued use may appear to some to protect vaccine makers and may appear to protect vaccine programs. But this apparent protection is illusion and in the meantime we are needlessly and knowingly exposing our most vulnerable citizens to harm.
I will have no confidence in the vaccine program and those who promote it until mercury in banned from all vaccines (including flu). I have a son who is significantly neurologically damaged and I have medical evidence that he has poor biological protection from toxins. Unfortunately he is far from alone in his vulnerability. Neither I, nor my children will submit to vaccines that contain mercury. It is not a needed component of vaccines. It does not make them more effective. But its use does undermine the credibility of those who promote them.

Lead was removed from paint by law.
Asbestos was removed from building materials by law.
Remove mercury from vaccines. There is no justifiable reason not to.

Kathy L Madison

7-65

To Whom it may concern,

My name is Debbie Graves, and I am here today to represent my children. All three have been injured by the mercury in their vaccines. I could tell you all of the horrible details of what that has meant for them, and our family, but you would still not have an accurate picture of how heartbreaking and tragic this has been for us. Even if I were to list all of the awful circumstances, situations and health issues, it would pale in comparison to what it has been like to live through it.

My family is fortunate. We have been able to help our children recover somewhat through different interventions. However, this was very difficult for us, as it is not easy to find treatment for something that the medical community is in denial about.

For the life of me I cannot understand why the government and medical community warn me about eating too much tuna, yet are so willing to inject a small baby with mercury. How many studies do we need to do to come to the conclusion that injecting babies with mercury is stupid??? We already accept that it is a known neurotoxin!

There are a handful of states that have already done what we are asking you to do, remove the mercury! In California the autism rates are beginning to drop.

Please, help make the suffering stop, and limit how much mercury is being pumped into the most precious resource we have…the children.

When people look back in a hundred years at the practice of injecting infants with mercury I believe they will do so in shock! This will be known as one of the biggest mistakes in medicine. It is time to right the wrong! Now is the chance to set this straight and do the right thing. We are calling on you to step up to the plate, today, and protect our children. History will reflect your decision forever. And one day we will all be held accountable for our decision in this matter.

Mark 9:42

And whosoever shall offend one of these little ones that believe in me, it is better for him that a millstone were hanged about his neck, and he were cast into the sea.

I hope you make the right decision. God knows we will not give up and go away until you do.

Thank you for your time,

Debbie Graves

Kansas Association of Osteopathic Medicine
1260 SW Topeka Boulevard
Topeka, Kansas 66612
Phone (785) 234 5563
Fax (785) 234 5564

Statement in Opposition to SB537
Submitted to
Senate Public Health and Welfare Committee
By Charles L. (Chip) Wheelen
March 1, 2006

Disease prevention and wellness promotion are two of the fundamental principles of osteopathic medical practice. The use of effective vaccine products to immunize patients against illness is an essential aspect of disease prevention. For this reason, the KAOM is generally opposed to the provisions of SB537, particularly section two of the bill.

Senate Bill 537 appears to be intended to prevent the use of vaccine products containing preservatives such as thimerosal. There are those who believe that autism may be caused by mercury contained in vaccine products, yet the scientific evidence does not support this hypothesis.

The eighth and final study of this topic by the National Academy of Sciences concludes "that the body of epidemiological evidence favors rejection of a causal relationship between the MMR vaccine and autism." The study "also concludes that the body of epidemiological evidence favors rejection of a causal relationship between thimerosal-containing vaccines and autism." An executive summary of this copyrighted 214 page book may be obtained via the internet at http://fermat.nap.edu/catalog/10997.html. We have provided a copy to your staff for possible reference.

Vaccine products such as the MMR (mumps, measles, rubella) vaccine almost never result in anaphylactic response or other adverse reaction. Administration of such vaccines immunizes the patient against diseases for which there are no cures or effective treatment; diseases that can result in deadly or disabling complications such as pneumonia or encephalitis. Of course pneumonia can be fatal, and encephalitis can result in permanent neurological damage.

We believe that passage of SB537 is unnecessary, and is contrary to the interests of our public health. We respectfully request that you not recommend passage.

Thank you for considering our concerns.

Senate Public Health & Welfare Committee
Date: March 1, 2006
Attachment #8

Kansas Academy Of Family Physicians

7570 W. 21st St. N. Bldg. 1046, Suite C ❖ Wichita, KS 67205 ❖ 316-721-
1-800-658-1749 ❖ Fax 316-721-9044 ❖ kafp@kafponline.org
❖ http://www.kafponline.org ❖

March 1, 2006

To: Senate Public Health & Welfare Committee
From: Joe D. Davison, MD, President
Re: SB 537

Sen. Barnett and Members of the Senate Public Health & Welfare Committee:

Thank you for this opportunity to present our position on Senate Bill 537 on behalf of the Kansas Academy of Family Physicians (KAFP). My name is Joe Davison, MD, and I am the president of KAFP this year. We have over 1,430 members in our organization, including over 850 practicing physicians, 155 resident-physician members, medical student members, and retired members.

SB 537 proposes to prohibit use of all vaccines containing more than trace amounts of thimerosal, effective July 1, 2007, that are given to children younger than 8 years and pregnant women. The bill would expand this prohibition to prohibit even trace amounts, effective July 1, 2008. If it is adopted, the bill would be detrimental to the health of Kansans for these reasons:

1. Contrary to the claims of proponents, no evidence exists that associates thimerosal-containing vaccines with the development of autism and other neurological disorders. The issue of mercury's ill effects on the neurological development of infants is based on studies of methylmercury. Nearly all methylmercury exposures in the US occur through eating fish and shellfish. Several large scientific studies show there is no evidence between autism and the ethylmercury-containing thimerosal in vaccines. This has been confirmed by many major professional medical and public health organizations, and affirmed by the independent Institute of Medicine.

2. It perpetuates misleading information about vaccines. If thimerosal is banned, parents will doubt the safety of vaccines in general, immunization rates would fall, and rates of vaccine-preventable diseases such as measles, whooping cough and Hib bacterial meningitis would rise. Many parents may unknowingly choose to reject vaccines that have never contained thimerosal because they don't understand the issues.

3. It could lead to children going unvaccinated because current US manufacturing capacity cannot produce enough thimerosal-free vaccine each year to vaccine

Kansas Academy Of Family Physicians

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all children. The pediatric influenza deaths during 2003-04 remind us of the dangers that vaccine-preventable diseases still pose to children, and of the need to ensure every child is vaccinated. The one manufacturer producing thimerosal-free influenza vaccine is moving to expand capacity. But a Kansas law to out law thimerosal will not make manufacturing capacity increase fast: it will just mean that vaccine may not be available to vaccinate children here.

4. It would disallow use of current combination vaccines which reduce the number of injections children receive. That would leave physicians to determine which vaccines to postpone, and wonder if parent and child will follow-up for the necessary additional injections. It may result in a drop in rates of childhood vaccinations, unnecessarily endangering the life and health of children.

5. It would add to the complexity of the vaccination process. The number of vaccines given to infants and children has increased from 7 in 1985 to 14 in 2006. With new vaccines being introduced, changes in scheduling, and combination vaccines adding complexity to delivery of vaccinations, providers already have to stay current with the ever-changing nature of immunization. Adding a requirement that we could only use reduced thimerosal or thimerosal-free formulations would add more complexity to no one's benefit.

6. Finally, besides all these reasons, it would also be a more costly alternative for taxpayers. Influenza vaccine without thimerosal is, on average, 25 – 30% higher than products containing thimerosal as a preservative or in trace amounts. For every 100,000 persons enrolled in our state Medicaid program who are vaccinated for influenza, the state would pay an additional $265,000 - $300,000 for thimerosal-free or thimerosal-reduced vaccine. Our state resources are scarce, and using them to unnecessarily purchase thimerosal-free vaccines would also impede our state's ability to purchase other critical vaccines.

For all these reasons, I urge you to oppose this unnecessary and harmful legislation.

Thank you in advance for your serious consideration of this request. As always, I am eager to answer any questions you might have about the importance of this legislation for practicing family physicians.

Sincerely,

Joe D. Davison, MD
President

ANIMAL HEALTH INSTITUTE

Representing manufacturers of animal health products

Alexander S. Mathews
President and CEO

February 24, 2006

The Honorable Jim Barnett
Chairperson, Public Health and Welfare Committee
Room 231-N
300 SW 10th St.
Topeka, Kansas 66612-1563

Re: SB 537

Dear Senator Barnett:

The Animal Health Institute (AHI) wishes to express its opposition to SB 537, an act relating to vaccines administered in Kansas. AHI is the national trade association representing manufacturers of animal health products -- the vaccines, pharmaceuticals, and feed additives that keep pets and livestock healthy and that are used in modern food production. Our members represent approximately 98% of the domestic veterinary biological products market. It is the mission of our members to provide livestock and companion animal owners with safe, effective and innovative medicines needed to protect the health and well-being of animals.

We are concerned that SB 537, if enacted, would endanger the lives of companion animals, horses and livestock in Kansas. It would require the removal of veterinary vaccines from the market in Kansas, leaving animals unprotected against disease and pet owners and livestock producers to deal with the disease, disruption and financial loss.

We offer the following observations:

- Ethyl mercury based preservatives, such as Thimerosal, have a decades-long record of safe use in animals. They are used in the vast majority of veterinary vaccines. There is no evidence that veterinary vaccines using such preservatives have caused any harm to the animals to which they have been administered or to humans.
- Thimerosal-type preservatives are used at very low levels to prevent microbial or fungal growth that could occur with the use of multi-dose vials, which is the most effective way to administer vaccines to many animals in a herd setting. These preservatives are also used to ensure purity in the manufacturing process. Their use is essential to the manufacture of safe, effective and affordable veterinary vaccines.
- Mandating the removal of Thimerosal-type preservatives from veterinary vaccines is unrealistic, impractical and, moreover, unnecessary. It would remove most veterinary

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www.ahi.org

vaccines from the Kansas market, leaving Kansas pet owners, horse owners and livestock producers unable to prevent disease in their animals.

- Any alternative formulation methods would take considerable time to develop and would necessarily increase retail cost of veterinary vaccines. Also, any possible alternatives would likely include use of single dose vials – a solution that would make the vaccination of livestock on a typical Kansas facility a time-consuming and impractical task. There is no reason to impose these costs and place the health of livestock at risk by banning the use of preservatives that have long been used safely and effectively in veterinary medicine.

If you have any questions or need further information, please do not hesitate to contact me.

Sincerely,

Alexander S. Mathews

cc: George Teagarden

P-5

Association of Immunization Program Managers
Council of State and Territorial Epidemiologists • Hepatitis B Foundation
Hepatitis Foundation International • Immunization Action Coalition
Infectious Diseases Society of America • Parents of Kids with Infectious Diseases
Pediatric Infectious Diseases Society • Society of Teachers of Family Medicine
Vaccine Education Center at the Children's Hospital of Philadelphia

Date: February 28, 2006

To: Kansas Public Health and Welfare Committee Members

Subject: Hearing Scheduled for March 2 on SB 537

We, the undersigned organizations, respectfully express our opposition to SB 537 that would restrict the use of vaccines containing thimerosal, a mercury-based preservative. If enacted, we believe SB 537 has the potential to do the following:

1. Perpetuate **false and misleading information that vaccines are not safe.** Parents may see the banning of thimerosal as an admission that vaccine safety oversight is inadequate. The issue of thimerosal's ill effects on the neurologic development of infants is based on studies of methylmercury and not the ethylmercury that is in the preservative thimerosal used in some vaccines. According to the U.S. Environmental Protection Agency, nearly all **methylmercury** exposures in the U.S. occur through eating fish and shellfish. The mercury that is contained in the preservative thimerosal is known as **ethylmercury**. There has been considerable research on this issue since the 1999 precautionary statement of the U.S. Public Health Service (USPHS) and the American Academy of Pediatrics (AAP) and there is **no documented scientific evidence** that ethylmercury in the form of thimerosal in the doses administered in vaccines causes any risk to health.

2. Potentially result in **on-going vaccine shortages** or inability to deliver care as healthcare providers are forced to seek vaccine formulations that are either free of thimerosal or contain only reduced quantities both of which would be in short supply. As an example, only 10% of a projected total of 80 million doses of injectable influenza vaccine was available for the 2005-06 vaccination season in a thimerosal-free formulation. Other vaccines, such as vaccine used to prevent Japanese encephalitis in travelers to certain Asian countries, are not available in reduced thimerosal or thimerosal-free formulations.

3. Limit the nation's **ability to quickly administer influenza vaccine** in the U.S. when a pandemic strikes. Vaccine containing no thimerosal or reduced quantities can be packaged only in single-dose units, and we are far short of the capacity necessary to fill enough single-dose units to quickly respond to a nation in need of immediate protection against influenza at the pandemic level (e.g., Avian flu). The only way we can more quickly build our vaccine delivery capacity is to fill multi-dose vials and these vials must contain a thimerosal-containing preservative.

4. Lead to **increased costs** for vaccines. Where alternative vaccines containing no thimerosal or only reduced quantities are available, they can be as much as 25-30% higher in cost, due to production losses and to single dose packaging. These additional costs will directly impact Medicare, the federal Vaccines for Children Program, state-administered Medicaid programs, as well as private health insurance costs.

5. Add **more complexity** to our present vaccine delivery system. With new vaccines being introduced, changes in vaccination scheduling, and all of the other complexities of vaccination delivery, it is already difficult for providers to stay current with the ever-changing nature of immunization. Adding a requirement that providers can only use vaccines with no or reduced amounts of thimerosal would add more complexity.

6. Profoundly **affect global immunization programs**, as do many vaccine policy decisions made in the U.S. Vaccines sold in the international market require multi-dose packaging because it reduces manufacturing costs significantly, a vital consideration for nations with fewer resources than the U.S. Multidose vials also conserve space in refrigerated containers (vaccines often require refrigeration when shipped to remote areas). The development of a trend in which states adopt policies that restrict access to vaccines could adversely affect the health and well-being of children all over the world in ways that you would not intend. The negative political consequences of the U.S. using vaccines "allegedly safer" than those it supports for other countries are very worrisome.

Vaccine manufacturers have revised their manufacturing processes to allow production of most vaccines in either a reduced thimerosal or thimerosal-free formulation. This was done as a precaution to address theoretical concerns noted in the USPHS/AAP joint request of July, 1999 and **not** because any evidence suggested that thimerosal was harmful.

One fact we know for certain: in the U.S., 10.5 million cases of vaccine-preventable disease and 33,000 deaths are prevented each year by vaccinations. We therefore urge the members of the Kansas legislature to trust in the conclusions of the scientific community, including the Institute of Medicine, that the scientific evidence does not identify any connection between vaccines and autism. Please oppose any legislation that would restrict access to vaccines and help us further our work in protecting our nation's children and adults against vaccine-preventable diseases.

Sincerely,

Dan Hopfensperger, Chair
Association of Immunization Program Managers

C. Mack Sewell, MD, President
Council of State and Territorial Epidemiologists

Molli C. Conti, Vice President of Community Outreach
Hepatitis B Foundation

Thelma King Thiel, Chair and CEO
Hepatitis Foundation International

Deborah L. Wexler, MD, Executive Director
Immunization Action Coalition

Martin J. Blaser, MD, President
Infectious Diseases Society of America

Trish Parnell, Executive Director
Parents of Kids with Infectious Diseases

Joseph W. St. Geme, III, MD, President
Pediatric Infectious Diseases Society

Donald Middleton, MD, Chair
Group on Immunization Education and
William Mygdal, EdD, President
Society of Teachers of Family Medicine

Paul A. Offit, MD, Center Director
Vaccine Education Center
Children's Hospital of Philadelphia

Statement PhRMA

Statement in Opposition to Senate Bill 537
Regarding Restrictions on Ingredients in Drugs

February 27, 2006

Position: PhRMA supports allowing individuals access to all available FDA-approved drugs. We respectfully oppose SB 537, which bans administration of all drugs within Kansas that contain any level of mercury.

Senate Bill 537 would prohibit any drug from being dispensed or administered in the State of Kansas that contains any amount of mercury. PhRMA is concerned that this legislation would be in conflict with federal law. The U.S. Food and Drug Administration (FDA) is considered the gold standard which most countries attempt to emulate in their drug review agencies. If this legislation were to pass, the State of Kansas and not the FDA, becomes the judge and jury of which medications patients should be taking.

Under federal law, the FDA has the authority to review and approve prescription medicines. This includes limitations on formulations of active and inactive ingredients of drug products. This preemption exists in order to give patients in all 50 states the security of one safety standard. Having one agency controlling drug oversight ensures that if it deems any medicine unsafe, it would not allow that medicine to be prescribed or administered to patients. Occasional safety recalls of medicines are good examples of the FDA's authority in these matters. It should be recognized that no medication is risk-free. It is the responsibility of the patient's health care professional to inform the patient of potential side-effects.

The federal preemption provides assurances that there will not be a patchwork of different state requirements that manufacturers have to meet, including varying administrative and manufacturing costs that could potentially escalate and possibly result in higher prices. Moreover, there is no guarantee that a manufacturer of any specific medicine would produce medicines that met state-specific restrictions for Kansas patients when the rest of the United States using the FDA-approved prescription drugs. Hence, Kansas patients could be left without access to important medications or forced to travel out-of-state to obtain needed medicines.

It is for these reasons, we respectfully urge the Legislature to oppose SB 537.

The Pharmaceutical Research and Manufacturers of America (PhRMA) represents the country's leading pharmaceutical research and biotechnology companies, which are devoted to inventing medicines that allow patients to live longer, healthier, and more productive lives. PhRMA members invested an estimated $38.8 billion in 2004 in discovering and developing new medicines. PhRMA companies are leading the way in the search for new cures.

Pharmaceutical Research and Manufacturers of America
1100 Fifteenth Street, NW Washington, DC 20005 (202) 835-3400

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PRESIDENT

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S.B. 537 Concerning public health, relating to vaccinations

Thimerosal Content Prohibitions

Written Testimony

Chairman Barnett and members of the Senate Public Health and Welfare Committee, the Kansas State Nurses Association does not support S.B. 537 which appears to be aimed at reducing the administration of vaccines and or other medications containing thimerosal to children and pregnant women .

In May of 2004 the Immunization Safety Review Committee, within the Institute of Medicine Board on Health Promotion and Disease Prevention released a report[1] indicating that after review of studies and evidenced based research "neither thimerosal-containing vaccines or MMR vaccine are associated with autism." Their conclusions were based on five large epidemiolgoical studies conducted in the United States, the United Kingdom, Denmark and Sweden since 2001 which consistently provided evidence that there was no association between thimerosal-containing vaccines and autism. They also reviewed 14 large epidemiological studies consistently showing no association between the MMR vaccine and autism. The committee also reviewed five studies that reported links between thimerosal and autism and two that indicated a connection between the MMR vaccine and the disorder. However, limitations in how these studies were conducted and how the data were analyzed led the committee to conclude that they did not provide evidence supporting an association between vaccines and autism.

This bill imposes unprecedented "criminal" charges in Section 4. for individuals administering vaccines with this ingredient.

> Sec. 4. A person who knowingly administers a vaccine or other drug in violation of this act is guilty of a class C misdemeanor. Such person may also be civilly liable under the act. Any person awarded damages in a civil action arising from a violation of the act shall be entitled to reimbursement for reasonable attorney fees and court costs.

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[1]Immunization Safety Review Committee, Board on Health Promotion and Disease Prevention, Institute of Medicine, Immunization Safety Review: Vaccines and Autism. (National Academies Press 2004).

Hundreds of Registered Nurses in Kansas administer vaccines everyday to protect citizens from life-threatening diseases. This criminal penalty component of this bill is very concerning. It potentially could have a chilling affect on the willingness of licensed nurses to comply with orders to vaccinate if uncertainly exists about the exact amount of thimerosal contained in the dose to be administered. Additionally, there are many other drugs that contain a mercury derivative preservative that are approved by the FDA and prescribed for patients, that are administered by licensed nurses in nursing homes, and hospitals. Additionally, Section 1 (b) appears very cumbersome and onerous on both the Kansas Department of Health and Environment (and Governor) to make 12 month interval decisions about the "appropriateness of a vaccine", and would present some communication and logistical challenges for health care providers responding to a biological threat warranting mass immunizations.

Licensed health care professionals (nurses, doctors, pharmacists, etc) rely on sound science and follow established standards of care in carrying out their professional responsibilities. The Institute of Medicine (IOM) is a prestigious and well respected entity that provides leadership and guidance on emerging health care issues and attempts to reduce uncertainty about the safety and efficacy of therapies. *The components of new policy contained in S.B. 537 is not supported by the evidence and therefore we ask that you not recommend S.B. 537 favorably for passage.*

Attachment: IOM Press Release dated May 18, 2004 MMR Vaccine and Thimersol-Containing Vaccines are Not Associated with Autism, IOM Report Says

Other References:

WHO, Thiomersal and vaccines: questions and answers, May 2003, available at http://www.who.int/vaccine_safety/topics/thiomersal/questions/en/print.html

CDC, Thimerosal & Vaccines, available at **http://www.cdc.gov/nip/vacsafe/concerns/thimerosal/faqs-thimerosal.htm** 6-7.

AAP What Parents Should Know About Thimerosal, available at http://www.cispimmunize.org/fam/thimerosal.htm

CSM Vaccine safety: The safety of thiomersal (ethylmercury)-containing vaccines(9/23/04) available at http://medicines.mhra.gov.uk/ourwork/monitorsafequalmed/vaccinesafety/thiomersal.htm

EMEA, EMEA Public Statement on Thiomersal In Vaccines For Human Use – Recent Evidence Supports Safety of Thiomersal-Containing Vaccines, March 24, 2004, available at http://www.emea.eu.int/pdfs/human/press/pus/119404en.pdf.

IOM Press Release
Date: May 18, 2004
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FOR IMMEDIATE RELEASE

MMR Vaccine and Thimerosal-Containing Vaccines Are Not Associated With Autism, IOM Report Says

WASHINGTON -- Based on a thorough review of clinical and epidemiological studies, neither the mercury-based vaccine preservative thimerosal nor the measles-mumps-rubella (MMR) vaccine are associated with autism, says a new report from the Institute of Medicine of the National Academies. Furthermore, the hypotheses regarding how the MMR vaccine and thimerosal could trigger autism lack supporting evidence and are theoretical only. Further research to find the cause of autism should be directed toward other lines of inquiry that are supported by current knowledge and evidence and offer more promise for providing an answer, said the committee that wrote the report.

"The overwhelming evidence from several well-designed studies indicates that childhood vaccines are not associated with autism," said committee chair Marie McCormick, Sumner and Esther Feldberg Professor of Maternal and Child Health, Harvard School of Public Health, Boston. "We strongly support ongoing research to discover the cause or causes of this devastating disorder. Resources would be used most effectively if they were directed toward those avenues of inquiry that offer the greatest promise for answers. Without supporting evidence, the vaccine hypothesis does not hold such promise."

The report updates two earlier IOM reports, published in 2001, on possible links between autism and the MMR vaccine and thimerosal. At that time, the committee determined that the evidence did not show an association between the MMR vaccine and autism, but there was not enough evidence to determine whether thimerosal was associated with neurodevelopmental disorders such as autism. Given that mercury is known to have a toxic effect on the nervous system and that prenatal exposures to another form of mercury have been shown to adversely affect early childhood development, the committee concluded in 2001 that it was possible to hypothesize that thimerosal might trigger neurodevelopmental problems. The committee revisited these issues because several studies exploring the epidemiology and biological mechanisms of possible links between vaccines and autism have been undertaken during the past three years.

The committee based its latest conclusions and recommendations on a careful review of the literature it had assessed to develop its previous reports; subsequent studies; and other information provided by researchers, parents, and others. Epidemiological studies that looked at autism rates and exposures to vaccines carried the most weight in the committee's assessment of causality, but it considered other kinds of studies as well.

Five large epidemiological studies conducted in the United States, the United Kingdom, Denmark, and Sweden since 2001 consistently provided evidence that there is no association between thimerosal-containing vaccines and autism. Similarly, 14 large epidemiological studies consistently showed no association between the MMR vaccine and autism. The committee also reviewed five studies that reported links between thimerosal and autism and two that indicated a connection between the MMR vaccine and the disorder. However, limitations in how these studies were conducted and how the data were analyzed led the committee to conclude that they did not provide evidence supporting an association between vaccines and autism.

The committee also reviewed evidence related to possible biological mechanisms by which immunizations might trigger autism. For example, it has been hypothesized that the measles virus in the MMR vaccine might lodge in the intestines and trigger the release of toxins that lead to autism. Another hypothesis suggests that the MMR vaccine might stimulate the release of immune factors that damage the central nervous system, resulting in autism. It also has been suggested that thimerosal may interfere with biochemical systems in the brain, leading to the disorder.

However, no evidence has yet been found that the immune system or its activation play a direct role in causing autism, the report notes. Autism also has never been documented as a consequence of exposure to high doses of mercury. While the committee agreed that the studies exploring these hypotheses raise interesting questions, they do not address the specifics of how autism could result. Therefore, evidence for any biological mechanism linking vaccines with autism can only be considered theoretical.

Autism is not a single condition, but rather a complex set of severe developmental disorders -- also referred to as autistic spectrum disorders -- characterized by sustained impairments in social interaction and communication abilities, as well as restricted or repetitive patterns of behaviors and interests. It is unclear how many cases of autism there are, but two reviews of published studies put the prevalence at one case for every 1,000 children. While some information suggests that autism rates may be rising, it is not clear whether the observed increase is real or due to factors such as heightened awareness of the disorder or the use of a broader diagnostic definition.

Thimerosal is an organic mercury compound that is still used as a preservative in some adult vaccines. It began to be removed from vaccines for children in 1999, and as of mid-2000, vaccines that are recommended for universal use in infants and young children are available in forms that have no or only trace amounts of thimerosal.

This study is the eighth and final in a series on vaccine safety sponsored by the Centers for Disease Control and Prevention and the National Institute of Allergy and Infectious Diseases. The Institute of Medicine is a private, nonprofit institution that provides health policy advice under a congressional charter granted to the National Academy of Sciences. A committee roster follows.

Pre-publication copies of Immunization Safety Review: Vaccines and Autism are available from the National Academies Press; tel. 202-334-3313 or 1-800-624-6242 or on the Internet at http://www.nap.edu. Reporters may obtain a copy from the Office of News and Public Information (contacts listed above).

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