

# CONSUMER CHOICE AND IMPLEMENTING FULL DISCLOSURE IN DENTISTRY

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## HEARING

BEFORE THE  
SUBCOMMITTEE ON HUMAN RIGHTS AND  
WELLNESS

OF THE

COMMITTEE ON  
GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

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## CONTENTS

---

	Page
Hearing held on May 8, 2003 .....	1
Statement of:	
Lorscheider, Fritz, professor emeritus, medical physiology and biophysics, University of Calgary; Boyd E. Haley, professor and chair, department of chemistry, University of Kentucky; Maths Berlin, professor emeritus, environmental medicine, University of Lund, Sweden, and past chair, international project of chemical safety, World Health Organization; and Fred Eichmiller, director, American Dental Association Health Foundation, Paffenbarger Research Center, National Bureau of Standards and Technology .....	5
Michaud, Hon. Mike, a Representative in Congress from the State of Maine; Chester Yokoyama, D.D.S., member, Dental Board of California; Sandra Duffy, esquire, founding member, Consumers for Dental Choice Northwest; and Emmitt Carlton, immediate past president, Alexandria, VA Chapter, National Association for the Advancement of Colored People .....	114
Letters, statements, etc., submitted for the record by:	
Berlin, Maths, professor emeritus, environmental medicine, University of Lund, Sweden, and past chair, international project of chemical safety, World Health Organization, information concerning an updated risk analysis .....	77
Carlton, Emmitt, immediate past president, Alexandria, VA Chapter, National Association for the Advancement of Colored People, prepared statement of .....	160
Duffy, Sandra, esquire, founding member, Consumers for Dental Choice Northwest, prepared statement of .....	132
Eichmiller, Fred, director, American Dental Association Health Foundation, Paffenbarger Research Center, National Bureau of Standards and Technology:	
Consumer choice brochures .....	46
Prepared statement of .....	51
Haley, Boyd E., professor and chair, department of chemistry, University of Kentucky, prepared statement of .....	14
Michaud, Hon. Mike, a Representative in Congress from the State of Maine, prepared statement of .....	117
Yokoyama, Chester, D.D.S., member, Dental Board of California, prepared statement of .....	125



## CONSUMER CHOICE AND IMPLEMENTING FULL DISCLOSURE IN DENTISTRY

THURSDAY, MAY 8, 2003

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON HUMAN RIGHTS AND WELLNESS,  
COMMITTEE ON GOVERNMENT REFORM,  
*Washington, DC.*

The subcommittee met, pursuant to notice, at 2:16 p.m., in room 2154, Rayburn House Office Building, Hon. Dan Burton (chairman of the subcommittee) presiding.

Present: Representatives Burton, Cannon, Watson, and Cummings.

Staff present: Mark Walker, chief of staff; Mindi Walker, legislative aide and clerk; Nick Mutton, press secretary; John Rowe, professional staff member; Tony Haywood, minority counsel; and Teresa Coufal, minority assistant clerk.

Mr. BURTON. The Subcommittee on Wellness and Human Rights will come to order. A quorum being present, we will start the meeting.

I ask unanimous consent that all Members' and witnesses' written and opening statements be included in the record. Without objection, so ordered.

I ask unanimous consent that all articles, exhibits, and extraneous or tabular material referred to be included in the record. Without objection, so ordered.

In the event of other Members attending the hearing, I ask unanimous consent—we may have other members who would like to serve as ex officio members of the subcommittee today, and if they come and would like to participate, we will allow them to do so. Without objection, so ordered.

Let me start off by saying that we began an investigation of mercury in medical and dental devices in 1999. Our early activities focused primarily on Thimerosal in childhood vaccines, and we quickly recognized a no-win situation for many children and their families.

The government mandates that all children be sent to school. The government mandates that all children get a series of vaccinations before they go to school, but sometimes things go awry when conscientious families follow these government mandates.

For far too many years, mercury has been used as a preservative in almost all childhood vaccinations. As the mandatory number of shots that children had to get before they could attend school increased, more and more mercury got pumped into their little bodies in shot after shot.

For an alarming number of children, the consequences were tragic. Many kids, including my grandson Christian, got many times the supposedly safe dosage of mercury that adults can tolerate from their shots. As a result, Christian became profoundly autistic almost overnight. Unfortunately, the tragedy that struck my own family has been repeated over and over again throughout the United States.

Sadly, autism has become an epidemic of outrageous proportions; 1 child in 10,000 in the United States used to be autistic, and now it is as many as 1 out of 250 and in some areas of the country it is 1 out of 150. So it is an absolute epidemic.

This epidemic is continuing to worsen at an alarming rate, growing by as much as between 10 and 17 percent each year. What did our Federal health agencies do while the autism epidemic spun out of control? They delayed, denied, and alibied.

Specious arguments were thrown up about safe levels of mercury that people should be able to tolerate. Silly mathematics were used to claim that somehow the mercury in a shot is mysteriously absorbed by the body over an extended period of time, such as 180 days, so that the theoretically daily safe dosage would not be violated.

For years, groups that should have been safeguarding our children kept chanting the refrain that there is insufficient evidence to establish a causal relationship and there is insufficient evidence to disprove a causal relationship. "We need to study it. Send us more money." And they studied it on and on and on, and the kids continued to become sicker and sicker and have neurological problems.

There was argument after argument about ethyl mercury versus methyl mercury versus elemental mercury, but all of that was bogus. There are different routes by which mercury gets into the human body. There are different rates of absorption, but all of it accumulates to some extent, and all of it hurts us, and, worst of all, it really hurts the kids.

Just last week, when talking to a group of congressional aides in the Dirksen Senate Office Building, noted pediatrician Dr. Kathleen Shay said, "All forms of mercury are toxic. It is a poison in all of its forms. There is no good mercury." Most profoundly of all, Dr. Shay emphasized that mercury damage lasts a lifetime, and she stated, "You can't take a pill to fix it."

Just last Saturday, in Chicago, Dr. Mark Geier, M.D., Ph.D., and Dr. David Geier announced the results of a search of about 1,500 articles, not 10 or 15, but 1,500 articles on the adverse effects of Thimerosal in various medical products. Their conclusion was that a causal relationship exists between mercury from Thimerosal in childhood vaccinations and neuro-developmental disorders. Our Federal health agencies haven't been able to find a causal relationship, but the Geiers found 1,500 articles that discussed the exact kind of relationship that exists.

Dr. Boyd Haley, who is here to testify today, also was in Chicago last Saturday, and he delivered a well-researched science-based paper laced with common sense in discussing the sources of heavy metal poisoning that lead to autism and Alzheimer's disease, and he stated, "The ones that stood out were mercury from dental

amalgams and vaccinations where Thimerosal was used as a preservative.”

Dr. Haley mentioned dental amalgams, and that brings us to today’s subcommittee hearing. Last fall, we expanded our investigation to include the mercury-containing dental filling material called amalgam. Although those fillings typically were called “silver” because of their color, in actuality, they contain 50 percent or more mercury by weight.

In an attempt to lay a solid foundation of fact, we held a hearing on November 14, 2002 entitled, “Mercury in Dental Amalgams: An Examination of the Science.” A panel of distinguished scientists and researchers, including Dr. Haley, made a good-faith effort to do exactly that, discuss the science, and we learned a great deal from them.

A representative of the American Dental Association and representatives of two Federal health agencies also appeared before the committee, but they seemed more inclined to share anecdotal evidence rather than solid science. Amazingly, none of those three individuals was aware of a single study, they didn’t know of a single study that contradicted their oft-repeated refrain that mercury-containing amalgams are safe and effective. They had heard of no study that pointed to health problems, not even one.

But today you will hear a different story and testimony from Dr. Maths Berlin from Sweden. Dr. Berlin is a former Chair of the World Health Organization’s International Project on Chemical Safety. So he is not some schlock that we brought in here. He knows what he is talking about.

He and his colleagues in Sweden identified 936 scientific papers that dealt with the health implications of amalgam. They found that over 700 of those studies were credible. Now our health agencies can’t find one. He found over 700.

But, as a result, as recently as last week, on April 28th to be exact, the ADA hand-delivered a letter to every Member of Congress that said, “Amalgam has been the subject of numerous rigorous scientific studies and none has revealed any credible evidence that dental amalgams are unsafe.”

Later on in the questioning, I want to show you some of the things that they have put out that show how to dispose of amalgams because they are not safe. I don’t understand that, but we will get to that later.

Swedish scientists know about hundreds of such studies, but the American Dental Association, that represents over 147,000 American dentists doesn’t know about a single one. Apparently, scientists at the FDA and NIH don’t know about one either.

Does something sound familiar here? Our health agencies can’t make the connection between Thimerosal and autism, but the Geiers found 1,500 articles on the adverse effects of Thimerosal.

I will finish my statement and then we will recess. Five votes? Well, I will finish my statement, and then you folks can have a cup of coffee before we get back because it is going to take us about 30 or 40 minutes before we get back here.

Our Federal health agencies can’t make the connection between mercury and dental amalgams and any adverse health events, but Swedish scientists found over 700 credible articles. I hope everyone

charged with safeguarding the health of the American people is listening.

As chairman of this subcommittee, you need to know that we are not going to go away. This subcommittee is not going to leave, and these issues are not going to go away, at least not until they are thoroughly discussed and dealt with by the appropriate government institutions.

We are going to have another science-based discussion today with world-class researchers. We will delve into whether the ADA believes in full disclosure and truth in labeling or whether those who accuse them of imposing a gag rule that inhibits open discussions with patients about mercury are correct.

We will hear about another no-win situation facing many American children from economically disadvantaged families. With very few exceptions, government health programs will only pay for mercury-containing amalgam fillings. If indigent families want to get their teeth fixed, they will get mercury put into their mouths.

In closing, I would like to quote from Dr. Charles V. Chapin, who lived from 1856 to 1948 and was Harvard-educated and renowned for his work in Providence, RI. Many consider him to be the godfather of the public health movement.

When discussing the need to abandon old ways and old ideas of doing things and to embrace the new, he easily could have been talking about the objectives of this hearing when he said, "Science can never be a closed book. It is like a tree, ever reaching new heights. Occasionally, the lower branches no longer giving nourishment to the tree slough off. We should not be ashamed to change our methods. Rather, we should be ashamed never to do so."

So I would just like to say, while we take this little break, to my friends at the health agencies, there are 1,500 articles that we know of that talk about the threat to human beings from amalgams and mercury in dental fillings. The scientists from Sweden found 700 articles that are credible, and I cannot figure out why our health agencies can't find one, and we will put that question to them when we return.

So we will stand in recess for probably about 25 or 30 minutes. I apologize for the delay, but the work of government has to go on the floor, and I will be back in a little bit. We stand in recess.

[Recess.]

Mr. BURTON. First of all, I want to apologize for being gone so long.

Hey, there's my dentist back there. How are you?

First of all, I am sorry we took so long. Unfortunately, we had no control over that.

We will go ahead and bring the first panel up. When Representative Watson comes back or Representative Cannon, we will let them make some brief opening remarks, if they choose to do so. But, in the interim, so we can go ahead and expedite this thing, why don't we bring Dr. Lorscheider, Dr. Haley, Dr. Berlin, and Dr. Eichmiller before the committee. I will swear you in, and then when they return, we will get on with that.

[Witnesses sworn.]

Mr. BURTON. Have a seat.



I think while we are waiting, if you would like, we will go ahead and start the testimony with Dr. Lorscheider because I know it has been a long day and I don't want to keep you here an unnecessary length of time.

Dr. Lorscheider.

**STATEMENTS OF FRITZ LORSCHIEDER, PROFESSOR EMERITUS, MEDICAL PHYSIOLOGY AND BIOPHYSICS, UNIVERSITY OF CALGARY; BOYD E. HALEY, PROFESSOR AND CHAIR, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF KENTUCKY; MATHS BERLIN, PROFESSOR EMERITUS, ENVIRONMENTAL MEDICINE, UNIVERSITY OF LUND, SWEDEN, AND PAST CHAIR, INTERNATIONAL PROJECT OF CHEMICAL SAFETY, WORLD HEALTH ORGANIZATION; AND FRED EICHMILLER, DIRECTOR, AMERICAN DENTAL ASSOCIATION HEALTH FOUNDATION, PAFFENBARGER RESEARCH CENTER, NATIONAL BUREAU OF STANDARDS AND TECHNOLOGY**

Mr. LORSCHIEDER. Thank you, Mr. Chairman.

Beginning 1985, a number of published papers from my laboratory, and subsequent papers from laboratories of other medical scientists have focused on the metabolism, toxicology, and pathophysiology of mercury with specific reference as a component of dental amalgam tooth fillings.

These papers have employed human clinical studies, also experimental animal models, and in some cases cell culture systems. Numerous peer-reviewed publications have unequivocally concluded and established that amalgam mercury is continuously released as vapor into the mouth. It is then inhaled, absorbed into both adult and fetal body tissues, oxidized to ionic mercury, and, finally, covalently bound to cell proteins.

So we do understand the body uptake, the tissue distribution, and excretion of amalgam mercury in some detail, and, indeed, these various routes and pathways for amalgam mercury are significant. Research evidence does not support the notion of amalgam safety because both organ system and cell function, as I am going to show you, are altered due to this mercury exposure.

An extensive review of the relevant literature is contained in the attached invited review which I have submitted to the subcommittee. This is a commissioned, invited review by the editors of the FASEB Journal. That is the Federation of American Societies for Experimental Biology here in Bethesda, MD.

Beginning in 1995, several laboratories, including my own, began to focus on brain concentration of mercury, including amalgam mercury, and the effects on both neuronal function in experimental models and also neural behavioral effects in humans in both biochemical evidence and whole mammalian brain and, more recently, as I am going to show you, visual evidence with neuron cell cultures clearly demonstrate the molecular mechanisms whereby very ultra, low levels of mercury exposure will initiate neuronal degeneration.

If we could have the film now, please?

[Video shown.]

Mr. LORSCHIEDER. Just a couple of concluding comments regarding this film. I think it should be pretty evident that medicine

clearly does now understand how mercury exerts its toxic effect on neural cell membranes.

The video film that has been displayed here, the amounts of mercury that were used in these experiments are approximately 1 million times less than the average daily dose of mercury absorbed due to dental amalgam mercury exposure, and also more than a million times less than four vaccine shots containing Thimerosal. So we are talking in order of magnitude here of 10 to the minus 6 less mercury concentration than what the average daily dose of an amalgam is.

My final comment about this film is that this film is an integral component of the data of a paper that we published in a British journal, *Neural Report*, in the year 2001. Consequently, this is another refereed paper. This paper was adjudicated by Oxford and Cambridge neuroscientists. The data was also presented for the first time at the University of Oxford, and the contents of that film received the same peer adjudication as did this paper, and I have provided a copy of this paper for the committee.

Thank you very much.

Mr. BURTON. Well, we appreciate that very much, Doctor, and we have shown that film a number of times. If only people would pay attention, but, unfortunately, we haven't broken through that thick cranium that exists over at our health agencies.

Ms. Watson would like to make a couple of opening comments, and then we will go to you, Dr. Haley.

Ms. WATSON. Thank you, Mr. Chairman. I would like to commend you for your leadership and hard work on this important issue.

Last Congress you joined with me and co-authored H.R. 4163, the Mercury in Dental Filling Disclosure and Prohibition Act. It is a true testimony to your dedication and concern for the public's well-being.

In the 108th Congress, we have not only reintroduced our bill, recently numbered H.R. 1680, but now serve as the chairman and ranking member, respectively, on a subcommittee that addresses human rights and health issues.

Mr. Chairman, you have set the tone for this subcommittee, garnering not only bipartisan support, but tripartisan support in the first human rights and wellness hearing regarding drug reimportation. I look forward to serving on this subcommittee under your leadership.

I would like to thank our panelists for taking the time to share important information with us today. I appreciate that each one of you has traveled to Washington from many different areas of the United States, but I must give a special thank you to Dr. Berlin for his journey all the way here from Sweden.

As the former Chair of the California Senate Health and Human Services Committee for 17 years, I received constant testimony as to the status of the health of Californians, especially the lower socioeconomic sector of our population there. One issue that stood above others was the use of mercury in dental fillings.

Dentists have stood behind a long history of utilizing mercury. However, a long history of use is no excuse. Mercury in any form is as much of a health risk as lead paint and asbestos.

Mercury is being taken out of other health care products, including disinfectants, thermometers, childhood vaccines, and even horse medicine. Mercury is a highly neurotoxic substance that has genetic effects on biological organisms, as you just saw.

Mercury must be removed from the last known use in the human body. Now it is hoped that this hearing will focus primarily upon new information relating to possible health implications of mercury in the human body, and upon disclosing adequate information to patients, to enable them to make informed choices about the type of dental restorative material that is used in their mouths.

The science presented by Dr. Lorscheider—I hope I pronounced that right—and Dr. Haley and Dr. Berlin is important information that should be highlighted in the public domain. Dr. Berlin will present, I guess already has, a conclusion from his research that states, with reference to the fact that mercury is a multipotent toxic with effects on several levels of the biochemical dynamics of the cell; amalgam must be considered to be an unsuitable material for dental restoration. This is especially true since fully adequate and less-toxic alternatives are, indeed, available.

The American public has the right to know. Consumers are often given disinformation instead of information. To hide the fact that mercury is the major component of amalgam, the ADA promotes the fillings as silver. I find that most consumers do not know amalgams contain mercury. We are keeping the information away from them.

States are trying to address this problem with statutes, but dental boards and other regulators are not implementing these laws. Proposition 65 in California adopted in 1986 took 17 years to apply to dental offices. Finally, in December 2002, dentists received a mandate from the court instructing them to post signs that warn that mercury fillings may cause birth defects and other reproductive harm.

In 1992, I wrote a law, section 1648.10 of the California State Business and Professions Code, that mandated a fact sheet be produced by the California State Dental Board stating the risks and efficacies of dental materials. Over the next 9 years, the board did not comply. I am pleased to report that, when Governor Davis got in office, he installed a new California Dental Board, and one of those board members is here today.

The new board held hearings on the safety of mercury fillings in 2002, but has, again, bogged down as the California Dental Association argues against effective disclosure of risk. You know, I would think that dentists would want to opt on the side of reducing risk, not preaching about assessability. If we know a toxic is being used, how could a medical professional not want to tell his or her patients?

So I applaud the efforts of Representative Mike Michaud in Maine to produce a fact sheet, and I appreciate the testimony of Dr. Chet Yokoyama, a mercury-free dentist and a member of the California Dental Board, because the public has a right to be informed and to make an informed choice.

Regrettably, the American Dental Association has the provision in its Code of Ethics to stop dentists from initiating communications with patients about the risk of mercury dental filling. If there

is anyone here from the ADA, I wish you would meet me outside and explain to me why that provision is in your Code of Ethics.

This gag rule has, unfortunately, been enforced by many dentist-dominated State dental boards. I am happy to report that the attorneys general of Iowa, Oregon, and Minnesota have directed that the ADA gag order may not be enforced in their States.

The dental board in my home State of California repealed its gag rule in 1999. Now it is time for the American Dental Association to stop preventing dentists from disclosing to patients the risk about amalgam, and it is time for every State dental board to stop enforcing this gag rule. Oregon attorney Sandra Duffy I hope will provide the insight into the ramifications of the gag rule.

Increased attention to mercury risk is apparent around the Nation, and I am pleased to inform you that the National Convention of the NAACP endorsed H.R. 4163. Also, the National Black Caucus of State Legislators has called for legislation to protect children and pregnant women from mercury dental fillings.

At the low and moderate end of the economic spectrum, no choice exists. Upper-income consumers are increasingly choosing non-toxic alternatives, and low-income families are generally forced to choose mercury fillings or no fillings at all. Alternatives to mercury-based dental fillings exist. Porcelain and resin fillings, for example, but many publicly and privately financed health plans do not allow consumers to choose alternatives to mercury amalgam fillings.

Medicaid should pay for the alternative and not pay for a substance that contains the toxic mercury. At the moment, two States are trying to change the Medicaid system through legislation, California Assemblyman Jerome Horton and Arizona Representative Carol Johnson, and they are both from different parties. Both bills have strong community support.

Emmitt Carlton, the immediate past president of the NAACP, Alexandria, VA chapter, is here to provide a perspective on choice.

So, Mr. Chairman, I look forward to the testimony of the ADA and everyone on the panel today, and I am pleased to have the opportunity to be able to hear scientific and regulatory testimony on this issue. So, again, I thank you for your leadership and your hard work, and I yield back my time, Mr. Chairman.

Mr. BURTON. Well, we will keep working until we get the facts out and the American people do know all the nuances of this issue.

Next, we will hear from Dr. Boyd Haley. He has become a friend of mine over the years. Dr. Haley, he is a professor and Chair of the Department of Chemistry at the University of Kentucky, and he will advance our science-based information on this important topic. He will show a PowerPoint presentation with us, is that right?

Mr. HALEY. I would welcome the appointment of a blue ribbon biomedical science committee to look at the information and the science that has been presented to this committee. I am very confident of what I say, and I think if anybody looks at the science, that they will dispel right away the attitude that there is no science backing up the toxicity of amalgam fillings. It is incredible that statement would be made.

What I am going to do today is address the synergistic effects of other heavy metals on mercury toxicity. I think this is something

that appears to have been ignored primarily not in the literature, but in addressing the level of toxicity of mercury and the fact that you can't say what level of mercury is toxic, if you don't know the level of lead in a person.

Now could I have the first slide? This slide here is an old slide, 1978. What it says in there is that the administration of essentially no response level, an LD1 of mercury solution, along with one-twentieth of an LD level of lead salt killed all the animals in this study. It was a rat study.

What this is telling you, that it should have been one plus only zero, equaling one. Instead, when you mix lead and mercury exposure, you get a dramatic enhancement of the toxicity of the mercury. This is what we are going to talk about. This is not a new phenomena. This has been known for many, many years.

They made a conclusion that the combination of synergism was most toxic when the member was present and near its LD1 dose. You get a tremendous—and I will give you examples of this in some of the later slides.

Can I have the next slide? The next slide is just something to say that it is not just one paper that said this. I have several papers. Again, they were 1973 and 1972. Why this has been ignored when we are discussing the medical effects of mercury from dental amalgams, because if you remember the newspaper articles just recently, they are showing that very, very low levels of lead previously considered non-toxic are injuring the IQ or the learning ability of children. I would submit to you that most likely what they are not looking at is the level of mercury with the level of lead that is in these children.

Could I have the next slide? This is a study that is coming out in the International Journal of Toxicology, and it concerns the mercury level in the birth hair of autistic versus control children. On the top slide, the top line—it is not going to show up this far away—on the top line you see going up, that is a plot of the increase in mercury in the birth hair versus the number of amalgam fillings in the birth mother. In control children, it increases, and when you get above 10, it goes up quite high.

If you look at the autistic children—they are on the bottom line—there is absolutely no change in the mercury in their birth hair. They do not excrete the mercury. The easiest explanation for this is that they retain it in their bodies, and that is based on the data by a lot of other people that, if you challenge them with a mercury challenge test, that they contain hundreds of times more heavy metals in their body than do control children. So they do not handle the exposure to mercury that is from Thimerosal nearly as well or from amalgam fillings that their mother has as do control children.

So this identifies a subset of the population that exists that cannot excrete chronic, low-level doses of mercury. It builds up in their body, and if they are a child, it probably enhances their chances of becoming autistic.

Could I have the next slide? If we look at the level, on the far left, those are children who have mild autism; in the center it is moderate, and then to the right it is severe. The green represents

the males, and you realize that they are the preponderance of the patients, the subjects. The black are the females.

What you see is that, as the severity of disease increases, the level of mercury in the birth hair decreases. I have done some research, not my research but literature research, and you find the same phenomena in Alzheimer's disease, in that Alzheimer's nail tissue, fingernail tissue, has less mercury in it than does that of age-matched controls. As the severity of the disease increases over a period of time, the level of mercury drops. So they represent also another group of people that appear to have lost the ability to excrete mercury, because if you can't excrete it, it doesn't get into the blood. If it doesn't get into the blood, it doesn't get into the hair, the nails, the feces, or the urine.

So we have to look at this. This is a good lead, I think, on the causation of a lot of these diseases.

Could I have the next slide? This is an example of the synergism with regard to Thimerosal with neurons in culture. If we see at the top, we can keep neurons alive with very little death rate for about 24 hours. You will see the one slide there in the center where it says, "50 nanomole" or 50 times 10 to the minus ninth lower levels of Thimerosal.

A vaccine contains 125,000 nanomole levels of Thimerosal. When we add to that, if you look where we have the red, I will just talk about a couple of them. If we add aluminum alone, it is only slightly toxic, and the Thimerosal at this time has killed less than 5 percent of the neurons. But if we mix those two together, we end up at the same time point killing 60 percent of the neurons. So the aluminum in the vaccine along with the Thimerosal has a synergistic effect on Thimerosal toxicity causing it to be much more toxic.

The second part that I want to talk about is the effect of testosterone. There was a study done in England where they found that in the amniotic fluid of mothers that gave birth to autistic children, they had one aberrancy, and that aberrancy was they had exceptionally high levels of testosterone, meaning the children, when they were born, were probably carrying high levels of testosterone or higher than the normal children.

When we added testosterone along with the Thimerosal in this culture, all the neurons were dead within 3 hours. Nothing else did this. This is a tremendous enhancement of the toxicity of Thimerosal by testosterone, and this probably explains why boys are 5 times or 4 times more likely to get this disease and why they are probably 10 times more likely to have severe cases of autism. It depends upon the level of the male hormone in their body, and that is a genetic factor that none of us have control over.

I think this is a perfect example of the synergism and why we cannot say what is a safe level of mercury. Aluminum, testosterone, and I would also point out antibiotics have the same effect, certain antibiotics.

Could I have the next slide? I am trying to get through something that is rather complex. Dr. Lorscheider presented his film, and this is a technology that most of you won't know about called photo affinity labeling that I invented when I was a post-doc at Yale. But you can see the sign that says, "beta-tubulin." That big,

black spot there tells you that tubulin is very viable. It is alive and working well in this brain tissue.

When you add Thimerosal, especially Thimerosal that has been exposed to UV light to enhance the breakdown to ethyl mercury, you see you totally wipe out its ability to interact with the probes it has to interact with to polymerize. This fits into exactly what we see with mercury. We get the same effect, and this is more complex than that, but I think it points out that mercury from dental amalgams and mercury from Thimerosal both affect the same protein that you saw cause the complete disassembly of the axons in Dr. Lorscheider's film.

Could I have the next slide? This is the effect we see with mercury in Alzheimer's or control brain. On the left two panels you see two AD subjects, and you see that the tubulin—it is kind of hard to see from this distance, but there is no photo labeling of tubulin. When you get to where that red arrow is on the right hand side, you see the two controls at the zero level. The tubulin is there; it is very viable. When you add a little bit of mercury to it, to the control brain, you make it have the same photo labeling profile as the Alzheimer's-diseased brain.

I think that, at the very least, anyone looking at this data would assume that having 50 years of a lot of mercury circulating in your blood from your amalgams would make you cross that thin red line into Alzheimer's disease quicker because mercury affects the same protein that is dramatically affected in Alzheimer's disease.

There is more than one protein like that, and it is very simple biochemistry to explain to someone that understands protein chemistry. That is the reason I would like to have a blue panel or biomedical group look at it instead of Congressmen.

Could I have the next slide, please? There is something unique about mercury that scientists, even a lot of scientists were shocked by this, and even I was also. You cannot prevent mercury toxicity by chelating it with normal compounds that exist in the body or that are made to protect people from heavy metal toxicity.

This is an audioradiograph where we have tried to chelate the toxicity of a lot of the metals away with the compound called ethylene diamine tetra-acidic acid [EDTA]. EDTA prevented the toxicity of all the heavy metals, and I would point so will citrate, so will glutamate, so will silver or other chelators. However, all of those chelators enhance the toxicity of mercury. They do not prevent it.

So mercury is unique that, when it gets into your brain with a lot of chelators that would be there naturally to protect you from heavy metal toxicity, it does not work with mercury. It is singularly exceptional in that aspect, and we published this back in 1988.

Could I have the next slide? There is this question: Is mercury released from dental amalgams? I think this is something that is absolutely absurd that we would be discussing this today because it is very simple to measure mercury coming off of a rock, and that is what we talked about the last time.

In this particular study, it was done at the University of Singapore, and that is the reason I think this is unique. They showed that this one form of amalgam—and it is high in mercury; it has got 66 percent mercury instead of 50 percent—that it released it at 43 micrograms per centimeter squared per day. But what both-

ered me, that this had to be done at the University of Singapore, that it wasn't done at a U.S. university or at the NIH.

We have repeated the study using the same technique that these people used on dispersal alloy, which is the normal one. While it is not this high, it is definitely much higher than what the ADA spokesmen say comes off of an amalgam. If you brush 30 seconds twice a day with a toothbrush, the level went up over ten-fold. So brushing amalgams causes a dramatic increase in the amount of mercury that is released.

Further, the study by NIH on 1,127 American military personnel, they showed that people with increasing number of amalgams had the increasing amount of mercury body burden. So we are not getting mercury in our bodies primarily from eating fish or breathing the air. It is coming primarily from amalgam fillings, in much of the population at least.

Could I have the next slide? Are amalgams toxic? If you take an amalgam made outside the mouth and drop it in a mil of water and you soak it for various periods of time, you take a sample of that, and if you add the same tests that we have been doing now or were reported earlier, you get the same effect. Within 1 or 2 hours, that solution of water will be toxic, and you can't tell the difference between adding it and adding a solution of mercury to a control brain. It inhibits the same protein that is primarily inhibited in Alzheimer's disease. So I can't believe that anybody would say amalgams are not toxic. This is backed up by other data.

Could I have the next slide? This is a report that described amalgam dispersal alloy. It was severely cytotoxic initially when Zinc released was greatest, but was less toxic when the Zinc came out. I would point out that Zinc is a trace element in amalgam fillings.

Zinc is something that cells need to live, and why they would tie this onto Zinc, you know, is kind of unusual to me, why they didn't talk about the mercury levels in these studies. We will address that in the next slide.

At the bottom you can see that another thing supporting the amalgam removal is it decreases the mercury body burden of mercury, the amount of mercury that is circulating in the blood.

In this study, we are looking again at the effect of mercury on the tubulin, the same protein that Dr. Lorscheider showed was disrupted. Using our technology, you can see the top line is Zinc. You have to go to high concentrations of Zinc to see any kind of effect.

The second line is mercury alone. But if you take the two levels of Zinc and mercury, where we see less than 5 percent and less than 6 percent, if you put them together, you see over 70 percent inhibition of the tubulin. That is the synergistic toxicity, and that is the reason why in that earlier study they said it was most toxic when Zinc release was greater. The Zinc potentiates the toxicity synergistically of mercury that is coming out of the same amalgam, because Zinc alone is not toxic to cells. Cells absolutely need Zinc, unless you go to high, really high concentrations. You will notice these concentrations aren't very high.

Could I have the next slide? This is something that I think that I can't imagine why Congress ignores this, but this was reported in the Journal of American College of Cardiology, and it showed that children that die with idiopathic dilated cardiomyopathy have



23,000 times more mercury in their heart tissue than do people who die of other forms of cardiac arrest.

Most of these people, some of them have died in southern Indiana. One of them was a young man that was in a high school basketball tourney that was coming to UK to play basketball.

How do you account for that much mercury? I would submit that people in the inner city and people in southern Indiana don't eat a lot of shark. So you have to at least ask the question, where did the mercury come from and why is it building up in these children, and why specifically these children?

It points out that, while many of us can have amalgam fillings and live for a long time and not have any problems, there is a subset of the population, and maybe several subsets, that cannot handle exposure to this. That is reason enough to get rid of them.

Could I have the next slide? These are just the conclusions, and you can read them as well as I can. But what I would point out is the take-home lesson: One, there is a subset of the population that appears unable to excrete mercury. This can be due to several things. It can be a genetic susceptibility. It can be the fact that they are exposed to other heavy metals that prevent this. It could be a fact that they may be exposed to antibiotics or pesticides or something else that prevents them from excreting the mercury properly.

We don't have to know exactly what it is. We can investigate and find out, but it says you can't say what is safe with regard to mercury, and the thing to do is just to try and decrease all exposures to this material.

I think that is probably the end of it. Having an appreciation for the synergism is something I would like to emphasize today.

[The prepared statement of Mr. Haley follows:]

SYNERGISTIC EFFECTS OF HEAVY METALS  
IS QUITE COMPLEX AND CAN GREATLY  
ENHANCE TOXICITY OF MERCURY

Shubert et al. Combined Effects in Toxicology--A Rapid systematic Testing Procedure:Cadmium, Mercury & Lead. J. of Toxicology & Environmental Health 4:763, 1978.

1. “the administration of an essentially no response level (LD1) of a mercury salt together with a 1/20 of the LD1 of a lead salt killed all of the animals.”
2. “Generally, a combination was synergistic when the most toxic member was present at or near its LD1 dose in the presence of a much less toxic member

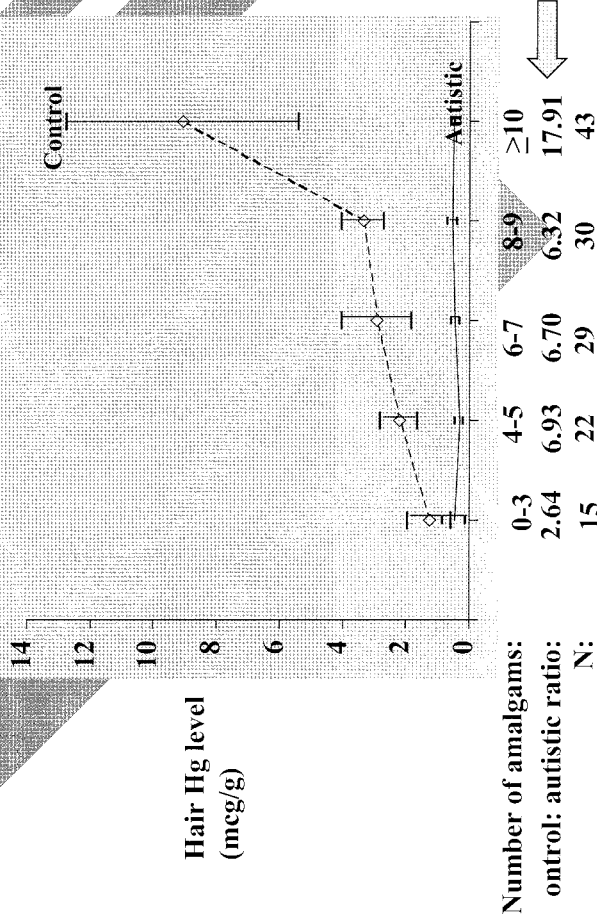
## SYNERGISTIC EFFECTS OF HEAVY METALS

(other relevant reports from some time ago)

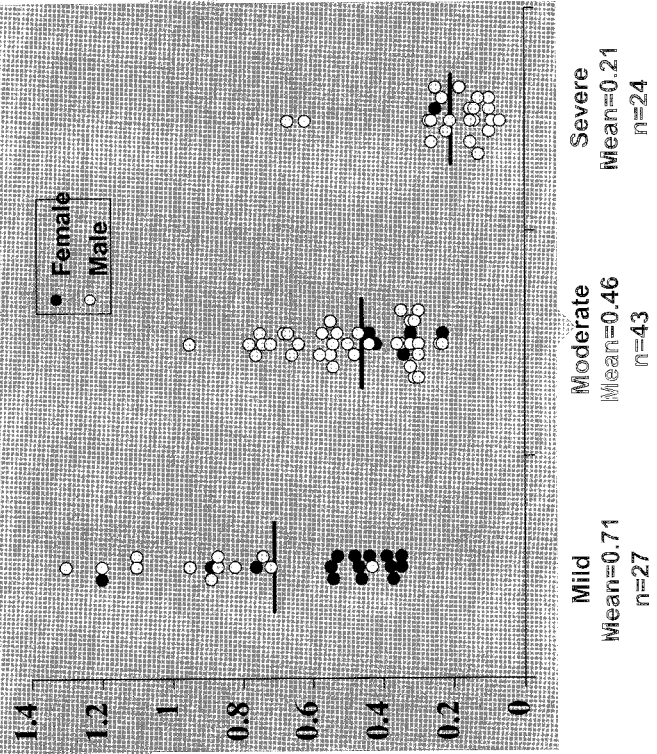
- Gale J., The Interaction of Mercury with Cadmium & Zinc in Mammalian Embronic Development. Environmental Research 6:95, 1973.
- Ferm, The Tetrogenic Effects of Metals on Mammalian Embryos. Advances in Tetrogology, ed. D.H. Woolam, v5,p51. 1972. New York .Academic Press.

MERCURY BIRTH HAIR LEVELS VS. NUMBER OF BIRTH MOTHER'S AMALGAM FILLINGS IN AUTISTIC AND CONTROL GROUPS

Data from A. Holmes, M. Blaxill & B. Haley  
 Int. J. of Toxicology  
 v22, in press, 2003



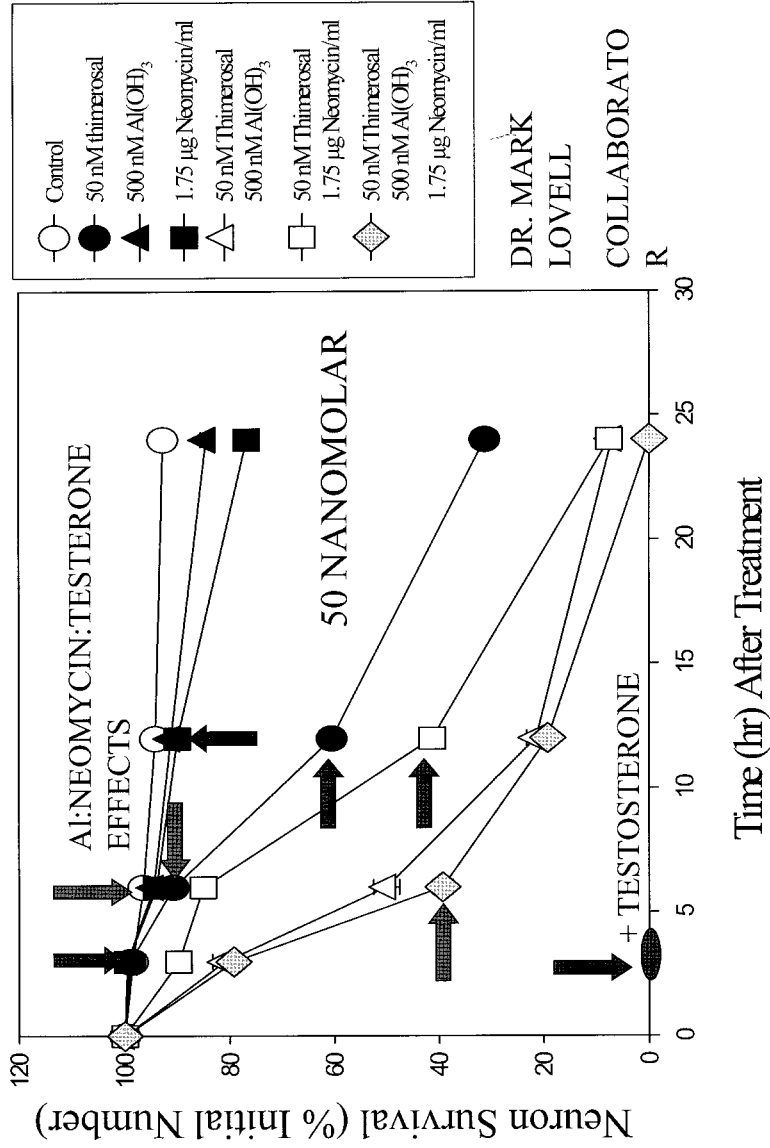
# BIRTH-HAIR MERCURY BY SEVERITY OF AUTISM



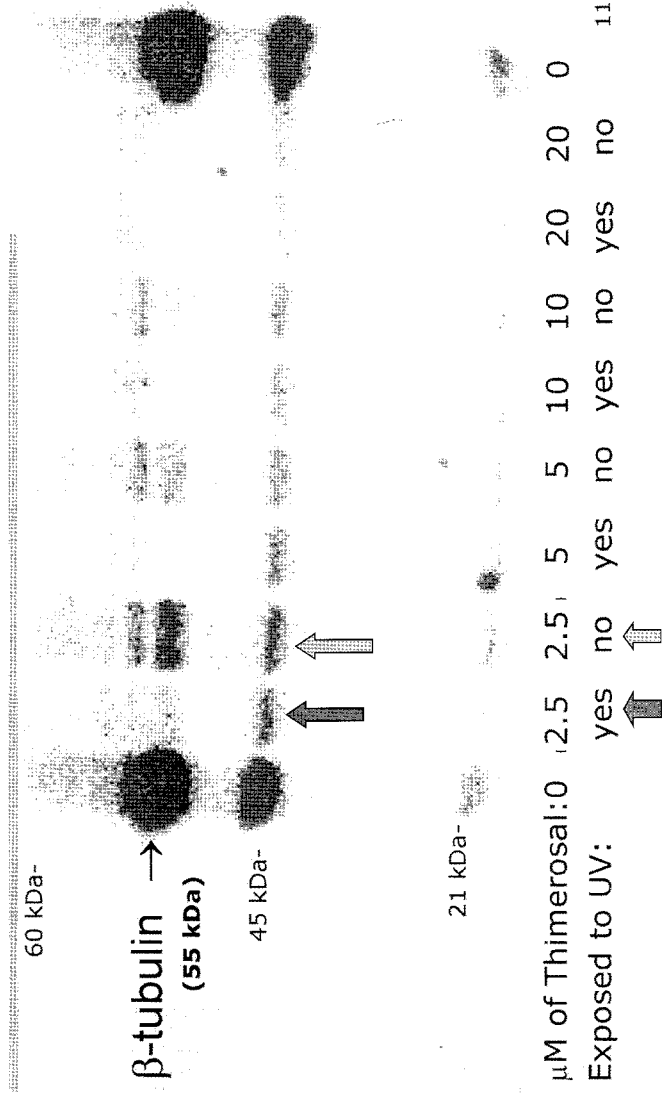
Hair Hg level (ppm)

Data from Amy Holmes, Mark Blaxill & Boyd Haley, Int. J. Toxicology v22, in press, 2003.

# SYNERGISTIC TOXICITIES & THIMEROSAL



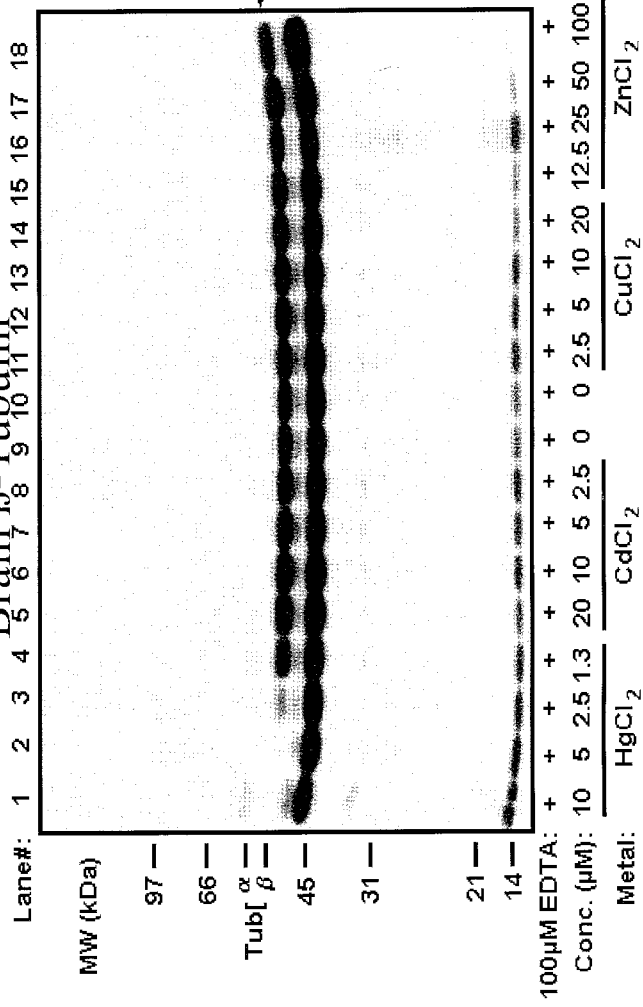
**Autoradiogram Showing Thimerosal  
Inhibition of  $[\gamma^{32}\text{P}]\text{8N}_3\text{GTP}$  Photolabeling of  
Brain  $\beta$ -tubulin**







# EDTA Prevents Cd, Cu & Zn But Not Hg Inhibition of [<sup>32</sup>P]8N<sub>3</sub>GTP Photolabeling of Brain β-Tubulin

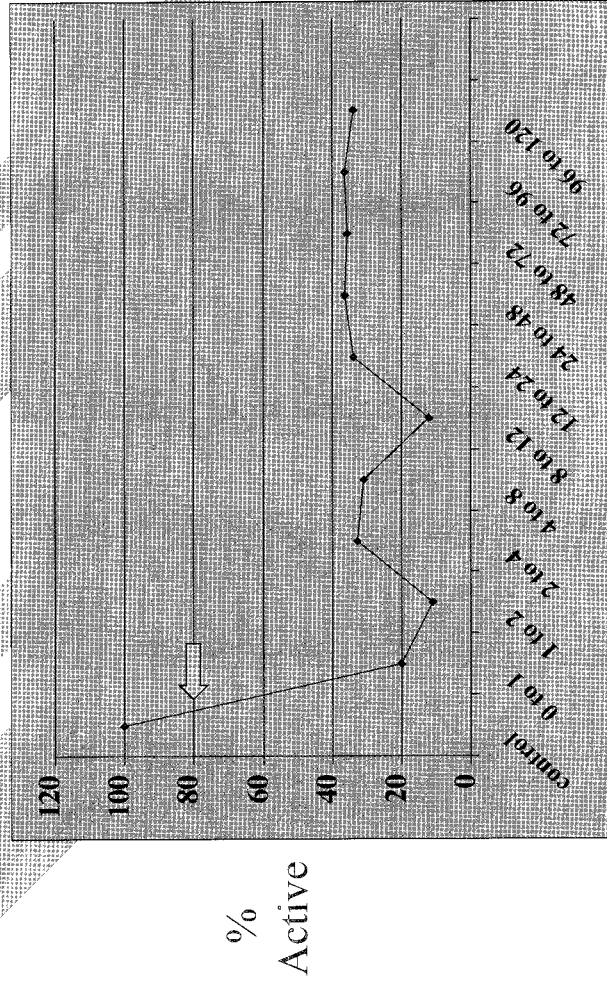


## IS MERCURY RELEASED FROM DENTAL AMALGAMS?

- In a study of long-term dissolution of mercury from a non-mercury releasing amalgam it was determined that  $43.5 \pm 3.2$   $\mu\text{g}/\text{cm}^2/\text{day}$  Hg was released and this remained constant for 2 years. Chew et al., Clin. Prev. Dent. 13(3):5-7, 1991.

- In a study of 1,127 soldiers by NIH the level of mercury in the urine of amalgam bearers was 4.5 times that of amalgam free controls. Some with extensive amalgams had levels 8 times or higher than controls. Kingman et al. J. Dental Research 77(3) 461, 1998.

**EFFECT OF SEQUENTIAL AMALGAM  
EXTRACTION SOLUTIONS ON THE VIABILITY OF  
BRAIN TUBULIN**

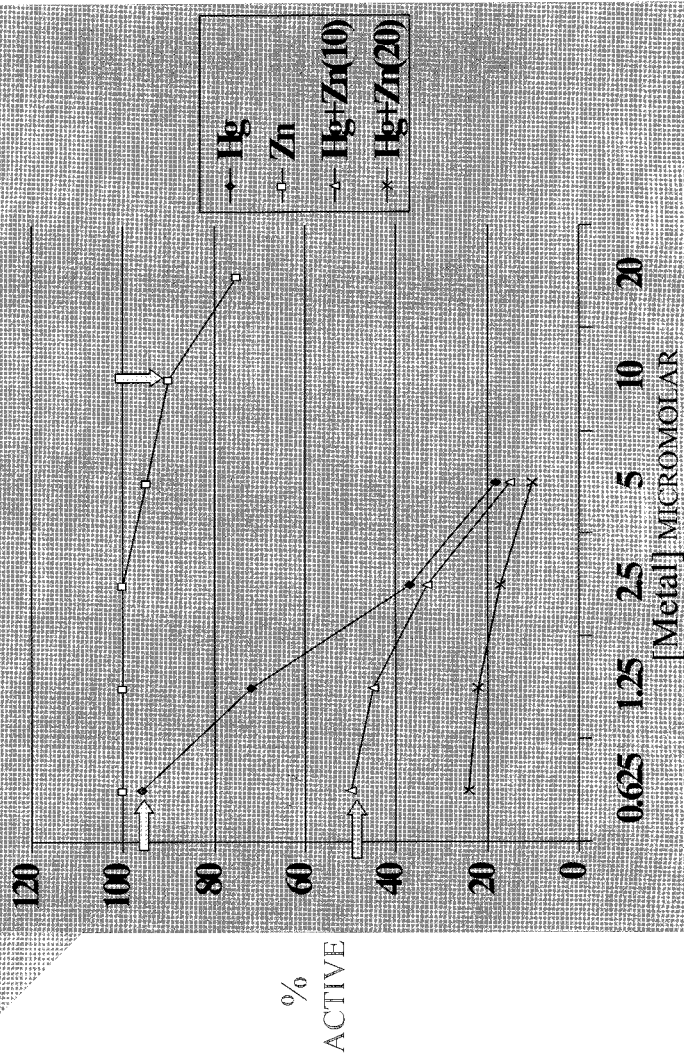


Hours of Amalgam Soak

## IS MERCURY RELEASED FROM DENTAL AMALGAMS?

- The amalgam “Dispersalloy (Johnson and Johnson) was severely cytotoxic initially when Zn release was the greatest, but was less toxic between 48 and 72 h as Zn release decreased.” Wataha et al., *Dent. Mater.* **10**, 298-303, 1994.
- After removal of amalgams from 17 individuals the average urinary mercury dropped by a factor of 5 from 1.44 to 0.36 micrograms/unit. Begerow et al. *Int. Arch. Occupational and Environmental Health* 66(3) 209, 1994.

SYNERGISTIC TOXICITY OF ZINC PLUS  
MERCURY ON TUBULIN VIABILITY



ELEVATED MERCURY IN IDIOPATHIC  
DILATED CARDIOMYOPATHY (IDCM).  
WHERE DOES IT COME FROM?

LEVELS ng/g	Hg	Sb
Controls	8.0	1.5
IDCM	178,400	19.260

Frustraci et al., J. of American College of Cardiology, 33, (6) 1578, 1999.  
Controls were patients with valvular or ischemic heart disease.  
Question is 'where does this mercury come from?' Athletic youth die of IDCM.

## CONCLUSIONS

- Both Hg and thimerosal rapidly inhibit tubulin. Tubulin is required for neuron function and is part of the mitotic spindle needed for cell division in the immune response.
- Both Hg and thimerosal have toxicities that are greatly enhanced by other compounds which humans are exposed to.
- There is no way to identify a “safe level” of mercury exposure without knowing the concentrations of all compounds that affect mercury toxicity.

**Opinion Report on Mercury Toxicity from Dental Amalgams and Thimerosal**  
**Presented to Congressional Hearing-8 May 2003**

by

**BOYD E. HALEY, Ph.D.**

Professor and Chairman of the Department of Chemistry at the University of Kentucky,  
Lexington, KY 50606-0055

In developing an opinion on mercury toxicity from exposures to dental amalgam and thimerosal I have reviewed toxicologic data relevant to animal and human studies to environmental mercury, methylmercury, thimerosal and exposure to mercury from amalgam fillings. I have reviewed literature searches conducted on various computerized databases; evaluated published literature on primary studies as referenced in part herein. I have reviewed relevant unpublished reports, consulted review articles, where appropriate, and held working meetings with experts in the field. I have also conducted experiments in my laboratory at the University of Kentucky with regards to the enzyme and cellular toxicity of both dental amalgams and thimerosal, including vaccine with and without thimerosal added as a preservative. In addition, I have reviewed evaluations and conclusions of various governmental agencies, including the International Agency for Research on Cancer (IARC), the World Health Organization ("WHO"), the National Institute of Health ("NIH"), the United States Environmental Protection Agency ("EPA"), and other groups regarding this issue. I have come to the following conclusions.

1. Mercury is the most toxic, non-radioactive element known to man. Virtually every industry has either reduced or banned the use of mercury with the exception of dentistry. Dental amalgam is approximately 50% mercury by weight. *Each* amalgam typically has between half of a gram to a gram of mercury. A typical person having between 5 and 15 amalgams, would have several grams of mercury implanted in his or her mouth. This amount is colossal using any standard. I am aware of no other situation today where grams of mercury are implanted in any human being. In fact, in the healthcare industry, mercury has been all but banned.
2. The concentration of thimerosal in vaccines that contain this agent as a preservative is approximately 125,000 nanomolar. In our studies pure thimerosal shows toxicity to neurons in



culture at 10 to 20 nanomolar, a 12,500 to 6,250 dilution factor. Calculations, using a conservative approach, demonstrate that vaccinations of infants exposes them to concentrations of thimerosal that could biologically injure them, especially if they were exceptionally susceptible to mercury toxicity due to genetic predisposition, other concurrent toxic exposures (e.g. to lead, elemental mercury, cadmium, etc.). Further, our research has shown that thimerosal, which releases the toxic agent ethylmercury, inhibits the same brain enzymes as does  $Hg^{2+}$ . Therefore, multiple exposures from dental amalgams, food, and vaccines are all capable of adding to the toxic load of these infants.

3. Further, we need to emphasize that humans are not rats in a pristine cage, being fed chow that is tested to be free of other toxic agents. Humans are exposed to numerous toxic agents that may act in a synergistic fashion to enhance the toxicity of other toxicants. That is, and this is well established, low levels of lead will greatly enhance the toxicity of mercury. It is well known that levels of lead previously thought to be non-toxic are now associated with decreased mental abilities in children. Could it be that this lead is enhancing the toxicity of mercury exposures from dental amalgams and vaccines?

4. The position of organized dentistry, primarily the American Dental Association (ADA), that “no valid scientific evidence exists that dental amalgam poses any health risk – other than rare, localized allergic reactions,” is, in my opinion, indefensible in the light of huge amounts of published science. The major basis I have heard for the ADA stand is the findings of “expert committees” within the dental branch of the FDA and WHO. I looked up the members of these committees and have serious concerns about whom the ADA classifies as “expert” that served on these committees. In my opinion, there was a severe paucity of relevant research publications on mercury toxicity by members of these committees. The ADA stand is especially weak if one considers the recent National Academy of Sciences and EPA reports implying that 8 to 10% of American women of child bearing age have blood levels of mercury that put any child they give birth to at risk for having neurological problems. Also, a plethora of peer reviewed, published, scientific studies and articles completely refute the evaluation of the ADA regarding amalgam safety. Frankly, outside of the Journal of the American Dental Association or JADA, the ADA’s trade journal, which is *not* a refereed scientific journal, but solely a *trade* journal, scientific consensus is completely contrary to the ADA’s position (note that the ADA escapes adjudication by claiming to be a trade organization with no responsibility to public health.). The fact is that there are no solid, refereed publications showing that mercury is not significantly emitted from

1 dental amalgams. On the contrary, there are several showing significant emissions of mercury  
2 from dental amalgams. In the one JADA article (Saxe, et al. JADA Alzheimer's Disease, Dental  
3 Amalgam and Mercury, V130, p191, 1999) it is claimed that amalgams are not related to brain  
4 Hg levels. I have several design and scientific criticisms of this paper, which I will not go into  
5 here. However, in this same paper there is a histogram that shows that about 6% of the subjects  
6 had mercury brain levels above 1 micromolar levels and about 15% had brain levels above 0.5  
7 micromolar levels. Therefore, roughly 6 to 15% of Americans, on the day they die, have what  
8 any competent neurologist or neurochemists or toxicologist would call **severely toxic levels of**  
9 mercury. These levels are about 1,000 times that needed to cause neurons to die in culture.  
10 Therefore, one needs to ask the question "where does this mercury come from and why does it  
11 exist in brain tissues at such high levels". I seriously doubt that the major cause is eating  
12 seafood for 85 year old AD subjects. The cause is obvious exposures from known sources  
13 (amalgams, food and vaccines) and the reason it collects in certain individuals is because they  
14 cannot effectively excrete mercury due to genetic susceptibilities or presence of other toxicants  
15 (lead, pesticides, etc.) or loss of cellular protection due to advanced age or disease. Perhaps this  
16 same phenomena accounts for the 22,000 times normal level of mercury in the heart tissues of  
17 children who die with Idiopathic Dilated Cardiomyopathy (*Frustaci et al., J. American College*  
18 *of Cardiology, v33#6, p1578, 1999*). This latter issue alone should make Congress consider a  
19 ban on mercury in dentistry and medicine.

20 5. Dental Amalgam emits dangerous levels of mercury. In fact, according to a 1991 WHO report,  
21 dental amalgam constitutes *the major* human exposure to mercury.<sup>1</sup> Grams of mercury are in the  
22 mouths of individuals with several amalgam fillings. Also, the level of blood and urine mercury  
23 positively correlates with the number of amalgam fillings.<sup>2</sup> It would be quite informative to  
24 require that the American Medical Association (AMA) be required to evaluate the state of  
25 mercury toxicity caused by dental amalgams and make a report regarding this issue. The lack of  
26 AMA support for the ADA contention on amalgam safety says something.

<sup>1</sup>See also, Lorscheider, F.L., Vimy, M.J. and Summers, A.O. Mercury Exposure from Silver Tooth Fillings: Emerging Evidence Questions a Traditional Dental Paradigm. *FASEB J.* 9, 504-508, 1995.

<sup>2</sup>See e.g., Kingman, A., Albertini, T. and Brown, L.J. Mercury Concentrations in Urine and Whole-Blood Associated with Amalgam Exposure in a U.S. Military Population. *J. Dental Research* 77(3) 461-71, 1998.

1 6. Careful evaluation of the amount of mercury emitted from a commonly used dental amalgam  
2 in a test tube with 10 ml of water was presented in an article entitled "Long-term Dissolution of  
3 Mercury from a Non-Mercury-Releasing Amalgam."<sup>3</sup> This study showed that "the over-all  
4 mean release of mercury was  $43.5 \pm 3.2$  micrograms per  $\text{cm}^2/\text{day}$ , and the amount remained  
5 fairly constant during the duration of the experiments (2 years)." This was without pressure, heat  
6 or galvanism as would have occurred if the amalgams were in a human mouth. To be fair, this  
7 amalgam contained about 66% mercury compared to about 50% in most amalgams in use. The  
8 importance of this publication is that the discovery of the tremendous amount of mercury  
9 released from this amalgam material was not discovered by NIDCR, FDA, ADA, CDC or any  
10 other American research group. It came from the University of Singapore. Why hasn't the ADA  
11 or FDA or CDC done similar studies on every amalgam preparation used in the USA today? In  
12 my laboratory we have done this on several aged amalgams made from one conventional, widely  
13 used amalgam company. The results indicated that about 4.5 micrograms  $\text{Hg}/\text{cm}^2/\text{day}$  was  
14 released without abrasion, but this increased to about 47 micrograms/ $\text{cm}^2/\text{day}$  with two 30  
15 second brushings with a toothbrush. Therefore, the question remains, who is protecting the  
16 American public from adverse exposures to mercury? It appears as if those who should be doing  
17 this job are failing to do so. Having an unbiased research group repeat the study above on all  
18 ADA approved amalgam materials would be very informative and I strongly recommend that  
19 this be done even though doing this it was not supported by the ADA spokesperson at a past  
20 Congressional hearing on this issue.

21 Recent research has shown that the birth hair of normal children increase in mercury content  
22 with increasing dental amalgams in the birth mother (*A. Holmes, M. Blaxill and B. Haley,*  
23 *Reduced Levels of Mercury in the First Baby Haircuts of Autistic Children, in press,*  
24 *International J. Toxicology V22#4, 2003*). In contrast, autistic children have much lower levels  
25 of mercury in their birth-hair, yet due to numerous reports have elevated mercury in their bodies  
26 on mercury challenge testing. This strongly indicates that a subset of the population does not  
27 have the ability to excrete mercury even if it is from low chronic daily exposure from dental  
28 amalgam.

<sup>3</sup>Chew, C. L., Soh, G., Lee, A. S. and Yeoh, T. S. Long-term Dissolution of Mercury  
from a Non-Mercury-Releasing Amalgam. *Clinical Preventive Dentistry* 13(3): 5-7, May-June  
(1991).

1  
2  
3 7.Furthermore, due to the substantial amounts of mercury in amalgams, it is the number of  
4 amalgams that controls the amount of mercury exposure and this is likely not significantly  
5 affected by the length of time each amalgam is in the mouth.<sup>4</sup> Put another way, since each large  
6 amalgam (i.e. those with 0.5 and 1.0 grams of mercury) contains between 500,000 to 1,000,000  
7 micrograms of mercury, and if mercury were estimated to be released at a high rate of 10  
8 micrograms a day from each amalgam, it would take between 137 and 274 years before any  
9 individual amalgam is completely depleted of its mercury content. A small amalgam with 0.1  
10 grams of mercury would take 27.4 years for depletion at this rate. Also, there is a high variance  
11 which is influenced by the surface area of the amalgam, its copper content, its location and the  
12 individual's eating and grinding habits, and rate of acidity, as noted herein. However, even at  
13 very conservative estimates, these figures equate to a substantial amount of *chronic* (continuous,  
14 daily) mercury exposure over a sustained, prolonged period of time. I think it is imperative that  
15 the ADA provide detailed research that demonstrates that amalgams MADE OUTSIDE THE  
16 MOUTH DO NOT RELEASE MERCURY ON REASONABLE ABRASION AS WOULD BE  
17 EXPECTED ON CHEWING FOOD OR DRINKING HOT DRINKS. The ADA and other  
18 supporters of amalgam refuse to do these studies or fund these studies even though several  
19 refereed journal reports list solutions in which amalgams have been soaked as "severely  
20 cytotoxic".

21  
22 8.About 80% of the mercury vapor from amalgams is readily taken up by the human body and  
23 distributed to various organs. Very little, if any, of the mercury vapors are exhaled; the vapors as  
24 well as mercury particles are absorbed into the lungs and body tissues. Through the lungs, for  
25 instance, mercury enters the bloodstream where it has access to all of the major organs; of  
26 particular concern are the kidneys and the central nervous system.<sup>5</sup> For example, studies have  
27 been performed where amalgams containing radioactive mercury were placed in sheep and  
28 monkeys, showed the radioactivity collecting in all body tissues and especially high in the jaw

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<sup>4</sup>See e.g., Motorkina AV, Barer Gm, Volozhin AL, *Patterns of mercury release from amalgam fillings into the oral cavity*, Stomatologiya (Mosk) 1997; 76(4) 9-11.

<sup>5</sup>See e.g., Reinhardt JW, *Side-effects: mercury contribution to body burden from dental amalgam*, Adv Dent Res 1992 Sep; 6:110-3.

and facial bones.<sup>6</sup> Human studies are also supportive.<sup>7</sup>

9. Even more concerning is the **synergistic toxicity effects** of other elements in amalgams, which increase the toxicity of mercury. For example, Zinc (or “Zn”) is a needed element for body health and is found in very low percentages in dental amalgams when compared to mercury. However, Zn<sup>2+</sup> is a synergist that enhances mercury toxicity. Studies have shown that solutions in which amalgams had been soaked were “severely cytotoxic initially when Zn release was highest.”<sup>8</sup> (see also, *Lobner & Asrari, Neurotoxicity of Dental Amalgam is Mediated by Zinc. J. Dental Reserch v82#3, 243, 2003*). We have repeated similar amalgam soaking experiments in my laboratory. Cadmium (from smoking), lead, zinc and other heavy metals enhanced mercury toxicity as expected. This is a well known phenomena in toxicology as it has been reported many years ago in a study on determining the lethal dose (LD) that “the administration of an essentially no-response level (LD-1) of a mercury salt together with a 1/20 of the LD-1 of a lead salt killed all of the animals”. If the toxicity were additive only 1 to 2 rats of 100 should have died, instead 100% died (*J. Shubert, E. Riley & S. Tyler. Combined Effect in Toxicology—A Rapid Systemic Testing Procedure: Cadmium, Mercury and Lead. J. Toxicology and Environmental Health V4, p763, 1978.*) What the data from several studies clearly shows is that no one can state what is a “safe” level of mercury exposure without knowing the concentration of

<sup>6</sup>See Hahn, L.J., Kloiber, R., Vimy, M. J., Takahashi, Y. and Lorscheider, F.L. Dental “Silver” Tooth Fillings: A Source of Mercury Exposure Revealed by Whole-Body Image Scan and Tissue Analysis. *FASEB J.* 3, 2641-2646, 1989;  
see also, Hahn, L.J., Kloiber, R., Leininger, R.W., Vimy, M. J., and Lorscheider, F.L. Whole-body Imaging of the Distribution of Mercury Released from Dental Filling Into Monkey Tissues. *FASEB F.* 4, 3256-3260, 1990.

<sup>7</sup>See e.g., Nylander, M., Friberg, L. and Lind, B. Mercury Concentrations in the Human Brain and Kidneys in Relation to Exposure from Dental Amalgam Fillings. *Swedish Dentistry J.* 11:179-187, 1987;  
see also, Nylander, M., Friberg, L., Eggleston, D., Bjorkman, L. Mercury Accumulation in Tissues from Dental Staff and Controls in Relation to Exposure. *Swedish Dental J.* 13, 235-243, 1989;  
see also, Zander D, Ewers U, Freier I, Brockhaus A., *The mercury exposure of the population. III. Mercury mobilisation by DMPS (Dimaval) in subjects with and without amalgam fillings, Zentralbl Hyg Umweltmed*, 1992 Feb; 192(5): 447-54.

<sup>8</sup>Wataha, J. C., Nakajima, H., Hanks, C. T., and Okabe, T. Correlation of Cytotoxicity with Element Release from Mercury and Gallium-based Dental Alloys *in vitro*. *Dental Materials* 10(5) 298-303, Sept. (1994)

1 all other factors that may synergistically exacerbate mercury toxicity.

2 10. Synergistic effects on ethylmercury is demonstrated by the dramatic enhancement of  
3 thimerosal toxicity against neurons in culture by aluminum cation ( $Al^{3+}$ ), antibiotics, and  
4 testosterone.  $Al^{3+}$  is another component of vaccines and dramatically increases the killing of  
5 neurons by thimerosal. Testosterone, at low nanomolar levels is not noticeably toxic to neurons.  
6 However, if testosterone is present with low nanomolar levels of thimerosal the rate of neuron  
7 death is greatly enhanced, more so than with  $Al^{3+}$ . This likely explains the 4 to 1 ratio of boys to  
8 girls that become autistic and the fact that most of the severe cases of autism are boys. This  
9 involvement of testosterone in autism is further supported by the work of Dr. Baron Cohen of  
10 England who studied the amniotic fluid of mothers who gave birth to autistic children. The only  
11 abnormality he found was that their amniotic fluid contained elevated testosterone. It is likely  
12 that this early elevated testosterone level rendered these children at enhanced risk for  
13 ethylmercury neurotoxicity.

14 11. There are two common misconceptions fostered by pro-amalgam supporters concerning  
15 mercury amalgam fillings: (1) that the mercury in dental amalgam is all chemically bound and  
16 not released at significant rates; and (2) that amalgam mercury is in a form that is biologically  
17 inactive. We have tested this in a direct fashion in my laboratory by soaking amalgams in  
18 distilled water and then testing these solutions for toxicity in a manner similar to our testing of  
19 solutions known to contain specific amounts of  $Hg^{2+}$ . The results were unequivocal, solutions in  
20 which amalgams were soaked for only one hour gave very similar effects on inhibiting the  
21 activity of tubulin and creatine kinase, two enzymes previously reported to be greatly inhibited in  
22 Alzheimer's diseased brain as compared to age-matched normal brain (*B. Haley, The*  
23 *Relationship of the Toxic Effects of Mercury to Exacerbation of the Medical Conditions*  
24 *Classified as Alzheimer's disease, Nordisk Tidsskrift for Biologisk Medisin, 2003*). Therefore,  
25 amalgams likely create a cytotoxic environment *in situ* as reported by others also.

26 12. By definition, an amalgam is a mixture of uncharged metal powders in elemental form that is  
27 mixed with liquid mercury to form an emulsion that hardens with time. Amalgams are not an  
28 alloy similar to steel or bronze. Furthermore, in the case of dental amalgam, all of the elements  
that are used to form amalgam have totally filled electron shells and form what is known as

1 metallic bonds. Mercury is a liquid because it makes very weak metallic bonds, even with other  
2 metals, and this bonding is reversible allowing bound mercury to become unbound and escape as  
3 a vaporous atom,  $\text{Hg}^0$ , at a rate that is significant. As such, there does not exist an irreversible  
4 covalent bond between mercury and the other metals that is caused by two elements binding to  
5 fill in shells with missing electrons. This means that, unlike most chemically bound molecules,  
6 the elements that are mixed in an amalgam do not lose their individual elemental properties on  
7 release from the amalgam, unless this release is caused by electro-galvanism. Simply put,  
8 mercury vapor emitting from amalgams does not lose any of its toxicity because it was at one  
9 time inside of a dental amalgam. As shown in study after study, mercury vapor is emitted from  
10 amalgams at substantial and toxic amounts, and is then distributed within the human body. The  
11 claims made by ADA spokespersons, even by one past director of the NIDCR, that mercury in  
12 amalgams is like sodium in table salt, or like hydrogen in water, represent what would be  
13 considered as preposterous by anyone knowledgeable in freshman level general chemistry.

14 13. As to the second misconception, all of the metal elements in amalgam, including mercury, are  
15 *not* biologically inactive. As noted in numerous studies, some of which are cited herein, mercury  
16 emits from amalgams on a 24 hour a day basis.<sup>9</sup> The emissions are increased based on the  
17 introduction of hot substances, such as beverages (coffee and the sort), with chewing (such as  
18 chewing gum or food) and with galvanism as  $\text{Hg}^{2+}$  (the simple electrical current set up between  
19 different metals in the mouth and ionic saliva). Additionally, numerous interactions cause the  
20 scratching of the amalgams, again causing an increase in mercury vapor emissions. This  
21 includes the grinding of teeth. Once the mercury vapor is emitted it enters the body and is  
22 converted to toxic  $\text{Hg}^{2+}$  inside of cells by a specific enzyme (catalyase). In the blood it is carried  
23 to various organs, including, but not limited to, the brain as supported by various studies, some  
24 of which are cited herein. Based on this, mercury vapor from dental amalgams cannot be said to  
25 be biologically inactive as it is rapidly converted to a toxic form once inside a cell.

26 14. Equally unsupportable, scientifically, is any “estimate” that amalgams emit mercury at minute  
27 amounts under a tenth of a microgram per day as suggested by an ADA pro-amalgam  
28 spokesperson at the last Congressional Hearing. Applying simple math to this “estimate” of 0.1

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<sup>9</sup>See e.g., Lorscheider, et al., *supra*, FASEB J. 9, 504-508.

1 micrograms/day/amalgam confirms this inaccuracy. If one would divide the 0.1 microgram/day  
2 amount by 8,640 (24 hours/day X 60 minutes/hour X 6 ten second intervals/minute) to calculate  
3 the amount of mercury in micrograms available for a ten second mercury vapor analysis. This  
4 equals  $1.16 \times 10^{-5}$  micrograms total. Assume the oral cavity is somewhere between  $10\text{cm}^3$  to  
5  $100\text{cm}^3$  volume (note that 1 milliliter equals  $1\text{cm}^3$ ) then  $1.16 \times 10^{-6}$  micrograms/ $\text{cm}^3$  or  $1.16 \times$   
6  $10^{-7}$  micrograms/ $\text{cm}^3$  would be obtained from a single amalgam. Note that the conventional  
7 vapor sniffer reads at it lowest setting about 10micrograms/meter<sup>3</sup> or  
8 10micrograms/1,000,000 $\text{cm}^3$  or 0.000001 or  $10^{-6}$  microgram/ $\text{cm}^3$ . Therefore, the readings from  
9 0.1 microgram mercury released/day/amalgam in a 10 second reading would give values in a  
10  $10\text{cm}^3$  oral volume that are barely if at all detectable. In a  $100\text{cm}^3$  oral volume it would take  
11 about 8-9 fillings to get a minimal reading on a vapor sniffer. This indicates that it would almost  
12 be impossible to detect mercury emitting from one amalgam or several if the "estimate" of the  
13 ADA spokesperson were accurate.

14 However, the mercury vapor sniffer has been used by numerous individuals to detect mercury  
15 vapor in a human mouth or oral volume, and in my opinion the levels reported would  
16 underestimate the amount of mercury emitting from a single amalgam because of the following.  
17 Consider that somewhere between one-half to five-sixths of the mercury released would enter the  
18 body through the tooth (that area of the amalgam that exists below the visibly exposed amalgam  
19 surface) and not into the oral air. While the margins between a tooth and an amalgam filling are  
20 small they are large compared to an atom of mercury vapor. So mercury does enter readily  
21 through this route. In addition, some mercury in the oral air would be rapidly absorbed from the  
22 air into the saliva and oral mucosa since mercury is a lipophilic (or hydrophobic) vapor. This  
23 mercury would not be measured by the mercury analyzer and yet would enter the body. Further,  
24 as the mercury analyzer pulls mercury containing oral air into the analysis chamber, mercury free  
25 ambient air rushes into the oral cavity decreasing the mercury concentration.

26 Taking all of this into account one can calculate that most mercury analyzers could not detect  
27 this "estimated" 0.10 micrograms/day level of mercury even if the test subject had several  
28 amalgams. However, it is quite easy to detect mercury emitting from one amalgam using these  
analyzers. Therefore, it is impossible for daily emissions from amalgam to be anything less than  
the detection limits of an analyzer in a 10 second test. Separately, if amalgam is gently rubbed



1 with a tooth-brush the amount of mercury emitted, as measured by a commercial mercury vapor  
2 sniffer, increases dramatically. As I have cited herein, mercury emissions from amalgams  
3 increase substantially when hot liquids are introduced or when the individual is chewing.<sup>10</sup>

4 15. Additionally, it is also important to note that measurement of mercury emissions by a mercury  
5 vapor analyzer in the human mouth tends to *greatly underestimate* the amount of mercury exiting  
6 the amalgam as it does not measure much of the mercury that is rapidly absorbed in saliva and  
7 oral mucosa. Also, as the analyzer pulls mercury contaminated air out of the mouth, mercury  
8 concentrations are also decreased as mercury free ambient air rushes in the oral cavity.

9 16. It is also important to note that when it comes to amalgam fillings, the concern is chronic, *not*  
10 *acute*, exposures. Basically, in the case of an acute exposure, one would be exposed to a large  
11 amount of mercury in a single dosage that, in and of itself, may or may not be toxic. In the case  
12 of chronic exposures, while an individual exposure may not be toxic, the concern is the sum of  
13 the exposures. With amalgams, the exposure is constant, 24 hours a day (*chronic*), and increases  
14 with the introduction of various elements, such as chewing and the like, and also the introduction  
15 of other chemicals which may act synergistically with mercury. Furthermore, mercury  
16 accumulates within the human body in various organs and remains there for prolonged periods of  
17 time as a "retention toxicity". A "retention toxicity" from mercury differs from most  
18 conventional toxicities as the toxin is not removed, but remains and builds up. For example,  
19 getting drunk or alcohol toxic one night, the toxicity is cleared by the body as it metabolizes the  
20 alcohol to other compounds. Mercury, being an element cannot be metabolically changed and,  
21 most importantly, forms a long-term attachment (or covalent bond) with proteins inside of cells  
22 and organelles, causing what is called retention toxicity as the level of mercury can build up with  
23 continuous chronic exposure.

24 In fact, mercury has been shown to remain in human organs for years after initial exposure

25 <sup>10</sup>See e.g., Sallsten G; Thoren J; Barregard L; Schutz A; Skarping G, *Long-term use of*  
26 *nicotine chewing gum and mercury exposure from dental amalgam fillings*, J Dent Res 1996 Jan;  
27 75 (1): 594-8;

28 Gebel T, Dunkelberg H., *Influence of chewing gum consumption and dental contact of*  
*amalgam fillings to different metal restorations on urine mercury content*, Zentralbl Hyg  
Umweltmed 1996 Nov; 199(1): 69-75.

1 accumulating in the brain, kidney, and lung.<sup>11</sup> Specific to amalgam and the central nervous  
2 system, low doses of mercury vapor enter and remain within motor neurons for prolonged  
3 periods of time. According to various studies, these are levels well within the WHO guidelines  
4 for occupational exposure.<sup>12</sup> Simply put, these published studies show that amounts of mercury  
5 that are considered within safe limits reaches the central nervous system, and accumulates to  
6 toxic levels via "retention toxicity". Mercury can be lodged in various organs causing toxicity  
7 for a prolonged period of time. This is of particular concern with amalgams, as mercury  
8 continuously accumulates in a given subject for years, adding up to potentially toxic levels in  
9 many individuals, including, as noted below, the developing fetus.

10 17. Any claim on the part of the ADA or established dental organizations that a zinc oxide layer  
11 is formed on the amalgams that decreases mercury release can only be true if an individual is not  
12 using his or her teeth. Note that zinc is listed at "trace levels" in amalgams. How can trace  
13 levels cover the 50% mercury? However, in the real world, any zinc oxide layer is easily  
14 removed by slight abrasion such as chewing food or brushing the teeth. Further, my laboratory  
15 has confirmed that solutions in which amalgams have been soaked can cause the inhibition of  
16 brain proteins that are inhibited by adding mercury chloride, and these are the same enzymes  
17 inhibited in AD brain samples.

18 18. Even more concerning is that at least some of the inorganic mercury that is emitted from  
19 amalgams is converted to methylmercury, a more toxic, organic form of mercury.<sup>13</sup> This  
20 strongly indicates that "organo mercury species" are indeed capable of being made in the human  
21 body and likely explains the appearance of methylmercury in the blood and urine of individuals  
22 who do not eat seafood, but do have amalgam fillings.

23 <sup>11</sup>See e.g., Opitz H, Schweinsberg F, et al., *Demonstration of mercury in the human brain*  
24 *and other organs 17 years after metallic mercury exposure*, Clin Neuropathol 1996 May-Jun;  
15(3): 139-44.

25 <sup>12</sup>See e.g., Pamphlett R, Coote P, *Entry of low doses of mercury vapor into the nervous*  
26 *system*, Neurotoxicology 1998 Feb; 19(1): 39-47.

27 <sup>13</sup>See e.g., Heintze, U. Edwardsson, S., Derand, T. and Birkhed, D. *Methylation of*  
28 *Mercury from Dental Amalgam and Mercuric Chloride by Oral Streptococci in vitro*. Scand. J.  
Dental Research 91(2) 150-152, 1983.

19. The bottom line is that amalgams emit significant levels of neurotoxic mercury that are  
 1 injurious to human health and would exacerbate the medical condition of those individuals with  
 2 neurological diseases such as Amyotrophic lateral sclerosis ("ALS" or "Lou Gehrig's  
 3 Disease")<sup>14</sup>, Multiple Sclerosis ("MS"), Parkinson's, autism and Alzheimer's Disease ("AD").  
 4 For example, mercury inhibits the same enzymes in normal brain tissues as are inhibited in  
 5 Alzheimer's Disease.<sup>15</sup> AD is pathologically confirmed post-mortem by the appearance of  
 6 neuro-fibrillary tangles (NFTs) and amyloid plaques in brain tissue. Published research, within  
 7 the past year, has shown that exposure of neurons in culture to sub-lethal doses of mercury  
 8 (much less than is observed in human brain tissue) causes the formation of NFTs,<sup>16</sup> the increased  
 9 secretion of beta-amyloid protein and the hyper-phosphorylation of a protein called Tau.<sup>17</sup> All

10 \_\_\_\_\_  
 11 <sup>14</sup>See e.g., Mano Y, Takayanagi T, Ishitani A, Hirota T, *Mercury in hair of patients with*  
*ALS*, *Rinsho Shinkeigaku* 1989 Jul; 29(7) 844-8.

12 <sup>15</sup>See e.g., Duhr, E.F., Pendergrass, J. C., Slevin, J.T., and Haley, B. HgEDTA Complex  
 13 Inhibits GTP Interactions With The E-Site of Brain  $\alpha$ -Tubulin Toxicology and Applied  
*Pharmacology* 122, 273-288 (1993).

14 See also, Pendergrass, J.C. and Haley, B.E. *Mercury-EDTA Complex Specifically Blocks*  
 15 *Brain  $\alpha$ -Tubulin-GTP Interactions: Similarity to Observations in Alzheimer's Disease*. p 98-  
 105 in Status Quo and Perspective of Amalgam and Other Dental Materials (International  
 16 Symposium Proceedings ed. by L. T. Friberg and G. N. Schrauzer) Georg Thieme Verlag,  
 Stuttgart-New York (1995);

17 Pendergrass, J.C. and Haley, B.E. *Inhibition of Brain Tubulin-Guanosine 5'-*  
 18 *Triphosphate Interactions by Mercury: Similarity to Observations in Alzheimer's Diseased*  
*Brain*. In *Metal Ions in Biological Systems* V34, pp 461-478;

19 *Mercury and Its Effects on Environment and Biology*, Chapter 16. Edited by H. Sigel and  
 A. Sigel. Marcel Dekker, Inc. 270 Madison Ave., N.Y., N.Y. 10016 (1996);

20 Pendergrass, J. C., Haley, B.E., Vimy, M. J., Winfield, S.A. and Lorscheider, F.L.  
 21 Mercury Vapor Inhalation Inhibits Binding of GTP to Tubulin in Rat Brain: Similarity to a  
 Molecular Lesion in Alzheimer's Disease Brain. *Neurotoxicology* 18(2), 315-324 (1997);

22 David, S., Shoemaker, M., and Haley, B. *Abnormal Properties of Creatine kinase in*  
 23 *Alzheimer's Diseased Brain: Correlation of Reduced Enzyme Activity and Active Site*  
*Photolabeling with Aberrant Cytosol-Membrane Partitioning*. *Molecular Brain Research* 54,  
 276-287 (1998);

24 Hock C, Drasch G, Golombowski S, et al. *Increased blood mercury levels in patients*  
 25 *with alzheimer's disease*, *J Neural Transm* 1998; 105(1): 59-68;

26 <sup>16</sup>Leong, CCW, Syed, N.I., and Lorscheider, F.L. Retrograde Degeneration of Neurite  
 27 Membrane Structural Integrity and Formation of Neurofibrillary Tangles at Nerve Growth Cones  
 Following In Vitro Exposure to Mercury. *NeuroReports* 12 (4): 733-737, 2001.

28 <sup>17</sup>Olivieri, G., Brack, Ch., Muller-Spahn, F., Stahelin, H.B., Herrmann, M., Renard, P,  
 Brockhaus, M. and Hock, C. Mercury Induces Cell Cytotoxicity and Oxidative Stress and

1 three of these mercury-induced aberrancies are regularly identified by world class scholars as the  
 2 major diagnostic markers for AD. Yet the ADA states there is no scientific data published to  
 3 indicate that mercury from amalgams could contribute to these diseases.

4 20. Furthermore, mercury from amalgams is transferred from a pregnant mother to the developing  
 5 fetus, causing increased mercury body burden in children solely based on the presence of  
 6 amalgams in the mother.<sup>18</sup> Mercury exposure is even more devastating to the developing brain  
 7 than to an adult brain. This has been shown in study after study culminating with the recent  
 8 publication by Dr. Lorscheider, et al., showing brain neuron degeneration from small amounts of  
 9 mercury and conclusively proving that such degeneration does not occur with the introduction of  
 10 any other element, including *lead*.<sup>19</sup> The research mentioned above on the levels of mercury in  
 11 the birth-hair of children increasing with the mother's amalgam clearly demonstrates that  
 12 mercury from dental amalgams enters the child *in utero* as has been previously reported.

13 21. Also, low level exposures like those associated with amalgam fillings and the resultant  
 14 increase in the mercury body burden are toxic to the central nervous system.<sup>20</sup> These can cause  
 15 from severe to subtle neuropsychological functions such as depression of performance

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16 Increases  $\alpha$ -amyloid Secretion and Tau Phosphorylation in SHSY5Y Neuroblastoma Cells. J.  
 17 Neurochemistry 74, 231-231, 2000.

18 <sup>18</sup>See e.g., Razagui IB, Haswell SJ, *Mercury and selenium concentrations in maternal*  
 19 *and neonatal scalp hair: relationship to amalgam-based treatment received during pregnancy,*  
 20 *Biol Trace Elem Res* 2001 Jul; 81(1) 1-19;

21 Drasch G, Schupp I, Hofl H, et al., *Mercury burden of human fetal and infant tissues,* Eur  
 22 *J Pediatr.* 1995 Jul; 154(7): 585-6.

23 <sup>19</sup>Lorscheider FL, Leong C, Syed NI, *How mercury causes brain neuron degeneration,*  
 24 *Neuro Rpt,* 2001 12(4): 733-737;

25 *see also,* Yeates KO, Mortensen ME *Acute and chronic neuropsychological*  
 26 *consequences of mercury vapor poisoning in two early adolescents* Clin Exp Neuropsychol 1994  
 27 Apr; 16(2): 209-22;

28 Fredriksson A, Dahlgren L, Danielsson B, et al., *Behavioural effects of neonatal metallic*  
*mercury exposure in rats* Toxicology 1992 Sep; 74(2-3): 151-60.

<sup>20</sup>See e.g., Echeverria D, Aposhian HV, Woods Js, Heyer NJ, et al., *Neurobehavioral*  
 effects from exposure to dental amalgam Hg: new distinctions between recent exposure and Hg  
 body burden, *FASEB J* 1998 Aug, 12 (11): 971-80;

*See also,* Aschner M, Aschner JL, *Mercury neurotoxicity: mechanisms of blood-brain*  
*barrier transport,* *Neurosci Biobehav Rev* 1990 Summer; 14(23): 169-76.

1 intellectual functioning, impairments of attention, impairment of short-term memory function,  
 2 visual judgment of angles and directions, psychomotor retardation and personality changes. As  
 3 further proof that these are mercury related, scientists have shown that in some cases, the effects  
 4 can be reversed simply by removal of the source of mercury intoxication, together with proper  
 5 medical treatment.<sup>21</sup> Mercury from fillings also leads to “considerable concentrations of  
 6 [mercury] in the olfactory bulbs.”<sup>22</sup> This may also explain the phenomena of Alzheimer’s  
 7 patients losing their sense of smell in the early stages of the disease (Kovacs, T., Cairns, N.J.,  
 8 Lantos, P.L. *Olfactory Centres in Alzheimer’s disease: Olfactory Bulb is Involved in Early*  
 9 *Braak’s Stages. Neuroreport 12(2): 285-288, 2001 and Gray, A.J., Staples, V., Murren, K.,*  
 10 *Dahariwal, A. and Bentham, P. Olfactory Identification is Impaired in Clinic-Based Patients*  
 11 *with Vascular Dementia and Senile Dementia of Alzheimer’s type. Int. J. Geriatr. Psychiatry*  
 12 *16(5):513-517, 2001).*

12 22. Mercury from dental fillings has also been associated with adverse effects in the  
 13 cardiovascular system, including high blood pressure, low heart rate, low hemoglobin, and low  
 14 hematocrit.<sup>23</sup>

15 23. Many of the experiments that show mercury emission and exposure from dental amalgams are  
 16 so simple and inexpensive to do that they could have and should have been completed many  
 17 years ago, in the 1950’s and 60’s. **Yet, they have not been done, or at least not reported on,**  
 18 **despite numerous requests by concerned citizens by the agencies and bureaucracies that**  
 19 **today testify that amalgams are safe. This includes the ADA and the dental branch of the**  
 20 **FDA.** It is important to note that I do not hold the entire FDA responsible for the actions of the

21 <sup>21</sup>See e.g., Hua MS, Huang CC, Yang YJ, *Chronic elemental mercury intoxication:*  
 22 *neuropsychological follow-up case study, Brain Inj. 1996 May; 10(5): 377-84;*

23 *Siblerud RL, A comparison of mental health of multiple sclerosis patients with*  
 24 *silver/mercury dental fillings and those with fillings removed, Psychol Rep 1992 Jun; 70(3Pt 2):*  
 25 *1139-51;*

26 <sup>22</sup>Henriksson J, Tjalve H, *Uptake of inorganic mercury in the olfactory bulbs via olfactory*  
 27 *pathways in rats Environ Res 1998 May; 77(2): 130-40.*

28 <sup>23</sup>See Siblerud RL, *The relationship between mercury from dental amalgam and the*  
*cardiovascular system, Sci Total Environ 1990 Dec 1; 99(1-2): 23-25;*

*see also, Carmignani M, Boscolo P, Cardiovascular homeostasis in rats chronically*  
*exposed to mercuric chloride, Arch Toxicol Suppl. 1984; 7:383-8.*

1 dental branch of the FDA. Other researchers also doing these tests do not find amalgams safe  
2 based on the continuous, chronic release of mercury. The fact that both the National Academy of  
3 Sciences and the EPA warn the government of the dangers of the level of mercury found in  
4 Americans and the NIH and WHO studies show that amalgams are the major contributor to the  
5 mercury body burden of humans. Couple this with the certain fact that mercury, and only  
6 mercury of the toxic metals, can mimic the aberrant biochemistry and produce the components of  
7 the widely accepted diagnostic hallmarks of Alzheimer's disease and it should be obvious that all  
8 exposures to mercury should be held to the lowest levels.

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9 24. Finally, science has produced compelling evidence at the biological level that mercury can  
10 cause the aberrancies found in Alzheimer's disease. Recent research has shown both strong  
11 biological plausibility and epidemiological studies regarding ethylmercury exposure from  
12 thimerosal in vaccinations being the cause of the devastating disease of autism and related  
13 disorder. Yet, our organizations and bureaucracies formed to protect us deny even the possibility  
14 that mercury or organic mercury is involved in the causation or exacerbation of these diseases.  
15 One only needs to know the history of Pink Disease (acyrodynia) to understand that proving  
16 mercury involvement in disease is quite difficult due to genetic susceptibility. **However, all of  
17 the scientific and biomedical facts together emphasizes the need for congressional action to  
18 stop the exposure of Americans to mercury and organic mercury compounds.**  
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Mr. BURTON. Thank you, Dr. Haley. We will get back to you with questions in a little bit.

Dr. Berlin, thank you very much for coming that long way to be with us, and you are recognized.

Dr. BERLIN. Thanks for calling the hearing. I am not going to present any primary research data. I will stick to conclusions here, the environmental medicine view on this problem.

As has been said, mercury vapor is a potent toxin which is released from amalgam fillings and that was accumulated in the brain of the bearer and also the brain of the fetus. It is important to stress here that I talk about mercury vapor; actual mercury like Thimerosal and methyl mercury behave differently in the body. Also, bivalent mercury, like mercury salt, also behaves differently. So that is just mercury vapor we are now discussing.

In fact, amalgam is the dominating source of mercury in the brain of the population. There are populations with high fish-eating habits which may come up to a number of mercury concentration in the brain which is close to this, which amalgam is close.

There is a correlation between number of amalgam fillings and mercury concentration in the central nervous system of the bearer and also a correlation between mercury concentration in the brain of the newborn and the mother's number of amalgam fillings.

The mercury concentration range in the brain of the fetus with an amalgam-bearing mother is similar to the concentrations that result in a gross effect in tissue cultures of animal brains, like Dr. Lorscheider mentioned.

Although a percent of available information is insufficient to allow risk assessment in terms of prevalence figures, the risk of inhibiting effect of mercury from amalgam on brain development is obvious. There is a number of animal experiments and tissue studies showing the effect on the nervous system of mercury vapor.

Until proven otherwise, it is necessary to assume that mercury vapor released from amalgam can cause retardation of brain development. Consequently, amalgam should not be used for dental restoration in women of child-bearing age or in children.

Considering the potent nature of the mercury molecule with many possible targets in the body, it is likely that mercury can cause serious side effects in a fraction or a subset of the population with deviating higher sensitivity to mercury for genetic reasons.

Such people with deviating sensitivity have recently been identified. Physicians and dentists have in the past tended to disregard or even deny this possibility, resulting in suffering of patients. It is important that more awareness of this fact develop within the medical profession and that more attention is given to this possibility in unclear cases of illness.

It will require clinical research, systematic clinical research, on this problem to elucidate the mechanisms involved and possible diagnostic methods.

Finally, I will say that it is my opinion, and that has been mentioned already, that amalgam is not a suitable material for dental restorations. It was defensible 20 years back in time; it was true that most people with amalgam in the mouth don't have any problems, don't show any health effects, but in a small fraction of the population, an estimated or an informed guess results in more than

1 percent of the population is likely to see side effects like that, and because we have not really established amalgam populations, which I think excludes prevalence of effects over 10 percent, 10 to 20 percent.

But, today, as mentioned, there are other alternatives, less toxic ones, and our learning is much more developed in terms of the effects of mercury vapor on the nervous system. Therefore, today the only reasonable thing to do is to use less toxic alternatives for dental restoration material.

Mr. BURTON. Thank you, Dr. Berlin. I will get back to you.

Now I didn't mention this when I introduced you, but you are the past chairman or Chair of the International Project of Chemical Safety of the World Health Organization, is that correct?

Dr. BERLIN. No.

Mr. BURTON. No, it is not correct?

Dr. BERLIN. No. Well, I was the chairman of that expert committee which finalized the criteria document for inorganic mercury in 1990, 1991, the two criteria documents, one for inorganic mercury and one for methyl mercury.

Mr. BURTON. Was that with the World Health Organization?

Dr. BERLIN. Yes, the World Health Organization, through ITCS.

Mr. BURTON. OK.

Dr. BERLIN. I have an activity, they use reviews and assessment of the chemical substances through the guidance of member nations.

Mr. BURTON. OK.

Dr. BERLIN. To produce this, they called together scientists in the field from all over the world. The scientists are in the capacity of knowledge and reputation. Then this group of scientists are left for a week or two to finalize documents, prepare and document them.

Then this group of scientists, they elect among them a chairman, and I was selected chairman for these two groups.

Mr. BURTON. And this was in what, 1990?

Dr. BERLIN. And the document I am sure you have here in the United States.

Mr. BURTON. OK.

Dr. BERLIN. These documents are circulated to all member countries for review and comments before they finally are finalized.

Mr. BURTON. OK, Doctor.

We now come to Dr. Eichmiller, Dr. Frederick C. Eichmiller. He is the DDS director of the American Dental Association Health Foundation at the Paffenbarger Research Center, National Bureau of Standards and Technology in Gaithersburg, MD. Is that a government-subsidized center?

Dr. EICHMILLER. Our center falls under the auspices of the American Dental Association Foundation. We are just located within a Department of Commerce facility.

Mr. BURTON. Who funds that?

Dr. EICHMILLER. It is funded by money from grants from the National Institute of Health and from a grant from the American Dental Association, and also some money from the Department of Commerce.

Mr. BURTON. So it is primarily funded by the Government of the United States?



Dr. EICHMILLER. Yes, correct.

Mr. BURTON. OK, proceed.

Dr. EICHMILLER. Thank you, Mr. Chairman. Members of the subcommittee, my name is Fred Eichmiller. I am a dentist. I am director of the Paffenbarger Research Center, which is one of the world's premier dental materials facilities. It is an affiliate of the American Dental Association Foundation located in Gaithersburg, MD. Scientists at the Paffenbarger Center conduct basic and applied studies to benefit the oral health of the American public.

I am grateful to have the opportunity to discuss not only dental amalgam, a topic often surrounded by misinformation, but also the overall subject of dental restorative materials.

I begin by stating that the American Dental Association concurs with the views of the World Health Organization, the Food and Drug Administration, the National Institutes of Health, and many other health organizations, that dental amalgam is a safe and effective treatment for dental decay. The ADA provided the full committee here extensive documentation of that during its hearing on November 14, 2002.

It is not the intent of the ADA to promote amalgam over any other safe and effective material dentists use to restore decay. The association actively conducts and supports research to develop a variety of materials to improve health, oral health. In fact, it was Paffenbarger Center researchers who invented composite resin fillings, also known as "white fillings," in the late 1950's. Today composites are the most commonly used dental filling material in the United States.

Our goal is to ensure that dentists and their patients have the best treatment options available for the unique needs of each patient. Because the ADA and our member dentists want patients to make informed choices, we provide both dentists and patients with educational materials concerning the advantages and disadvantages of materials used to treat decayed teeth. I would like to provide the subcommittee with copies of these consumer choice brochures, which I have here, and charts for the record.

[The information referred to follows:]

**Comparison of Indirect Restorative Dental Materials**

FACTORS	ALL-PORCELAIN (ceramic)	PORCELAIN FUSED TO METAL	GOLD ALLOYS (high noble)	BASE METAL ALLOYS (non-noble)
General Description	Porcelain, ceramic or glass-like fillings and crowns.	Porcelain is fused to an underlying metal structure to provide strength to a filling, crown or bridge.	Alloy of gold, copper and other metals resulting in a strong, effective filling, crown or bridge.	Alloys of non-noble metals with silver appearance resulting in high strength crowns and bridges.
Principal Uses	Inlays, onlays, crowns and aesthetic veneers.	Crowns and fixed bridges.	Inlays, onlays, crowns and fixed bridges.	Crowns, fixed bridges and partial dentures.
Leakage and Recurrent Decay	Sealing ability depends on materials, underlying tooth structure and procedure used for placement.	The commonly used methods used for placement provide a good seal against leakage. The incidence of recurrent decay is similar to other restorative procedures.		
Durability	Brittle material, may fracture under heavy biting loads. Strength depends greatly on quality of bond to underlying tooth structure.	Very strong and durable.	High corrosion resistance prevents tarnishing; high strength and toughness resist fracture and wear.	
Cavity Preparation Considerations	Because strength depends on adequate porcelain thickness, it requires more aggressive tooth reduction during preparation.	Including both porcelain and metal creates a stronger restoration than porcelain alone; moderately aggressive tooth reduction is required.	The relative high strength of metals in thin sections requires the least amount of healthy tooth structure removal.	
Clinical Considerations	These are multiple step procedures requiring highly accurate clinical and laboratory processing. Most restorations require multiple appointments and laboratory fabrication.			
Resistance to Wear	Highly resistant to wear, but porcelain can rapidly wear opposing teeth if its surface becomes rough.	Highly resistant to wear, but porcelain can rapidly wear opposing teeth if its surface becomes rough.	Resistant to wear and gentle to opposing teeth.	Resistant to wear and gentle to opposing teeth.
Resistance to Fracture	Prone to fracture when placed under tension or on impact.	Porcelain is prone to impact fracture; the metal has high strength.	Highly resistant to fracture.	
Biocompatibility	Well tolerated.	Well tolerated, but some patients may show allergenic sensitivity to base metals.	Well tolerated.	Well tolerated, but some patients may show allergenic sensitivity to base metals.
Post-Placement Sensitivity	Sensitivity, if present, is usually not material specific.			
	Low thermal conductivity reduces the likelihood of discomfort from hot and cold.	High thermal conductivity may result in early post-placement discomfort from hot and cold.		
Esthetics	Color and translucency mimic natural tooth appearance.	Porcelain can mimic natural tooth appearance, but metal limits translucency.	Metal colors do not mimic natural teeth.	

FACTORS	ALL-PORCELAIN (ceramic)	PORCELAIN FUSED TO METAL	GOLD ALLOYS (high noble)	BASE METAL ALLOYS (non-noble)
Relative Cost to Patient	Higher; requires at least two office visits and laboratory services.	Higher; requires at least two office visits and laboratory services.	Higher; requires at least two office visits and laboratory services.	
Average Number of Visits To Complete	Minimum of two; matching esthetics of teeth may require more visits.	Minimum of two; matching esthetics of teeth may require more visits.	Minimum of two.	

**Comparison of Direct Restorative Dental Materials**

FACTORS	AMALGAM	COMPOSITES Direct and Indirect	GLASS IONOMERS	RESIN- IONOMERS
General Description	A mixture of mercury and silver alloy powder that forms a hard solid metal filling. Self-hardening at mouth temperature.	A mixture of submicron glass filler and acrylic that forms a solid tooth-colored restoration. Self- or light-hardening at mouth temperature.	Self-hardening mixture of fluoride containing glass powder and organic acid that forms a solid tooth colored restoration able to release fluoride.	Self or light-hardening mixture of sub-micron glass filler with fluoride containing glass powder and acrylic resin that forms a solid tooth colored restoration able to release fluoride.
Principal Uses	Dental fillings and heavily loaded back tooth restorations.	Esthetic dental fillings and veneers.	Small non-load bearing fillings, cavity liners and cements for crowns and bridges.	Small non-load bearing fillings, cavity liners and cements for crowns and bridges.
Leakage and Recurrent Decay	Leakage is moderate, but recurrent decay is no more prevalent than other materials.	Leakage low when properly bonded to underlying tooth; recurrent decay depends on maintenance of the tooth-material bond.	Leakage is generally low; recurrent decay is comparable to other direct materials, fluoride release may be beneficial for patients at high risk for decay.	Leakage is low when properly bonded to the underlying tooth; recurrent decay is comparable to other direct materials, fluoride release may be beneficial for patients at high risk for decay.
Overall Durability	Good to excellent in large load-bearing restorations.	Good in small-to-moderate size restorations.	Moderate to good in non load-bearing restorations; poor in load-bearing.	Moderate to good in non load-bearing restorations; poor in load-bearing.
Cavity Preparation Considerations	Requires removal of tooth structure for adequate retention and thickness of the filling.	Adhesive bonding permits removing less tooth structure.	Adhesive bonding permits removing less tooth structure.	Adhesive bonding permits removing less tooth structure.
Clinical Considerations	Tolerant to a wide range of clinical placement conditions, moderately tolerant to the presence of moisture during placement.	Must be placed in a well-controlled field of operation; very little tolerance to presence of moisture during placement.		
Resistance to Wear	Highly resistant to wear.	Moderately resistant, but less so than amalgam.	High wear when placed on chewing surfaces.	
Resistance to Fracture	Brittle, subject to chipping on filling	Moderate resistance to	Low resistance to fracture.	Low to moderate resistance to

FACTORS	AMALGAM	COMPOSITES Direct and Indirect	GLASS IONOMERS	RESIN- IONOMERS
	edges, but good bulk strength in larger high-load restorations.	fracture in high-load restorations.		fracture.
Biocompatibility	Well-tolerated with rare occurrences of allergenic response.			
Post-Placement Sensitivity	Early sensitivity to hot and cold possible.	Occurrence of sensitivity highly dependent on ability to adequately bond the restoration to the underlying tooth.	Low.	Occurrence of sensitivity highly dependent on ability to adequately bond the restoration to the underlying tooth.
Esthetics	Silver or gray metallic color does not mimic tooth color.	Mimics natural tooth color and translucency, but can be subject to staining and discoloration over time.	Mimics natural tooth color, but lacks natural translucency of enamel.	Mimics natural tooth color, but lacks natural translucency of enamel.
Relative Cost to Patient	Generally lower; actual cost of fillings depends on their size.	Moderate; actual cost of fillings depends on their size and technique.	Moderate; actual cost of fillings depends on their size and technique.	Moderate; actual cost of fillings depends on their size and technique.
Average Number of Visits To Complete	One.	One for direct fillings; 2+ for indirect inlays, veneers and crowns.	One.	One.

NOTE: The information in this chart is provided to help dentists discuss the attributes of commonly used dental restorative materials with their patients. The chart is a simple overview of the subject based on the current dental literature. It is not intended to be comprehensive. The attributes of a particular restorative material will vary from case to case depending on a number of factors.

Dr. EICHMILLER. It is noteworthy that for more than a decade in our patient information on amalgam, the ADA has indicated the presence of mercury. To facilitate patient choice, we encourage private and publicly funded dental plans to cover a full range of restorative treatment options, not simply the least-costly option, which is usually dental amalgam. Unfortunately, many States continue to dramatically underfund their Medicaid and SCHIP dental programs.

In an effort to draw attention to this problem, this past February the ADA undertook a massive campaign to "Give Kids a Smile Program," to emphasize the need to improve access to dental care for children. This program treated an estimated 1 million children at approximately 5,000 locations in all 50 States, and we are working with some of your colleagues in the House and Senate to develop legislation that will focus on increasing access to oral health care for needy children.

Health care policy must be based on sound science because our patients deserve nothing less. Then I would like to set the record straight about a few of the misconceptions that some hold concerning dental amalgam.

The first is that amalgam is considered toxic: "Before it is placed in a patient and after it is removed from a patient, it is toxic in a patient's mouth." Dental amalgam is not the same as mercury. The mercury in the dental amalgam is chemically bound with other metals, including silver, copper, and tin. These components are bound into a hardened stable and safe substance.

The only relevant question is whether this substance creates a measurable negative effect on health, and dental amalgam does not. Like many substances used in health care, dental amalgam requires proper handling during the manufacture, shipping, storage, use, and disposal, in accordance with Federal, State, and local regulations.

Second is "the ADA attempts to conceal that mercury is a principal component of amalgam by calling the fillings 'silver.'" Dentists and scientists generally refer to this material as "dental amalgam." Many traditionally referred to these restorations as "silver fillings" because of the color of the material, differentiating them from gold fillings or the more-recently developed white fillings or composite resins. It is that simple. We always indicated the presence of mercury in our patient information on amalgam.

Third, "the ADA has a gag rule that prevents dentists from talking about the dangers of amalgam." The ADA neither has the power nor the desire to gag anyone. Rather, we support and defend the right of dentists to discuss freely, appropriately, and accurately all aspects of dental care with their patients. This information should be consistent with accepted science and the standard of care governing clinical practice.

That said, a dentist who recommends removal of a serviceable filling from a non-allergic patient claiming that doing so will remove toxic substances and cure some non-dental disease is acting unethically by misleading that patient about therapeutic value of the proposed treatment.

These are but a few of the misguided claims made by some concerning amalgam, and I would direct the members to our written testimony for a more complete discussion.

The ADA's mission is to protect the rights of dentists and their patients to choose the most appropriate material that is safe and effective, based on the individual needs of that patient. We remain committed to research on improving restorative materials, making composites stronger, more resistant, longer lasting, usable for a larger variety of cavity types.

Recently, our laboratories have developed composite resin to stimulate the natural healing abilities of teeth, rather than just repairing the damage done by decay. To reap the benefits promised by these and other improvements, however, we must work to incorporate them into the options that dentists and their patients have to treat oral disease, not eliminate safe and effective choices already providing relief to millions.

Thank you, Mr. Chairman. I would be happy to answer questions.

[The prepared statement of Dr. Eichmiller follows:]

51

**WRITTEN STATEMENT  
OF THE  
AMERICAN DENTAL ASSOCIATION  
TO THE  
U.S. HOUSE OF REPRESENTATIVES  
GOVERNMENT REFORM  
SUBCOMMITTEE ON  
HUMAN RIGHTS AND WELLNESS  
MAY 8, 2003**

The American Dental Association is devoted to improving the oral health of the public. The ADA has achieved considerable success in meeting this goal. In no small part through the efforts of the ADA and its members, Americans today enjoy the best oral health in the world. As the leader of a science-based profession, the ADA is open to new scientific information and welcomes the opportunity to debate it according to the standards that prevail in the scientific community.

As the very event of this hearing proves, dental amalgam remains the subject of debate and controversy. Unfortunately, much of the information we encounter about amalgam and the American Dental Association's positions and policies regarding it are simply wrong. We are grateful that the subcommittee has invited the ADA to appear at its hearing, and we offer this testimony to set the record straight.

The ADA submitted extensive documentation on November 14, 2002, for a hearing before the House Committee on Government Reform, to support our assertion that, according to the best available scientific information, dental amalgam is a safe and effective restorative material, even though mercury is a component of this alloy. As stated in our written testimony last year, "If the Association believed that dental amalgam posed a threat to the health of dental patients, we would advise our members to stop using it. But the best and latest available scientific evidence indicates that it is safe." A copy of that submission, which remains accurate today, is attached (*Attachment I*).



In fact, the major U.S. and international scientific and health bodies—organizations responsible for protecting the public’s health—have all stated that dental amalgam is a safe restorative material. These bodies include the National Institutes of Health (NIH), the U.S. Public Health Service (PHS), the Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), among others.

It is not the intent of the ADA to promote amalgam over any other safe and effective material dentists use to restore decayed teeth, but our organization believes very strongly that Americans should not be deprived of this valued—and in some instances—irreplaceable treatment option. For instance, in large cavities in the rear teeth, where chewing forces are the greatest, or in cavities below the gum line, amalgam is used because of its durability and because it is one of the best filling materials that can be placed in areas of the mouth that are difficult to keep dry.

We will focus this statement on issues relating to the ADA’s role in promoting the development of alternative dental materials and patients’ choice among appropriate treatment options.

### **Making Clinical Dentistry Better**

For 75 years, the ADA, through the Paffenbarger Research Center of the ADA Foundation in Gaithersburg, Maryland, has been working to develop and improve dental equipment and materials—including improved filling materials. The labs at PRC have a

long history of developing technologies that increase the treatment options available to dentists and their patients. The ADA Foundation's mission is to "make clinical dentistry better," and the Foundation is proud of its success in advancing both the prevention and treatment of dental disease.

PRC researchers invented composite resin filling materials—so called “white fillings”—in the late 1950s, and they are the most commonly used filling material today. In addition to making possible the immediate placement of strong tooth-colored fillings, this discovery led to the dental sealants used to prevent decay on the biting surfaces of teeth.

Research is still ongoing in the PRC labs on ways to make composite resins stronger, more wear resistant, longer lasting and useful for different kinds of fillings. A recent invention has been the incorporation of new technologies into composite resins that help them actually stimulate the natural healing abilities of teeth, rather than just repairing damage done by dental decay. This should result in less need for replacement of worn, broken or decayed fillings, root canals and implant replacements for teeth. Moreover, in the early 1980s PRC researchers invented adhesives that could reliably bond fillings to teeth, making it much easier to place smaller, more conservative fillings. PRC researchers now are working on the next generation of decay-preventing toothpastes and mouth rinses and cavity-fighting candies and chewing gums.

### **Choosing a Filling Material**

The ultimate decision about what filling material to use is best determined by an informed patient in consultation with his or her dentist. Toward that end, the ADA has developed a chart (*Attachment 2*) that compares restorative dental materials. The chart provides comparative information on thirteen distinct factors, including durability, clinical considerations, leakage and recurrent decay, and resistance to wear and fracture. This information sheet has been widely circulated through ADA publications and is on our website. Recently, the ADA Council on Scientific Affairs published a companion piece for dentists on direct and indirect restorative materials, *JADA*, April 2003.

The ADA does not recommend or promote any single restorative material. The Association believes that patients, in consultation with their dentists, should have a full range of treatment options, including filling materials, basing decisions on what is most clinically appropriate to meet each patient's needs. Dental amalgam is but one of many dental filling materials that the ADA evaluates to help dentists and their patients choose safe, appropriate and effective treatments.

Esthetic dentistry is increasingly popular, and the use of dental amalgam is declining, as more patients and dentists choose newer, more natural-looking, tooth-colored restorative materials when such treatment is a viable option. Yet, dentists and patients still value amalgam because of its unique qualities, and the ADA is therefore committed to protecting the patient-doctor decision to select this durable, cost-effective material among the safe options available for restoring decayed teeth.

Dentistry has no vested interest in the continued availability of amalgam beyond its utility as a safe option for restoring decayed teeth. Our concern is for patient choice, because alternative materials generally cost more, involve longer, more complex procedures to place and, in some cases, are less durable.

The ADA publishes brochures (*Attachment 3*), which dentists distribute to their patients - that accurately state the pros and cons of many dental treatments, including fillings. The ADA's web site also contains a wealth of information about dental filling choices including ionomers, composites, gold, porcelain, as well as amalgam (<http://www.ada.org/public/topics/fillings.html#Restoring%20Your%20Smile>).

### **Principles of Practice: ADA's Code of Professional Conduct**

The ADA has gone one step further in its commitment to providing patients with the best possible information about all aspects of oral health and dental care. We have developed fundamental principles in our Code of Professional Conduct, to which all members voluntarily agree to abide as a condition of membership, that stress patient autonomy, nonmaleficence, beneficence, justice and veracity. As stated in the Code's preamble, "The ethical dentist strives to do that which is right and good. The ADA Code is an instrument to help the dentist in this quest."

The following are excerpts from the ADA Code of Professional Conduct that put in context the Association's position about patients' right to complete and accurate information about their dental care:

**Section 1 — Principle: Patient Autonomy** ("self-governance"). The dentist has a duty to respect the patient's rights to self-determination and confidentiality.

*This principle expresses the concept that professionals have a duty to treat the patient according to the patient's desires, within the bounds of accepted treatment, and to protect the patient's confidentiality. Under this principle, the dentist's primary obligations include involving patients in treatment decisions in a meaningful way, with due consideration being given to the patient's needs, desires and abilities, and safeguarding the patient's privacy.*

**1.A. Patient Involvement**

The dentist should inform the patient of the proposed treatment, and any reasonable alternatives, in a manner that allows the patient to become involved in treatment decisions.

**Section 3 — Principle: Beneficence**

**Principle: Beneficence** ("do good"). The dentist has a duty to promote the patient's welfare.

**3.C. Research And Development.**

Dentists have the obligation of making the results and benefits of their investigative efforts available to all when they are useful in safeguarding or promoting the health of the public.

**Section 5 — Principle: Veracity**

**Principle: Veracity** ("truthfulness"). The dentist has a duty to communicate truthfully.

**5.A Representation of Care.** Dentists shall not represent the care being rendered to their patients in a false or misleading manner.

**5.B.6. Unnecessary Services.** A dentist who recommends and performs unnecessary dental services or procedures is engaged in unethical conduct.

**5.D.2 Marketing or Sale of Products or Procedures (excerpt)**

Dentists should not induce their patients to purchase products or undergo procedures by misrepresenting the product's value, the necessity of the procedure or the dentist's professional expertise in recommending the product or procedure.

With these excerpts from the ADA Code as context, consider the Code's professional conduct provision and advisory opinion dealing specifically with dental care and dental restorative materials:

5.A. Dentists shall not represent the care being rendered to their patients in a false or misleading manner.

**5.A.1. Dental Amalgam and Other Restorative Materials.** Based on available scientific data the ADA has determined that the removal of amalgam restorations from the non-allergic patient for the alleged purpose of removing toxic substances from the body, when such treatment is performed solely at the recommendation or suggestion of the dentist, is improper and unethical. The same principle of veracity applies to the dentist's recommendation concerning the removal of any dental restorative material.

In other words, the ADA Code obliges dentists to inform patients of the proposed treatment and any reasonable alternatives in a way that allows the patients to make an informed choice about their dental treatment. In providing this information to patients, the code obliges dentists to be truthful and not misrepresent the therapeutic benefits of the treatment. These ethical principles apply to all dental restorative materials, whether it is gold alloy, resin composites, glass ionomers or dental amalgam.

**Myth vs. Fact**

Despite the ADA's straightforward policies regarding patient autonomy and dentist veracity to foster that autonomy, myths and misstatements abound about the ADA, its

positions on dental amalgam and the scientific basis for those positions. The following are but a few of the misstatements, with the Association's responses.

**Myth:** *The ADA and dentists attempt to conceal that mercury is a principal ingredient in amalgam by calling the fillings "silver."*

**Response:** Dentists and scientists generally refer to this material as "dental amalgam." However, some dentists and many patients refer to these restorations as "silver fillings," because, traditionally, it was a way to distinguish them by appearance from "gold fillings" (gold) and the more recently developed "white fillings" (composite resin). In fact, the word amalgam means an alloy of mercury with another metal.

**Myth:** *The ADA somehow profits from amalgam, either by holding patents or taking money from amalgam manufacturers.*

**Response:** Scientists at the ADA Foundation (ADAF) obtained two patents in the early 1970s for changes in the formulation of dental amalgam. These patents were never exploited commercially and have long since expired. Neither the ADA nor its foundation earned a cent from the patents.

In the past, the ADA charged a modest fee to manufacturers to help cover a small part of the cost of evaluating products submitted to the ADA's Seal of Acceptance program. The Seal program evaluates dental products according to stringent, objective criteria of safety and effectiveness and awards the Seal to products that are found in tests to meet

these criteria. Participation is strictly voluntary, and the fee was charged regardless of whether the product was accepted or not. The ADA receives no money from the sale of an accepted product.

The total cost to maintain the Seal program is approximately \$1.5 million annually. Fees paid by amalgam manufacturers to the Seal program totaled about \$5,100 per year, or less than one-half of one percent of the program's total costs. ADA members pay most of the cost of operating the Seal program as a service to the public and the profession. On July 1, 2002, the ADA eliminated fees for evaluating all professional products.

**Myth:** *The ADA has a "gag rule" that prevents dentists from talking about the "dangers" of amalgam.*

**Response:** The ADA supports and defends the right of dentists to discuss freely, appropriately and accurately all aspects of dental care with their patients. This includes answering any questions patients might have about the mercury content in dental amalgam. Information that a dentist gives a patient should be consistent with accepted science and the applicable standard of care governing clinical practice. That said, a dentist who recommends removal of a serviceable amalgam from a non-allergic patient claiming that doing so will remove toxic substances or cure some systemic disease is acting unethically, by misleading the patient about the therapeutic value of the proposed treatment.



The ADA has neither the interest nor the desire to “gag” anyone. But dentists are held to the ethical standard that what they advise their patients should be truthful and not deceptive.

*Myth: Further, during the November 14, 2002, hearing, Rep. Watson claimed that the Iowa Dental Examiners Board “lifted the gag rule” on Iowa dentists regarding amalgam.*

**Response:** A statement from the dental board tells a much different story. While the Iowa Dental Examiners Board did announce that it would make minor changes to its rule preventing dentists from initiating the removal of serviceable amalgam restorations from the non-allergic patient for the “alleged purpose of removing toxic substances from the body,” the Board stated: “Although the sub rule [on removal of amalgams] is being rescinded at this time to allow the Board to consider whether to redraft another sub rule to specifically address amalgam restorations, the Board’s position concerning the removal of serviceable restorations has not changed. In the absence of this specific sub rule, the Board will continue to pursue disciplinary action in appropriate cases...the Board is authorized to prosecute a dentist for making medical diagnoses outside the scope of the practice of dentistry, incompetent or substandard practice, fraudulent or misleading representations in the practice of dentistry, willful or gross malpractice or **subjecting a patient to needless or harmful treatment regimes** (emphasis added).”

Contrary to how some may portray the action, the Dental Board of Examiners specifically states that, “The Board is rescinding the sub rule in light of concerns that the rule may not be sufficiently detailed to fully guide dentists in adhering to prior decisions of the Board on the removal of restorations.” It is clear that the Dental Board of Examiners in Iowa acted to protect the public from unscrupulous treatments and to ultimately provide licensed dentists with more detailed guidance on appropriate professional conduct.

Worse than the misinformation about the ADA is the seemingly limitless number of claims about dental amalgam that purport to be based on science. Here are a few of the more persistent and pervasive ones.

**Myth:** *Mercury is toxic; therefore, amalgam is toxic.*

**Response:** Like virtually every substance to which people are exposed, mercury can be toxic in specific forms and specific doses. It is important to distinguish dental amalgam, a solid intermetallic compound of mercury, silver, tin and copper, from mercury.

Exposure to dental amalgam cannot correctly be compared to exposure to an equivalent amount of mercury, whether in the human body or the environment. Nor is the mercury contained in amalgams present as methylmercury, or readily converted to this organic form, which is of most concern to human health.

**Myth:** *Amalgam is considered toxic before it is placed in a patient and after it is removed from a patient; therefore it is toxic in a patient's mouth.*

**Response:** Dental amalgam is not the same as mercury. The mercury in dental amalgam is chemically bound with other metals, including silver, copper and tin. These components are bound into a hard, stable and safe substance. The only relevant question is whether a substance creates a measurable, negative effect on health, and dental amalgam does not. Like many substances used in health care, dental amalgam requires proper handling during manufacture, shipping, storage use and disposal in accordance with federal, state and local laws and rules. The ADA strongly recommends recycling amalgam waste, but this does not affect whether amalgam is safe when used appropriately to restore decayed teeth.

**Myth:** *There is growing evidence that amalgam fillings are associated with a number of disorders from neurological problems to heart disease.*

**Response:** The **FDI World Dental Federation** and the **World Health Organization of the United Nations** state, “No controlled studies have been published demonstrating systemic adverse effects from amalgam restorations.”<sup>1</sup> The **U.S. Food and Drug Administration (FDA)** has said, “FDA and other organizations of the U.S. Public Health Service (USPHS) continue to investigate the safety of amalgams used in dental restorations (fillings). However, no valid scientific evidence has shown that amalgams cause harm to patients with dental restorations, except in the rare case of allergy.”<sup>2</sup> In July, 2001, the associate director for science of the **CDC** stated, “[W]e believe it’s

<sup>1</sup> FDI World Dental Federation/WHO Consensus Statement on Dental Amalgam, 1997.

<sup>2</sup> U.S. Food and Drug Administration, Center for Devices and Radiological Health, *Consumer Update: Dental Amalgams (Updated 12/31/2002)*.

inappropriate to stop using or to recommend removing amalgam. There's no current scientific evidence that amalgam poses a risk to human health, except for the exceedingly small number of allergic reactions."<sup>3</sup> A 2003 report by the CDC found that most of the mercury in people's blood results from their diets, specifically by consuming fish that contains the organic form of mercury known as methylmercury. The report went on to say that the mercury levels in the U.S. population were "well below occupational thresholds of concern." In addition, the report observes that, "Finding a measurable amount of mercury in blood or urine does not mean that the level of mercury causes an adverse health effect."<sup>4</sup>

In fact, the support and advocacy organizations for many of the conditions proponents of this bill often cite as being caused by dental amalgam have specifically gone on record as finding no link between dental amalgam and specific conditions. The **Alzheimer's Association** states, "According to the best available scientific evidence, there is no relationship between silver dental fillings and Alzheimer's. . ."<sup>5</sup> The **National Multiple Sclerosis Society** maintains, "There is no scientific evidence to connect the development of MS or other neurological diseases with dental fillings containing mercury."<sup>6</sup> The **Autism Society of America** has gone on record saying, "There is no known single cause for autism, but it is generally accepted that it is caused by abnormalities in brain structure or function. Brain scans show differences in the shape and structure of the brain in

<sup>3</sup> Dr. Bill Kohn, associate director for science, Centers for Disease Control and Prevention (CDC), Division of Oral Health, July 2001.

<sup>4</sup> Centers for Disease Control, January 2003, Second National Report on Human Exposure to Environmental Chemicals.

<sup>5</sup> Alzheimer's Association, Q&A: About Dental Fillings and Alzheimer's Disease, October, 2001

<sup>6</sup> The National Multiple Sclerosis Society, The MS information Sourcebook, Dentistry, 2001.

<sup>7</sup> Immunization Safety Review: Thimerosal Containing Vaccines and Neurodevelopmental Disorders. Immunization Safety Review Committee, Board on Health Promotion and Disease Prevention 2001.

autistic versus non-autistic children. Researchers are investigating a number of theories, including the link between heredity, genetics and medical problems. In many families, there appears to be a pattern of autism or related disabilities, further supporting a genetic basis to the disorder. While no one gene has been identified as causing autism, researchers are searching for irregular segments of genetic code that autistic children may have inherited. It also appears that some children are born with a susceptibility to autism, but researchers have not yet identified a single 'trigger' that causes autism to develop." The Institute on Medicine has concluded that there was no evidence linking mercury to any of the pathophysiological changes known to be associated with autism, such as genetic defects.<sup>7</sup>

**Myth:** *Mercury released from a mother's amalgam fillings is neurotoxic to a developing fetus and nursing infants.*

**Response:** Several studies have examined the levels of mercury (from fish and amalgam) in the blood of pregnant women and in breast milk. The conclusions were that mercury is found in blood and breast milk<sup>1,2,3,4</sup>, that the contribution of mercury to the fetus from dental amalgam was insignificant compared to the contribution from maternal fish consumption<sup>2</sup>, and that the low levels of mercury detected (from either source) would not be expected to have any adverse effects on infants<sup>1,2,3</sup>. In fact, one study<sup>3</sup> showed that the mercury level in commercial formula was higher than the mercury level in the breast milk of mothers with amalgam fillings.

There is another issue that requires clarification. Rep. Watson's bill, H.R. 1680, the "Mercury in Dental Filling Disclosure and Prohibition Act," states that the "California Dental Association, by court order, is sending health warnings about mercury fillings to California dental offices for posting ... which read, "NOTICE TO PATIENTS: PROPOSITION 65 WARNING: Dental amalgam, used in many dental fillings, causes exposure to mercury, a chemical known to the state of California to cause birth defects or other reproductive harm."

On the contrary, the notice provides only that amalgam contains mercury and that mercury—not amalgam—has been determined by the State of California to cause adverse health effects. The California Dental Association's (CDA) action demonstrates dentistry's commitment to comply with the 1986 voter initiative (Proposition 65) mandating certain warnings. CDA does not disavow its faith in amalgam as a safe and effective dental restorative material for dental treatment.

<sup>1</sup> Oskarsson A, Schutz A, Skerfving S, Hallen IP, Ohlin B, Lagerkvist BJ. Total and inorganic mercury in breast milk and blood in relation to fish consumption and amalgam fillings in lactating women. *Arch Environ Health* 1996;51:234-241.

<sup>2</sup> Drexler H. The mercury concentration in breast milk resulting from amalgam fillings and dietary habits. *Environ Res.* 1998;77:124-91.

<sup>3</sup> Drasch G, Aigner S, Roeder G, Staiger F, Lipowsky G. Mercury in human colostrum and early breast milk. Its dependence on dental amalgam and other factors. *J Trace Elem Med Biol.* 1998;12:23-7.

<sup>4</sup> Ask BK, Vahter M, Petersson-Grawe K, Glynn A, Cnattingius S, Darnerud PO, Atuma S, Aune M, Becker W, Berglund M. Methylmercury and inorganic mercury in Swedish pregnant women and in cord blood: influence of fish consumption. *Environ Health Perspectives* 2003 [ehponline.org \(http://dx.doi.org/\)](http://dx.doi.org/).

Notably, the court was uncomfortable with approving any warning that so manifestly contradicted the Food and Drug Administration's conclusions that amalgam is a safe and effective dental restorative material. Refusing to approve an early proposal as unduly alarming to the consumer, the court added the following wording: "The U.S. Food and Drug Administration has studied the situation and approved for use all dental restorative materials. Consult your dentist to determine which materials are appropriate for your treatment."

### **Access to Care for the Underserved**

And what of the millions of Americans who do not have access to dental care? The ADA believes that it is a national disgrace that so many Americans, particularly children, lack dental care, including all appropriate treatment options. As an association, we took the recent Surgeon General's "Call to Action" to heart. As such, the ADA continues to advocate for improved access to care for underserved populations and encourages coverage of the full range of restoration treatment options, not simply the least costly option, which is usually dental amalgam. To heighten awareness of this problem, while working to expand access to care, the ADA:

- Undertook a massive campaign this past February, the "Give Kids A Smile" program, which emphasized the need to improve access to dental care for children. This program treated an estimated one million children at approximately 5,000 locations in all 50 States.
- Advocated for S. 1626 and H.R. 3659 in the 107<sup>th</sup> Congress, the "Children's Dental Health Improvement Act, which would provide support to states as they determine how best to improve access to dental care for children in their communities. While most Americans have access to the best oral health care in the world, low-income children suffer disproportionately from oral disease. Even as our nation's health has progressed, dental caries (tooth decay) remains the most

prevalent chronic childhood disease. This year we are working with members of the House and Senate again on the development of similar legislation that will focus on increasing access to oral health care for needy children.

- Promotes legislation, the "Medically Necessary Dental Care Act of 2003," to assist certain medically compromised senior citizens in obtaining necessary dental care in situations where oral infection interferes with the treatment of their underlying medical condition. Oral health care would be extended to people suffering from head or neck cancer, lymphoma, and leukemia and requiring prosthetic heart valve replacement or organ transplantation.
- Agrees that choice in dental filling materials is important and that private and public insurance plans should cover a full range of treatment options, not simply the least costly option, which is usually dental amalgam. To that end, the ADA encourages our state associations to continue to advocate that all state Medicaid programs and private plans reimburse for all dental filling materials.

In conclusion, health care policy must be based on sound science because our patients deserve nothing less. As the leader of a science-based profession, the ADA is open to new scientific information and welcomes the opportunity to debate it according to the standards that prevail in the scientific community. In keeping with numerous U.S. and international organizations responsible for protecting the public's health, the American Dental Association reiterates its position that dental amalgam is a safe restorative material whose continued use has value.

Therefore, we oppose H.R. 1680, the "Mercury in Dental Filling Disclosure and Prohibition Act," which would eliminate this viable option for treating dental disease.



Mr. BURTON. Dr. Berlin has worked with the World Health Organization, and you were chairman of that committee during the early nineties on metals and the toxic components of them, right?

Dr. BERLIN. Inorganic mercury was one document, and the other committee was methyl mercury.

Mr. BURTON. What did the World Health Organization say about those metals being used in human beings?

Dr. BERLIN. Well, 1990, we said in the document that the information available, when it comes to low doses of exposure, low levels of exposure, wasn't enough to make an assessment, but we said also that we didn't exclude the possibility of adverse effects. We clearly stated—we didn't say it was safe. We said that we didn't have enough information to make any assessment.

Mr. BURTON. But you were the chairman of that, were you not?

Dr. BERLIN. Yes.

Mr. BURTON. And didn't you just say a few minutes ago that you didn't think amalgams containing mercury were suitable for human beings?

Dr. BERLIN. I didn't get your question.

Mr. BURTON. Didn't you just say in your testimony that mercury in amalgams was not suitable for human beings?

Dr. BERLIN. That's right, today, because—yes.

Mr. BURTON. That is fine.

Now, Dr. Eichmiller, how can you say that the World Health Organization says this is safe?

Dr. EICHMILLER. The World Health Organization, in their most recent statement on dental amalgam, has held that they do not see any adverse effect from the use of amalgam.

Mr. BURTON. Well, this guy sitting right next to you, a very eminent scientist from Sweden, who headed the panel back in the early nineties, now says that he doesn't think that it is safe for humans to use those. How do you respond to that?

Dr. EICHMILLER. That is not the current statement of the World Health Organization.

Mr. BURTON. So you think he is full of prune juice, right?

Dr. EICHMILLER. Excuse me. This was put forward today, and I have just seen testimony this morning, but that is not the current World Health Organization statement, no.

Mr. BURTON. Are you familiar with this thing called the ADA News?

Dr. EICHMILLER. Yes, I am.

Mr. BURTON. This is your publication. You have an article here that says, "ADA's best management practices offered," and it says here what you should do with amalgams. It says, "Do recycle used, disposable amalgam capsules. Do use chair-side straps to retain amalgam and recycle the content. Do appropriately disinfect extracted teeth that contain amalgams." And it says, "Don't dispose of extracted teeth that contain amalgam restorations in biohazard containers, infectious waste containers, red bags, or regular garbage. Don't flush amalgam waste down the drain or toilet."

Why wouldn't you want to do that?

Dr. EICHMILLER. Those recommendations are primarily based upon proper handling of waste amalgam both from an environmental standpoint and from the standpoint of infection control.

Mr. BURTON. OK, but I mean you think there is a hazard or else you wouldn't have these recommendations made in your publication, right?

Dr. EICHMILLER. Those are done for the proper handling and recycling of amalgam material.

Mr. BURTON. Right, I know, but there is a reason for that. There is something that you are concerned about being put into the environment, and that is the mercury in amalgams, is that not correct?

Dr. EICHMILLER. It is correct that we would rather see the mercury, yes, absolutely, we would rather see the mercury recycled and not put into the environment.

Mr. BURTON. Because you don't want it in waste water treatment centers, where they clean that waste water treatment in the process and put it back out into water that goes back out and is consumed by human beings? You wouldn't want that mercury out there floating around getting back into human beings when they ingest that, right?

Dr. EICHMILLER. Waste water treatment centers are subjected to regulations which restrict—

Mr. BURTON. I know, I know.

Dr. EICHMILLER [continuing]. The amount of mercury they can emit, and we are cooperating with them in trying to reduce their mercury burden through these best management practices.

Mr. BURTON. That is why you don't want to flush this down the toilet or down the drain?

Dr. EICHMILLER. That is correct.

Mr. BURTON. Now when I had my teeth filled with mercury, with amalgams, I remember he mixed it up, you know, in one of those things that mixed it up real quickly, and then he put it in some kind of an instrument that he scrunched into my tooth. You know, he shoves it up in there.

I recall very clearly little fragments falling down into my mouth that he tried to suck out with some kind of a vacuum cleaner, but all of it didn't get sucked out. A lot of it went into my body. What do you think happened to that stuff? It was mercury. You know part of it was mercury and it wasn't hard because he was putting it in. Do you think there was a danger there at all?

Dr. EICHMILLER. Elemental mercury swallowed has a fairly short half-life and a fairly low absorption, and we have not seen any research to show that scrap amalgam during placement would cause any adverse effect on health.

Mr. BURTON. Dr. Lorscheider, how do you respond to that?

Mr. LORSCHIEDER. Well, first of all, Dr. Eichmiller, in his initial statement, the very first point that he raised, that mercury is bound in amalgam and that this mercury is stable, is patently incorrect.

The American Society of Metallurgy's Handbook makes a comparison of dental amalgam with another metal that we are all familiar with, stainless steel. The principal metal in amalgam is mercury, 42 to 54 percent, depending upon the manufacturer. The principal metal in stainless steel is iron. Now the American Society of Metallurgy, notwithstanding the American Dental Association, classifies this mixture of mercury with other metals, classifies this

amalgam as a solid emulsion, whereas they classify stainless steel and the iron within it as a true alloy.

The reason for this is that there is covalent bonding of the metals in stainless steel, but there is no covalent bonding whatsoever in the metals that are in dental amalgam.

Mr. BURTON. Put that in laymen's terms, so everybody understands it.

Mr. LORSCHIEDER. OK. What this means is that the mercury that is put into an amalgam is not chemically bound, as the dentists would like you to believe, but, in fact, is simply a solid emulsion. It is a free substance.

The evidence for this, which the American Society of Metallurgy gives, is that with respect to stainless steel, iron no longer rusts once it is put into stainless steel, as a component of stainless steel. In other words, the original physiochemical properties of iron have changed irreversibly because of this covalent chemical bonding.

Mr. BURTON. Right.

Mr. LORSCHIEDER. But in the case of amalgams, mercury still vaporizes and comes off of amalgams. Now that is the first point that I wanted to make about what Dr. Eichmiller said.

The second point is with respect to his comments on the stability of mercury in amalgams. Congressman Watson made reference to the California State Dental Board's hearings last fall. This was a hearing which both I and Dr. Haley were invited to speak at, and the topic was pregnant women and children are at increased risk for exposure to mercury from dental amalgam.

Just to cite one paper, the scientific evidence clearly shows that human fetal liver and kidney and also infant kidney and brain mercury burdens are directly correlated with their mother's amalgam load. In other words, a mother that has a lot of amalgam fillings, her newborn invariably, or in the case of some these were aborted fetuses, her fetal or newborn will contain significantly more mercury than if she did not have amalgam fillings.

So here you have human clinical evidence done in pathology labs in medical schools showing that this mercury in amalgam is not stable, and you also have evidence from the American Society of Metallurgy classifying dental amalgam as a solid emulsion. There is no chemical bonding—repeat: no chemical bonding—of mercury to any of the other metals.

Mr. BURTON. Dr. Haley, I think you testified about this before, but you said that you dropped amalgams in a glass of water. Can you, once again, reiterate what happened when that happened?

Mr. HALEY. With these experiments that were done, you would soak amalgams in water. You take aliquots out and you test them for toxicity using common enzymology.

Mr. BURTON. And what do you find?

Mr. HALEY. Well, they are toxic. I mean, his comments that they are not toxic, they fly in the face of stuff that has been published in the *Journal of Dental Research*.

I just gave a reference up there where they said solutions in which amalgams have been soaked were severely cytotoxic. There was a paper that came out just this year again saying, you know clamoring, saying they were the first people to show neurotoxicity

from dental amalgams by soaking amalgams in solution and exposing them to neurons and killing the neurons.

I would like to point out one other thing.

Mr. BURTON. OK.

Mr. HALEY. When he says NIH, FDA, and WHO agrees with the American Dental Association, nothing could be further from the truth. That is like saying a committee of Republicans say something that I don't agree with, and so, therefore, I am wrong.

These committees, if you go back to the committees he is making reference to, there were committees in the National Institutes of Dental and Cranial Facial Research and in the FDA and in WHO that were primarily made up of dentists. I took the time to go back and look at the credentials of these people to see what mercury toxicologist they had on those committees, what neurologists they had on those committees, what publications members of that committee had done, because I couldn't recognize very many of the names, none of them, to be honest with you.

What I would say, there is a big difference from having a committee in WHO that is primarily constructed by the dental organization to have a meeting and release a report than have all of the World Health Organization agree. I would suggest that your committee go and look at the, "expertise" of the people that were on these committees that he says support them.

So I just think that sometimes it is a ploy to have a committee that you have set up that will agree with what you want to have them agree with and then say all of the NIH agrees with you. I doubt that the American Medical Association would agree that it is a good idea to have something in your mouth that increases your mercury body burden by 80 percent, especially in light of the National Academy of Sciences study and the EPA study that says 8 to 10 percent of American women have such high mercury circulating in their blood that their children are at risk of neurological damage when they are born.

I mean, so common sense would say you get rid of that source, if you look at the science, I mean published science and refereed journals, and I really find it objectionable that he would sit here and say that mercury doesn't come out of amalgams. I mean I am a chemist. That is easy to do.

I do know that most dental schools don't have one instrument to measure mercury coming off amalgam, and we have five in our department. It comes off. It is simple to measure, and it comes off at a rate that anybody would say is unacceptable for human health.

I think that people like Dr. Eichmiller is giving dentistry a bad name. I have a lot of good friends who are dentists who are saying they are wanting somebody to stand up and say, "What the hell is the truth?" Yet, you go to the UK dental school and they will tell you, well, the mercury coming off of dental amalgam isn't very much. And they use the weasel terms: "We estimate" or "It is just a little bit" or "It is an insignificant amount." Scientists don't talk that way. They talk in micrograms per kilogram body weight or some other measurable unit.

If they want to show—and he has been in charge of a major research unit—he should have published the amount of mercury coming off per centimeter squared of all of the amalgam fillings that

the FDA and ADA have approved. I would like to know they have done that, why they haven't done it if they haven't, and where in the hell did they publish, if they did, because this is something that he should have done a long time ago.

Mr. BURTON. That's OK. Would you like to respond, Dr. Eichmiller?

Dr. EICHMILLER. There has been a fairly longstanding debate about what the proper measurement method should be for mercury coming off of amalgam. I don't think that the scientific community denies that there is mercury vapor that comes off of amalgam. The debate has been, how much?

Where I think many of the studies that you are referring to have been done; in fact, have been done quite extensively over the years. I think if you go back to the work Mackert and Bradts, they have pretty clearly shown that there is mercury released and it is at a known but very low level.

Mr. BURTON. Let me ask you, so the ADA does admit that there is a mercury vapor that comes off of the amalgams? Is that correct?

Dr. EICHMILLER. Would you repeat this?

Mr. BURTON. The ADA, for which you are a spokesman, admits that there is a mercury vapor that does come off of the amalgams?

Dr. EICHMILLER. Yes, we have never denied that.

Mr. BURTON. Is there anybody that you know of or any scientific expert that would say that any amount of mercury vapor going into a person on a constant basis wouldn't be a risk?

Dr. EICHMILLER. I couldn't speak to that.

Mr. BURTON. You can't speak to that?

Dr. EICHMILLER. I wouldn't know, no.

Mr. BURTON. Well, the reason I asked—I mean, can you cite any scientist that would say or any doctor that would say that mercury vapor being put into a person's mouth on a constant basis would not be a risk? Just any scientist that you know that would say, "Mercury vapor in anyone's mouth on a constant basis would not be a neurological risk?"

Dr. EICHMILLER. The debate here is dose. We know that mercury vapor is released, but what we don't know is, or what we don't see is, that it is released in a sufficient quantity to be a risk.

Mr. BURTON. What is a sufficient quantity?

Dr. EICHMILLER. Right now, most of the data is from industrial data, looking at vapor levels, and the level has been set at around 50 micrograms per cubic meter for air. However, I think Dr. Berlin indicated that the World Health Organization I think is looking at lowering that some, but it is still—we plainly fall well within.

Mr. BURTON. If I have five fillings in my mouth that are amalgams, how much vapor comes off of that?

Dr. EICHMILLER. That I don't know.

Mr. BURTON. Well, that is the point: You don't know. People are chewing and brushing their teeth and being exposed to this vapor on a regular basis, and the people that you represent don't know.

Dr. EICHMILLER. Excuse me, but I don't know off the top of my head.

Mr. BURTON. I certainly don't want to beat up on you because I know that you probably feel like that when you leave this place, but the fact of the matter is we have got millions and millions of

people that have these things in their mouth. I was one of them until my dentist out there very kindly got it out of there.

But the fact is there is a risk factor, and you don't know how many micrograms, or whatever, is being emitted from these amalgams and you don't know how much per body weight is going to adversely affect people. It seems to me that the ADA, if they are concerned about humanity and the people that they serve, would want to double-check that and have scientific research done to make sure that they are protecting the American public.

Now if they don't, I think there is a risk factor here because these hearings over the next year, 2 years, 3 years, however long I am chairman, however long will they go on, we are going to build-up a body of evidence I think that is going to show that there is a risk factor. I think the ADA, or any agency or any organization that continues to deny that there is a risk factor, in view of the facts that are being built up over this period of time, are going to leave themselves open to all kinds of potential lawsuits.

It seems to me that the prudent thing to do would be get on with research with the ADA to make sure that you guys aren't stepping on a land mine. Do you see what I am saying? I really, for the sake of your dentists around the country, I think that if there is any doubt whatsoever about the veracity of what has been said by these gentlemen or yourself, then there ought to be a scientific study done by the organization itself to protect itself against the potential of litigation down the road.

Yes, sir, Dr. Haley?

Mr. HALEY. I am chairman of the chemistry department that has a building that is 40 years old, and we have threats to shut down the water supply to our building because the water going out and the effluent is too toxic for them, too high to take, and it is much less than what would be in the saliva of anybody with a single amalgam filling.

I would point out that chemistry has known for at least 20 to 30 years how to accurately measure mercury coming off of any substance. To say that we don't know how much mercury will come off of a amalgam filling is silly. I mean it is preposterous. Anybody, any chemistry department, if you call them—and I would suggest you not believe me, but call chemistry departments and say, "Can you accurately measure to less than a microgram level per day how much mercury comes off of a solid, fixed substance?" They would tell you they can.

This data should have been published, should have been done by the American Dental Association or the FDA or the NIH a long time ago. This is not rocket science. This is as simple as chemistry gets to measure mercury coming off of a hard substance such as an amalgam.

Why this isn't done, well, it doesn't baffle me. I think I truly understand that it is not for good reasons. It is something that should be done, that has been done, and why the ADA can make the claim that we don't know what is just a little bit—and his reference to Dr. Mackert, Dr. Mackert estimated the amount of mercury coming out of an amalgam filling by using a vapor sniffer or something measuring it in the mouth, which is one of the most inaccurate ways of doing it.

But making amalgams outside the mouth, leaving them untouched, and measuring the mercury that comes off in the air or in water or any solution you want is very easy to do. It has been done several times. I think this is something that the American public should be made aware of. It is not rocket science.

Mr. BURTON. Dr. Lorscheider, do you have any comment on that?

Mr. LORSCHIEDER. Well, I am surprised at Dr. Eichmiller's comment that, even though he does concede that mercury does come off of amalgams, first, he claimed that dentistry has always admitted that. I can tell you that before 1985 they did not admit that, but after 1985, as ours and other papers began to come out in the literature, they had to concede that mercury does come off of fillings.

Now if he claims that dentistry believes this mercury to be a very small amount, in the Commission review article that I submitted to you, there is a reference, No. 17, by the World Health Organization. This was a committee chaired by Dr. Lars Friberg. They published a document in 1991 on inorganic mercury.

On page 36 of this document is a very nice table showing the sources of all mercury exposure that humans would incur. In that table, it includes air, water, diet, foodstuffs, and also dental amalgams. And the No. 1 source of mercury exposure to humans as far back as 1991 is clearly dental amalgams, not mercury in the diet, not mercury in the air or water.

So, again, I totally disagree with Dr. Eichmiller's statements. The research evidence does not support what Dr. Eichmiller claims. In medicine we can only deal with published adjudicated evidence.

Mr. BURTON. Did you give us a copy of that document for the record, sir?

Mr. HALEY. I will indicate which reference citation that is in this review article.

Mr. BURTON. Well, we would like to have—in fact, I will have my staff make a copy of that, so we can have a copy for our record, if you would like.

Mr. HALEY. Well, I don't have the original WHO document with me, but Dr. Berlin may, in fact, have that document.

Mr. BURTON. OK. Well, Dr. Berlin, do you have that article?

Dr. BERLIN. We are talking about that chart, and, in fact, yes, first of all, I really have the original document here. But on top of that, in the report I handed over it is referred to, and we stated that 3 to 70 micrograms per day is taken up from amalgam in a toxin with an average number of amalgam fillings.

And later on, it was discovered that some people, those people who have the habit to chew chewing gums through the day, and especially those people who use this nicotine chewing gum to stop smoking, these people, some of them, tended to excrete a very high amount of mercury when they did this, up to levels—

Mr. BURTON. Again, would you pull the mic closer? We want to make sure we hear what you say.

Dr. BERLIN. Sorry. They came up to levels which are around that level of 50 micrograms per liter urine where we see effect in mercury workers. But the range in extreme cases, amalgam can cause so much mercury excretion that it is up to what we consider the

limit for industrial populations exposed to mercury. These are all references you can find—

Mr. BURTON. In your report?

Dr. BERLIN. Yes.

Mr. BURTON. Well, we will put that in the record. We will put that report in the record.

[The information referred to follows:]



Draft translation from  
the original in Swedish  
by Dr. Maths Berlin.

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The Dental Material Commission —  
Care and Consideration

## **Mercury in dental-filling materials — an updated risk analysis in environmental medical terms**

Maths Berlin

An overview of scientific literature published in  
1997–2002 and current knowledge

## Contents

1.	BACKGROUND .....	1
1.1	DATA COLLECTION .....	4
2.	SUMMARY OF THE 1997 RISK ANALYSIS.....	5
3.	NEW RESEARCH FINDINGS .....	6
3.1	STUDIES IN MOLECULAR BIOLOGY .....	6
	<i>Modified redox potential</i> .....	6
	<i>Cytoskeleton of the nerve cells</i> .....	8
	<i>Apoptosis in nerve tissue</i> .....	9
	<i>Retinal pigment epithelial cells</i> .....	9
3.2	THE NERVOUS SYSTEM .....	9
	<i>Data from animal experiments</i> .....	9
	<i>Accumulation in the retina</i> .....	9
	<i>Brain development and toxicokinetics in the foetus and mother</i> .....	9
	<i>Neuropsychological tests</i> .....	10
	<i>Persistent effects of mercury exposure</i> .....	11
	<i>Alzheimer's disease</i> .....	<b>Error! Bookmark not defined.</b>
3.3	THE IMMUNE SYSTEM AND BLOOD CELLS .....	12
	<i>Data from animal experiments</i> .....	12
	<i>Lichen</i> .....	13
	<i>Occupational exposure</i> .....	13
	<i>Reduced enzyme activity in erythrocytes</i> .....	14
	<i>Autoimmune diseases</i> .....	14
	<i>Mercury-resistant and antibiotic-resistant bacteria</i> .....	15
3.4	KIDNEYS .....	15
3.5	THYROID AND MUSCULAR ATROPHY .....	15
3.6	TESTICLES.....	16
3.7	POLYMORPHISM .....	16
3.8	GENDER DIFFERENCES .....	17
3.9	SIDE-EFFECTS AND THEIR INCIDENCE .....	18
	<i>Clinical surveys</i> .....	18
	<i>Provocation tests</i> .....	19
4.	RISK ANALYSIS — DEFINITION OF THREE NEW HAZARDS .....	20
	<i>Scientific support for influence at low concentrations</i> .....	21
	<i>Influence on foetal development</i> .....	22
	<i>Influence on the immune system</i> .....	22
	<i>Risk of kidney disease</i> .....	23
	<i>Varying sensitivity between individuals</i> .....	23
5	SUMMARY AND CONCLUSIONS.....	24
6	ENVIRONMENTAL MEDICAL VIEWS OF RISK MANAGEMENT.....	26
7	CLINICAL MANAGEMENT .....	26
8	NEED FOR RESEARCH .....	27
	BIBLIOGRAPHY.....	28
	ABBREVIATIONS .....	33

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### **The Dental Material Commission — Care and Consideration**

'The Dental Material Commission — Care and Consideration' assigned Maths Berlin, in autumn 2002, to report on the past five years' research literature on amalgam and the health hazards, if any, of mercury.

Maths Berlin is a Professor Emeritus with long experience of the effects of mercury on animals and humans. He chaired the WHO Task Group on Environmental Health Criteria for Inorganic Mercury (WHO Environmental Health Criteria 118, 1991) and a similar group with the function of drawing up health criteria for methylmercury.

Professor Berlin compiled the environmental medicine risk analysis of mercury and amalgam issued by the Swedish Council for Planning and Coordination of Research (FRN) in 1998 (FRN, Report 1998:22). This risk analysis was based on literature published between 1993 and November 1997. The present risk analysis builds further on this material, and analyses literature published between November 1997 and November 2002.

*Available on order from:*

*The Dental Material Commission — Care and Consideration  
Kv. Spektern, SE-103 33 Stockholm, Sweden or on the web site,  
[www.dentalmaterial.gov.se](http://www.dentalmaterial.gov.se)*

## 1. Background

In April 2002 the Swedish Government appointed a Special Investigator to propose measures to boost knowledge of health problems relating to amalgam and other dental materials, and to improve care of patients who associate their symptoms with such materials. The directives for the Commission emphasise that the Special Investigator should assess the knowledge situation with respect to such health problems and pinpoint areas on which further studies should focus. The Investigator was also assigned to report on key research in recent years, focusing on the past five-year period.

The author was assigned by the Investigator to summarise and evaluate research findings, regarding the environmental medical aspects of exposure to mercury from amalgam, that were published during the period from November 1997 to November 2002. The summary is to continue and supplement the risk analysis that was carried out for the Swedish Council for Planning and Coordination of Research in 1997.

### 1.1 Data collection

The task of collecting relevant publications was conducted according to the same principles as in 1997. A Medline search for 'mercury' yielded 3,600 references. From these, 936 references of conceivable relevance were selected. After abstracts and summaries had been studied, just over 700 references remained to be read and assessed, and this activity generated an additional number of secondary references of importance to the assessment.

Jointly with the Swedish Research Council, the Commission held a seminar to which Swedish mercury researchers were invited<sup>1</sup>. These were briefed on the key features of the past five years' research findings and my assessment of the same. The results were discussed, and an opportunity for commenting on the presentation and proposing additions was provided. A preliminary report was then drawn up and dispatched, along with a request for written comments. Based on the opinions received, this report was completed and submitted to the Special Investigator.

The present report starts by summarising the results from the 1997 risk analysis (FRN Report 98:22). An account of the new research findings follows. Finally,

<sup>1</sup> The seminar, at Lastberget near Stockholm on 6 February 2003, was attended by Maths Berlin (rapporteur), Gunnar Bergenholtz (moderator), Göran Möller, Per Hultman, Marie Vahter, Lars Friberg, Karin Warfvinge, Jan Marcusson, Staffan Scherfving, Gunnar Nordberg, Mats Hanson, Ulf Lindh, Jan Ekstrand, Sven Langworth and Per Dalén. Certain members of the Dental Material Commission were also present: Helena Starup (chairman), Mariana Blixt, Bo Jordán, Christer Malmström, Lars Sjödin, Bengt Järholm (expert), and Ann-Marie Lidmark and Ann-Kristin Myrman (secretaries).

these are summarised, along with an evaluation of the risks and hazards entailed by amalgam mercury and proposals on how to manage the same.

## 2. Summary of the 1997 risk analysis

In 1997, the Swedish Council for Planning and Coordination of Research was commissioned by the Swedish Government to review and extend knowledge of the health hazards, if any, of mercury from amalgam. I was then assigned to carry out a review of literature, in the form of published research findings, on the subject. This report was written as a continuation of the 1997 report.

In the 1997 risk analysis, it was found that:

- The WHO estimate of amalgam bearers' daily mercury uptake was 3–7 µg, which was the best estimate available at the time. This uptake gives rise to urinary mercury secretion of around 5 µg/g creatinine. However, WHO found wide variation between individuals.
- In subsequent studies of amalgam bearers, uptake of up to 100 µg daily has been observed in extreme cases. The individuals concerned had urinary secretion of around 50 µg/g creatinine. This secretion rate is as high as, or higher than, the lowest exposure shown to provoke clinically demonstrable symptoms in mercury-exposed workers.
- There are no scientific grounds for assuming that the prevalence of clinically demonstrable effects of mercury exposure from dental amalgam exceeds 10 per cent.
- No known epidemiological population study has demonstrated any adverse health effects in amalgam bearers.
- Mercury is a potent toxin that affects the basic functions of the cell by bonding strongly with sulphhydryl and selenohydryl groups on albumen molecules in cell membranes, receptors and intracellular signal links, and by modifying the tertiary structure.
- The structure of albumen molecules is genetically determined, and this leaves ample scope for genetic polymorphism to manifest itself in varying sensitivity and types of reaction to mercury exposure.
- It is probable that, besides local hypersensitivity reactions, mercury in amalgam fillings exerts side-effects just like most potent pharmaceuticals. Some support for this conclusion is to be found in clinical observations reported to date. At a rate that is probably below 10 per cent, however,

these side-effects cannot be demonstrated by means of population-based epidemiological studies.

Mercury is thus a multipotent cytotoxin that intervenes in the primary processes of the cell. This creates scope for a broad spectrum of possible side-effects. The analysis performed in 1997 identified the following health risks from mercury in dental fillings:

- Risk of impairment in the functions of the central nervous system.
- Risk of impairment in kidney function.
- Risk of impairment in the immune system.
- Risk of impairment in foetal development, especially development of the nervous system.

The presentation below is an account of the past five years' research publications, in so far as these may prompt us to supplement or modify the assessments and conclusions contained in the 1997 risk analysis.

### **3. New research findings**

#### **3.1 Studies in molecular biology**

In the past five years, several studies of the effects of mercury at cell level have been conducted and published. These studies were performed on cell lines in cultures or suspensions of various origins. Intracellular measurement of mercury concentration has not, however, been feasible. The dose has therefore been represented by the estimated concentration in the medium concerned. Media usually contain proteins and other molecules that can bind mercury. It is therefore impossible to gauge any cellular concentration.

Nevertheless, the estimated concentration in the medium is, in many studies, very high. These concentrations are both non-physiological and, in the amalgam context, unrealistic. Publications referring to medium concentrations of mercury exceeding 1  $\mu\text{M}$  have therefore, as a rule, been regarded as irrelevant and excluded from this summary.

#### ***Modified redox potential***

One hypothesis often propounded in the literature is that mercury is toxic because it induces production of free oxygen radicals and modifies the redox

potential of the cell. Several mechanisms for this effect have been proposed (Ercal et al. 2001) and are reviewed in brief below.

Olivieri et al. (2000) reported that mercuric chloride ( $\text{HgCl}_2$ ) in a concentration of 50  $\mu\text{g/l}$  reduces the cellular content of glutathione by 30 per cent in neuroblastoma cells, thereby decreasing their reductive capacity. Another observation was an increased release of  $\beta$ -amyloid ( $\text{A}\beta$ ) peptide and elevated phosphorylation of tau protein.

Mahboob et al. (2001) found that mice exposed to  $\text{HgCl}_2$  (0.8  $\mu\text{g}$  in two peroral doses per week, for two weeks), which showed no influence on weight increase or food intake, had increased lipidoxidation in the kidneys, testicles and epididymides, and an elevated concentration of glutathione (GSH) and superoxide dismutase in the testicles. Administering a dose 10 times as large resulted in a significant reduction in weight increase, in GSH concentration in the epididymides, and also in the activity of glutathione disulphide reductase (GR) and glutathione reductase (GPx) in the kidneys and epididymides.

Goering et al. (2002) exposed rats to 1.2 and 4  $\text{mg/m}^3$  of mercury vapour for two hours daily during 11 days. The rats showed no clinical or histopathological signs of toxic influence. A dose-related increase in the mercury concentration in the brain and kidneys and a 30% increase in free oxygen radicals in the frontal cortex at a dose of 1  $\text{mg/m}^3$  were observed. A statistically significant decrease in GSH concentration and GPx activity was seen in the kidneys at a dose of 2  $\text{mg/m}^3$ . No such change in the brain was detectable at any dose. The authors' conclusion is that neither oxidative stress nor changes in GSH concentration and activity of antioxidant enzymes play any significant part in the toxic effect of mercury vapour on the brain and kidneys.

Wolfreys and Oliviera (1997) found that the increase in sensitivity to IgE stimulation in the peritoneal mast cells of mercury-sensitive rats is due to intracellular increase of free oxygen radicals produced by mercury. Mice exposed to mercury vapour, at 0.5  $\text{mg/m}^3$  for two hours, showed an elevated mercury concentration in motor neurons in the spine and signs of oxidative damage to DNA (Pamphlett et al. 1998).

The difference in results may be explained by the fact that Goering et al. determined the degree of oxidative stress in whole tissues, while the other authors determined oxidation in individual cell types.

In determining mercury concentrations in amalgam bearers' saliva, Pizzichini et al. (2001, 2002) found a significant correlation between mercury in saliva and the number of amalgam fillings in both men and women. Determination of total

antioxidant activity (TAA) in saliva and plasma showed a significant inverse correlation between mercury concentration in plasma and TAA in both genders. In addition, antioxidant activity showed a significant negative correlation with mercury concentrations in women's saliva. In men, no such correlation was found.

The question of the importance of oxidative stress in causing an early toxic effect of mercury exposure is still uncertain. Nevertheless, it is difficult to believe that this effect alone could explain the differences in toxicity for various organs and species to which the mercury gives rise.

#### ***Phosphorylation and intercellular signalling***

It has been suggested that mercury in low concentrations may affect phosphorylation and thereby intercellular signalling. Huang and Narahashi (1997) used voltage-clamp technology to study the effect of  $0.5\mu\text{M}$   $\text{HgCl}_2$  on GABA-induced currents from dorsal root ganglia in rat neurons. They found that mercury increases GABA-induced currents, and attributed this effect to an inhibition of protein kinase A (PKA).

Rosenspire et al. (1998) found that  $0.13\mu\text{M}$   $\text{HgCl}_2$  boosted phosphorylation of tyrosine in proteins from B-cell lymphoma cells from mouse. The same research group (Mattingly et al. 2001) reported that  $0.6\mu\text{M}$   $\text{HgCl}_2$  inhibits T cell-receptor-mediated activation of RAS in Jurkat cells, which are a human T cell line. Königsberg et al. (2001) studied the effect of  $0.5\mu\text{M}$  on mitochondrion function in a foetal liver-cell line. They found ultrastructural modification of the mitochondria. The respiratory functions of the cell remained intact, but they found that the modification had involved uncoupling from signal links in the cell.

#### ***Cytoskeleton of the nerve cells***

Mercury inhibits the development of, and breaks down, cytoskeleton structures in nerve cells. This was shown by Pendergrass et al. (1997) when they made rats inhale mercury vapour for 14 days. At approximately  $0.35\mu\text{g/g}$  mercury in brain tissue, bonding of GTP to tubulin was inhibited. This process is necessary for polymerisation of tubulin, which in turn is a key component of the cytoskeleton.

The same group of researchers, Leong et al. (2001), added  $\text{HgCl}_2$  to cultures of neurons from a snail with growing nerve germs. They were able to show that concentrations of  $\text{HgCl}_2$  below and close to  $0.1\mu\text{M}$  inhibit the growth of nerve germs and also cause retrograde degradation of the cytoskeleton in nerve cells.



***Apoptosis in nerve tissue***

Monnet-Tschudi (1998) studied the incidence of apoptosis (programmed natural cell death) in cultures of foetal rat brain. She found that a concentration of 1 nM of HgCl<sub>2</sub> speeds up spontaneous apoptosis in immature cultures. A concentration of methyl mercury a thousand times higher was required for the same effect. In more differentiated cultures without spontaneous apoptosis, no effect was observed. A high proportion of the apoptotic cells were astrocytes.

***Retinal pigment epithelial cells***

Toimela and Tähti (2001) studied the effect of HgCl<sub>2</sub> on cultured retinal pigment epithelial cells from pig and from a human cell line. They observed that 0.1 µM mercury reduced glutamate uptake by some 25 per cent. They interpreted this effect as due to inhibition of protein kinase C (PKC).

**3.2 The nervous system**

Knowledge of the mechanisms of neurotoxic effects exerted by mercury vapour is highly deficient. Perhaps as a result, we lack specific indices of nervous-system impairment caused by mercury vapour.

***Data from animal experiments***

Exposure to mercury vapour in rat (Warfvinge et al. 1992), mouse (Warfvinge 1995) and monkey (Warfvinge et al. 1994; Warfvinge 2000) causes accumulation of mercury in the brain and spinal cord. Mercury was often concentrated in neurons, especially motor neurons and astroglia cells. With toxic exposure, loss of Purkinje cells and granulocytes in the cerebellar cortex arises in rat (Sörensen et al. 2000). Whether similar changes arise in other parts of the brain has not yet been investigated by means of modern methods. Myelin sheaths of dorsal nerve roots also manifest changes (Schionning et al. 1998).

***Accumulation in the retina***

The retina of the eye accumulates mercury when there is exposure to mercury vapour. Mercury remains in the retina for a very long time — often for years. Accumulation of mercury is seen, in monkeys, in the inner portion of the retina, in pigment epithelial cells and capillary walls (Warfvinge and Bruun 2000).

***Brain development and toxicokinetics in the foetus and mother***

During the past five-year period, there have been few publications elucidating the effect of mercury vapour on foetal development. Studies clarifying its effect on the growing brain and foetal development in general are entirely lacking. According to information received, however, several major epidemiological studies are under way in the USA.

A German prospective study of 3,946 pregnant women was carried out. The women were interviewed regarding mercury exposure at the workplace. The mothers-to-be exposed to mercury or mercury compounds showed a significantly elevated risk of giving birth to babies who were small for their gestational age (Seidler et al. 1999). Nevertheless, the exposure criteria were dubious: they mean that other exposure to chemical substances also took place. Nor can chance significance be excluded.

Studies of the toxicokinetics of mercury in humans, including pregnant and lactating women, have been conducted by Swedish researchers. These studies confirm the picture previously obtained from animal experiments, and have provided quantitative information. The mother's amalgam fillings are reflected in the quantities of inorganic mercury in the placenta (Ask et al. 2002), in umbilical-cord blood, in breast milk (Vahter et al. 2000) and in amniotic fluid (Luglie et al. 2000).

The conclusion from the information available is that the mercury contained in breast milk is not a substantial source of infants' mercury exposure (Oskarsson et al. 1996; Drexler & Schaller 1998).

Amalgam removal involves a rise of some 30 per cent in plasma levels of inorganic mercury. After a phase of rapid decline, the plasma level decreases with a half-life of around 46 days (Sandborgh-Englund G 1998).

#### *Neuropsychological tests*

In occupationally exposed workers, it has been clinically feasible to demonstrate changes in brain potentials induced by visual stimulation and changes in conduction velocity in peripheral sensory nerve fibres. This result suggests that both the central nervous system (CNS) and the peripheral nervous system (PNS) are affected. These effects arise at relatively high exposure levels (Urban et al. 1999). At lower exposure levels, impairment of cognitive, sensory and motor functions occurs. Mood may also be modified. These changes have been quantified using batteries of neuropsychological tests.

At a level of mercury exposure caused by one of their duties, 13 men (mean age: 45 years) were exposed to mercury vapour for two to four weeks. After the exposure ceased, the men's blood mercury concentration averaged 48 µg/l of blood (corresponding to approx. 150 µg/g creatinine), with a range of 21–84 µg/l. One year after exposure had ceased, all the men were subjected to a battery of neuropsychological tests, and compared with a control group of 13 non-exposed workers.

Compared with the control group, the exposed group displayed cognitive deficits in terms of motor coordination, rapid reception of information with and without motor elements, verbal capacity, verbal memory, visual problem-solving and comprehension. The men exposed also had more emotional problems, such as an increased focus on bodily functions, depression, anxiety and being more socially withdrawn (Haut et al. 1999).

With batteries of neuropsychological tests, several studies of populations that are occupationally exposed to mercury vapour have been conducted. These studies have had two main purposes: to identify the lowest exposure level that gives rise to demonstrable health effects, and to investigate how far the health effects that have arisen are reversible if exposure ceases.

Early 2002 saw the publication of a meta-analysis of 44 epidemiological studies of populations that are occupationally exposed to mercury vapour. Twelve of these studies were included in the analysis, which comprised 686 exposed persons and 579 controls. In nine neuropsychological performance parameters, statistically significant differences between exposed persons and controls were found, with a dose-response association for exposure corresponding to 18–34 µg Hg per litre of urine (Meyer-Baron et al., 2002).

In an Italian multicentre study of 122 workers exposed to mercury vapour and 196 controls, a statistically significant decline in motor performance and a significant decrease in blood prolactin concentrations were found, with a dose-response association. Mean secretion of mercury in urine was  $10.4 \pm 6.9$  µg/l for the exposed subjects and  $1.9 \pm 2.8$  µg/l for the controls (Lucchini et al. 2002).

#### *Persistent effects of mercury exposure*

In one American survey, the reversibility of symptoms induced by exposure to mercury vapour was studied. The survey covered 205 workers whose mean age was 71 years. Of these workers, 104 had been heavily exposed more than 19 years previously, with mercury secretion in excess of 600 µg/l urine. The other 101 workers had not been exposed. Conduction velocity in peripheral nerves was significantly correlated with cumulative mercury exposure, which suggests residual peripheral neuropathy. Motor co-ordination was also reduced to a statistically significant degree, with a dose-response association (Letz et al. 2000).

In a Norwegian survey of 75 chloralkali workers compared with 52 controls, a dose-related effect on attention capacity and visual-motor capacity was found 12 years after termination of exposure. This group's exposure to mercury was considerably lower than that of the above-mentioned American cohort. For the

Norwegian workers, mean mercury secretion was roughly 100 µg/l urine during their work period (Mathiesen et al. 1999).

#### *Alzheimer's disease*

The question of whether mercury exposure from amalgam can cause Alzheimer's disease (AD) has been raised. This is because some *in vitro* studies have found effects of inorganic mercury on nerve tissue that resemble those seen in Alzheimer's.

In a study of 68 Alzheimer's patients and 33 controls, no significant difference was detected between the patients and controls in terms of mercury concentrations in the various parts of the brain. Nor was there any difference with respect to the presence of amalgam fillings (Saxe et al. 1999).

Another study involved a comparison of mercury concentrations in blood between 33 Alzheimer's patients on the one hand and, first, a group of 45 patients suffering from depression and, secondly, a group of 65 patients with a variety of non-psychiatric illnesses, on the other. The mercury concentrations were more than twice as high in the Alzheimer's patients as in both the control groups. Nevertheless, no association was found between elevated mercury concentrations and the presence of amalgam fillings (Hock et al. 1998).

### **3.3 The immune system and blood cells**

#### *Data from animal experiments*

Substantial research inputs have been made over the past five-year period to survey the mechanisms underlying autoimmune reactions provoked by mercury in sensitive rat and mouse strains. These studies have essentially increased our knowledge; nonetheless, they have not succeeded in elucidating this complex phenomenon.

The effects of mercury on the immune system are governed by genotype, mercury dose and the status of the immune system concerned. Reactions to mercury vary between different bred strains and between species. Reaction intensity increases with the mercury dose, while there appears to be a dose threshold below which no reaction can be produced (Nielsen and Hultman 1999). In mercury-sensitive strains, too, the reactions decrease after a certain period of exposure (Roether et al. 2002).

If mercury-sensitive newborn rats are injected with HgCl<sub>2</sub>, resistance to mercury arises. This suggests that the system can offset the stimulation of mercury (Field et al. 2000).

Amalgam fillings in the teeth of mercury-sensitive rats give sufficiently high mercury exposure to provoke an autoimmune syndrome with a rise of immunoglobulins in plasma and immunocomplex deposition in the kidneys (Hultman et al. 1998).

In animal experiments, mercury can modify the functioning of the immune system in various pathological states. Mice treated with injections of subtoxic doses of  $\text{HgCl}_2$  are, for example, more susceptible to leishmaniasis infestation than untreated animals (Bagenstose et al. 2001).

Both mercury-sensitive and mercury-resistant mice show reduced immunity against malaria protozoa after injection of subtoxic doses of  $\text{HgCl}_2$  (Silbergeld et al. 2000). In mice with a genetically conditioned tendency to develop the autoimmune syndrome systemic lupus erythematosus (SLE), development of the disease is accelerated if mercury is injected in subtoxic doses (Pollard et al, 2001). In mice with a genetic predisposition for diabetes (non-obese diabetic [NOD] mice), the development of diabetes is inhibited if subtoxic doses of  $\text{HgCl}_2$  are injected (Brenden et al. 2001).

#### ***Lichen***

One side-effect of amalgam fillings that is not particularly unusual is oral lichen. Larsson (1998) describes accumulation of mercury in the tissue affected, and accumulation of dendritic cells. Little et al. (2001) showed that a culture of human oral keratocytes, on exposure to subtoxic concentrations of  $\text{HgCl}_2$  (10  $\mu\text{M}$ ), expresses ICAM-1, which in turn induces T cell binding, release of  $\text{TNF-}\alpha$  and interleukin-8 and down-regulation of interleukin- $1\alpha$ . This induces activation of the immune system, which is not seen in experiments with cutaneous keratocytes.

#### ***Occupational exposure***

Effects on the immune system of occupational exposure to mercury vapour have been studied in several surveys of worker populations. The workers were exposed to mercury levels below and at around the threshold value for permitted exposure, which corresponds to a urinary secretion rate of mercury of some 50  $\mu\text{g/g}$  creatinine. These results were summarised by Moszczynski (1999). The studies reported statistically significant deviations in the number of cell elements, cytokine concentrations and immunoglobulin concentrations in the exposed workers. Nevertheless, these findings are contradictory: both stimulating and inhibitory effects were found to exist.

In a later study, 20 workers exposed to mercury vapour had mean urinary secretion of mercury of 45  $\mu\text{g/l}$ . The study reported that the number of  $\text{CD4}^+$  and  $\text{CD45RA}^+$  and the total number of  $\text{CD4}^+$  T-lymphocytes were significantly

lower than in the controls. The numbers of CD57+ and CD16+ NK (Natural Killer) cells were also found to be negatively correlated with the mercury concentration in urine (Park et al. 2000).

Another group of 19 workers exposed to mercury vapour had a mean urinary secretion of mercury of  $9.7 \pm 5.5$   $\mu\text{g/l}$ . In this group, Vimercati et al. (2001) found an inverse correlation between mercury in urine and the numbers of CD13+ and CD15+ leucocytes and NK cells. A reduced capacity for chemotaxis in polymorphonuclear leucocytes was also found. Loftenius et al. (1998) studied the effect of amalgam removal on mononuclear lymphocytes from 10 patients. They found no statistically significant change in the number of cell types. However, they found a rise in IL-6 in plasma after 48 hours. The mercury concentration in plasma rose by some 10 per cent.

In 47 chloralkali workers with mercury exposure corresponding to 5.9 nmol/mmol creatinine, an increase in autoantibodies against myeloperoxidase and proteinase 3 was observed. This increase was correlated with the mercury concentration in urine (Ellingsen et al. 2000a).

#### *Reduced enzyme activity in erythrocytes*

Zabinski et al. (2000) reported that enzyme activity for several enzymes in erythrocytes — G-6PD, AchE, GR and SOD — was significantly reduced in a group comprising 46 chloralkali workers, with a urinary mercury concentration of 77  $\mu\text{g/l}$ . Bulat et al. (1998) observed reduced activity for GPx and SOD in erythrocytes for a group of 42 chloralkali workers, with a urinary secretion rate of  $23.2 \pm 11.3$  nmol/mmol creatinine.

In a group of 16 workers exposed to mercury vapour, reduced levels of glutathione and elevated catalase activity in red blood cells were observed. Mean urinary secretion of mercury in this group was  $18.5 \pm 8.8$   $\mu\text{g/l}$  (Queiroz et al. 1998).

#### *Autoimmune diseases*

The tendency of mercury to induce autoimmunity gives rise to suspicion that mercury may boost the risk of autoimmune diseases, such as multiple sclerosis (MS). In a Canadian case-reference study, this hypothesis was tested (Bangsi et al. 1998). The findings of this survey, which covered 143 MS patients and 128 controls, provided no support for the hypothesis. True, persons with more than 15 fillings showed an excess risk of 2.57 times the risk of getting MS among persons without fillings, but this difference was not statistically significant.

Similar results were obtained in an Italian survey comprising 132 MS patients and 423 controls (Casetta et al. 2001). A British survey of 39 female MS

patients and 62 matched controls showed a significant correlation between the prevalence of caries and the risk of MS. However, no significant difference was found between the MS patients and the controls in terms of how many amalgam fillings they had (McGrother et al. 1999).

#### ***Mercury-resistant and antibiotic-resistant bacteria***

Results from experimental studies have aroused suspicions that release of mercury in the oral cavity could produce mercury-resistant bacterial flora and, by the same token, antibiotic resistance. In several surveys of humans, this suspicion has not found support. In a British survey of 83 children, half of whom had amalgam fillings and the other half of whom lacked them, no differences were found in the prevalence of mercury-resistant or antibiotic-resistant bacteria (Pike et al. 2002).

### **3.4 Kidneys**

Understanding of the mechanisms whereby the kidneys absorb and secrete mercury has improved considerably, largely thanks to new methods in molecular biology. The current state of knowledge has been summarised in an article in *Pharmacological Reviews* (Zalups 2000).

In a cross-section study in Scotland, 180 dentists were compared with 180 academics at Scottish universities. Kidney disease was found to be ten times more common among the dentists (6.5%) than in the controls. The dentists' mean urinary secretion was 2.58 nmol/mmol creatinine (Ritchie et al. 2002).

Among 47 chloralkali workers with a mean urinary mercury concentration of 5.9 nmol/mmol creatinine, secretion of N-acetyl- $\beta$ -D-glucosaminidase (NAG) was measured. The results showed that in those with mercury secretion that exceeded the mean for the group, NAG secretion was also elevated (Ellingsen et al. 2000 a).

### **3.5 Thyroid and muscular atrophy**

Ellingsen et al. (2000b) reported finding impaired thyroid function in a group of 47 chloralkali workers, whom they compared with 47 controls. The exposed workers showed a statistically significant rise in reverse T<sub>3</sub> (rT<sub>3</sub>) — a rise that was dose-related. The mean urinary concentration of mercury was 5.9 nmol/mmol creatinine, with a range of 1.1–16.8.

Atrophy and capillary damage in thigh muscle were observed in five out of six workers in dental care who had a urinary mercury-secretion rate of 13–67  $\mu$ g/l at the time of the biopsy. These changes may, according to the authors, have been

induced by the effect of the mercury on the nervous system or on capillaries. There might also be a direct effect on muscle fibres (Nadorfy-Lopez et al. 2000).

### 3.6 Testicles

Exposure to mercury vapour causes mercury to accumulate in the testicles, where it is eliminated very slowly. Daily administration of HgCl<sub>2</sub> to mice in a dose that did not affect body weight caused a reduced sperm count, modified sperm morphology and lower fertility. It proved possible to offset this effect by administering vitamin E (Rao and Sharma 2001).

Monsees et al. (2000) studied the *in vitro* effect of HgCl<sub>2</sub> on Sertoli cells from rat. They observed that concentrations below 1 µM of HgCl<sub>2</sub> sharply reduced inhibin production. Clinical observations have prompted suspicions of associations between acrodynia (Pink Disease) and epididymis obstruction (de Kretser et al. 1998).

### 3.7 Polymorphism

During the five-year period under review, several case descriptions involving acute mercury exposure, with concentrations usually well above what may be expected from amalgam, have been published. These case descriptions have been published because the symptoms are unexpected. Mercury concentrations are documented with urine and blood figures, and the symptoms have subsided when the exposure ceased. Accordingly, there is no doubt that the high mercury concentrations genuinely caused the symptoms.

Besides oral lichen — which is sometimes combined with facial exanthema — the symptoms present have been a range of dermal syndromes, such as systemic contact dermatitis (baboon syndrome) (Alegre et al. 2000; Bartolome et al. 2000). Three cases of nummular dermatitis, which were cured by amalgam removal, are described by Adachi et al. (2000) and Pigatto et al. (2002). In a review article, Britschgi and Pichler (2000) assert that mercury can induce acute generalised exanthematous pustulosis. In another review article, Boyd et al. (2000) summarise experience of skin diseases caused by mercury.

One article describes a five-year-old boy who, after massive mercury exposure, developed tics, extensive blinking, head-twisting and shoulder-jerking as his sole symptoms (Li et al. 2000).

There have also been descriptions of several cases where, in children with hypertension and elevated catecholamine secretion induced by mercury exposure, the symptomatology has resembled phaeochromocytoma (Laurans et



al. 2001; Torres et al. 2000; Wössmann et al. 1999; Kosan et al. 2001). A 48-year-old man developed aspects of severe, acute polyarthritis (Karatas et al. 2002) as a result of massive mercury exposure. Dalén (2000) describes a historical case with symptoms suggesting gastroenteral influence.

The cases referred to above evince pronounced polymorphism in ways of reacting to mercury exposure. The conclusion is that the clinical picture of exposure to mercury vapour may vary greatly.

### 3.8 Gender differences

Knowledge of the dose-response association for exposure to mercury vapour and inorganic mercury compounds is derived mainly from epidemiological studies of occupationally exposed populations. The great majority of subjects studied have been men.

To permit conclusions to be generalised to the whole population, one must assume that sensitivity to mercury is equally distributed. There is well-founded reason to question support for such an assumption. Data from animal experiments do not show a consistent picture; but neither do they provide support for the thesis that men and women are equally sensitive to mercury.

In one study, 30 Sprague-Dawley rats received a daily dose of  $\text{HgCl}_2$  by gastric tube, in doses from 0 to 10 mg/kg. The rats were killed after 14 days, and distribution and uptake of mercury were studied. No significant gender difference emerged with respect to signs of toxicity or concentration of mercury in various organs.

Previous studies of rats and mice have shown gender differences in the kidneys' uptake of mercury, but in divergent directions (Khan et al. 2001). In mice that had received intraperitoneal injections of  $\text{HgCl}_2$  corresponding to 0.5mg/kg or been exposed to mercury vapour in low doses, gender differences were demonstrated. With autometallography, uptake of mercury in motor neurons was shown to occur to a larger extent among females than among males. Males were also found to accumulate more mercury in the kidneys than females (Pamphlett et al. 1997; Pamphlett and Coote 1998).

Hultman and Nielsen (2001) studied the importance of dose, gender and genetic composition in two mouse strains. They found that the same dose produced quantitative differences in mercury uptake both between the two strains and between the genders. This suggests differences in toxicokinetics between the genders and different strains. They also found that the concentration of mercury in tissue that is required for an autoimmune reaction to be induced varies

between strains and the genders. This suggests variation in sensitivity to mercury between strains and between genders.

Data from humans are notably scant. One study was carried out in which diurnal variation in the kidneys' mercury secretion was investigated. No demonstrable diurnal variation in men, but significant diurnal variation in women, was found (Woods et al. 1998).

Barregård et al. (1999) determined mercury concentration in test biopsies from 36 kidneys donated for transplantation — half from men and half from women. Mercury concentration in the kidneys was statistically significantly higher in women than in men. As discussed above (3.1), TAA in saliva was found to be significantly inversely correlated with mercury concentration in saliva in women, but not in men (Pizzichini et al. 2001, 2002).

### 3.9 Side-effects and their incidence

'Side-effect' is a clinical pharmacological term relating to unintended repercussions over and above the therapeutic effect. In toxicology, reference is made to especially sensitive populations, who have a dose-response association and/or a way of reacting that significantly deviates from the majority of the population. These deviant populations may be conditioned by genetic differences, age and gender differences or pathological states.

The fact that a person feels ill as a result of amalgam fillings may be due to various factors. It may be because the person perceives a connection between the symptoms and the oral cavity, or that the symptoms are connected with a dentist's manipulations. Alternatively, amalgam may be perceived as an explanation for malaise of a different origin, if a credible explanation is sought. Research has been carried out to find methods of distinguishing between these alternative explanations.

#### *Clinical surveys*

In a summary of just over 400 patients referred to Huddinge Hospital with suspicion of amalgam-related conditions, the authors consider that some 30 per cent of cases were attributable to diagnoses other than amalgam influence. These diagnoses included, for example, heart disease, chronic collagenosis, neurological disease and cancer; in the authors' opinion, these could explain the patients' condition. In other cases, there was speculation about the causes and it was found that the summary did not support the hypothesis that amalgam had contributed to the patients' pathological condition. The argument for this was that no connection between their symptoms and elevated mercury concentrations in their blood or urine were demonstrable (Langworth et al. 2002).

This survey supports the hypothesis that, among those who believe themselves to be suffering as a result of amalgam, the true cause is not always amalgam. However, it does not rule out the possibility that amalgam influence can be found in some of these persons. The diagnoses mentioned in this study include impaired thyroid function, oral lichen, kidney disease, fatigue, vertigo, somatisation tendency, depression and anxiety — all of which are symptoms that may be associated with mercury exposure.

A Swiss dentist followed up 75 of the 90 patients he had treated with amalgam removal according to the patients' own wishes. All the patients had psychoneurological symptoms or muscular and joint pains of various kinds. Sixty-eight per cent of the patients felt that they were much better at the time of their annual check-ups following the removal. Another 12 per cent felt better, 9 per cent were slightly better, 7 per cent were unchanged and one of the patients felt worse after the removal (Engel 1998).

In a similar Swedish questionnaire survey comprising 445 patients of one dentist, the patients' amalgam fillings were removed because of prolonged, unexplained ailments. Here, the health of 80 per cent of the patients whose fillings had been removed was found to be good or better, while that of 11 per cent was unchanged and 9 per cent felt that it had deteriorated or were doubtful. More than half the patients stated that they had experienced symptoms in connection with having their fillings removed. These symptoms often began after a few days and commonly lasted about a week (Strömberg and Langworth 1998).

#### ***Provocation tests***

One study was carried out in the form of provocation tests. Initially, an advertisement was placed in the daily press inviting people suffering from amalgam-related disease to apply. Of those who registered their interest, 39 were tested by being given gas to inhale through a mouthpiece for five or 10 minutes. The gas was blindly switched from each occasion to the next between pure air and air containing mercury. The mercury concentrations varied between 25 and 200  $\mu\text{g}/\text{m}^3$ . Exposure occurred at intervals of two to three weeks. Each patient's symptoms were registered after every exposure occasion. In two persons, the results showed unequivocal mercury sensitivity, while suspected sensitivity was found in another two, although not with statistically significant results (Strömberg et al. 1999). The survey appears to be highly illuminating. The provocation dose corresponded, at its highest level, to the daily exposure dose for an amalgam bearer, or roughly one-hundredth of the permitted daily dose for an industrial worker. It is possible that optimal discrimination would have been increased a slightly higher exposure dose.

Allergy diagnostics with epicutaneous tests (patch testing) can sometimes, besides skin reactions, provoke systemic effects with such symptoms as headache, vertigo, fatigue and general malaise (Kunkeler et al. 2000; Inerot and Möller 2000). A group of 65 patients who had all reacted with intensified subjective symptoms in conjunction with amalgam removal, were subjected to provocation experiments by means of patch testing.

The tests were carried out blind, with a concentration of roughly 10 µg of metallic mercury, 4 µg phenylmercuric acetate and mercury-free substances. For a week after the skin application, the patients had to keep a log according to a questionnaire on their symptoms. Some reacted with increased symptoms of substances containing mercury, and were described as 'mercury-intolerant'. The patients who did not react were described as 'mercury-tolerant' (Marcusson 1996).

Neutrophils from 14 intolerant and 14 tolerant patients and 14 controls were tested. The cells were exposed to HgCl<sub>2</sub> and compared in terms of the release of superoxide. A statistically significant difference between tolerant and intolerant patients was observed. There was a correlation between the activity of superoxide dismutase (SOD) in lymphocytes and the symptom score, and also between superoxide formation and the symptom score for the mercury-exposed patients (Marcusson et al. 2000).

#### **4. Risk analysis — definition of three new hazards**

Not infrequently, progress in research raises more questions than it answers. Since 1997, three new health risks have emerged that, with reasonable suspicion, may conceivably be attributed to mercury from amalgam. These hazards involve influence on the retina of the eye, testicle function and thyroid function.

Suspicion of effects on the retina is founded mainly on the fact that mercury accumulates in the retina, with lasting retention especially in the pigment epithelium. Whether this mercury accumulation can contribute to the incidence of degenerative changes, such as retinal detachment or macular degeneration, cannot be assessed without further research.

In the testicles, too, accumulation of mercury takes place with lasting retention as a result of exposure to inorganic mercury. Clinical observations and experimental studies confirm that functional impairment may arise from exposure to mercury. Information on dose-response association is, however, lacking and amalgam risk therefore cannot be assessed at present.

Mercury accumulates in the thyroid as a result of exposure to mercury vapour. This may be associated with observed impairment of T<sub>4</sub> deiodisation. In this case, too, the information available is insufficient to permit assessment of whether there is a risk of amalgam causing thyroid disease.

***Scientific support for influence at low concentrations***

The 1997 risk analysis assumed that the minimum exposure level that gives rise to demonstrable impairment of the nervous system is represented by urinary secretion of mercury at roughly 50 µg/l. Subsequent research findings have shown that influence arises at considerably lower exposure levels. There is scientific evidence for influence from mercury concentrations in urine of some 25 µg/l, and from even lower levels.

In a cross-section study of 49 dentists and dental nurses, mercury secretion in their urine was measured before and six hours after administration of sodium-2,3-dimercaptopropane-1-sulfonate (DMPS), a mercury-chelating substance (Echeverria et al. 1998). Before chelation, the mercury concentration in urine averaged 0.95 µg/l; after six hours it was 9 µg/l. The statistical analysis showed, throughout the dose range, a significant correlation between dose in terms of secretion after chelating and aggregate subjective symptoms. Conversely, there was a correlation between secretion after chelation and the results of tests of motor function.

The dose-response curve for this group of dental-care personnel covers roughly the same dose range as that incurred by amalgam bearers. Nevertheless, it is unclear how far the mercury concentration in urine before chelation is representative of exposure further back in time. It cannot be excluded that the dental-care staff's exposure may have been higher further back in time.

In the Scottish study referred to above (Ritchie et al, 2002), 180 dentists were compared with an equal number of controls of university employees. Mean urinary mercury secretion was four times as large among the dentists as among the controls and five times as large as that in the dental-care personnel above before chelation. Statistically significantly more often than the controls, the dentists showed memory impairment and deterioration in psychomotor function. These changes were not, however, correlated with the mercury secretion in their urine.

A Swedish prospective cross-section study of 1,462 women aged 38–60 was conducted, with a follow-up after five years. In this study, no correlation was found between symptoms and exposure to mercury from amalgam (Ahlgvist et

al. 1999). The yardstick of exposure used was the mercury content of serum, and effects were gauged by responses to a questionnaire concerning symptoms.

The statistical sensitivity of this Swedish study is much greater, but the effect measure is relatively insensitive and the dose measure less specific than in the chelation study. Nevertheless, it should be emphasised that the effects referred to here are subclinical effects, i.e. observed functional impairment, and that the symptoms fall within the normal variation in the population. Accordingly, these effects can be demonstrated only at group level.

At present it may be considered unproven, but not excluded, that subclinical psychomotor functional impairment caused by mercury is demonstrable in groups at the mean exposure level for amalgam bearers.

#### ***Influence on foetal development***

The risk of influence on foetal development was pointed out in the 1997 risk analysis. This is not contradicted by more recent results that may suggest an elevated risk, among women exposed to mercury in the course of their work, of giving birth to babies who are small for their gestational age. In addition, there are experiments on animals indicating that one expected effect of exposure to low doses of mercury vapour is inhibition of brain development. In these experiments, this inhibition resulted in reduced cognitive and motor capacity. Such inhibition of brain development falls within the normal range in the population.

These effects in animal experiments resemble those observed after exposure to methyl mercury. However, the dose of mercury that yields the effect has been only about one-tenth of the dose of mercury that exerts an effect following exposure to methyl mercury. Only through epidemiological studies using batteries of neuropsychological tests and possibly neurophysiological survey methods can these effects be demonstrated.

The risk of inhibition of brain development during the foetal stage and early childhood is obvious. This hazard is a contraindication for amalgam fillings in children and women of fertile age, until a quantification of the risk prompts a different assessment.

#### ***Influence on the immune system***

The clinical studies of how mercury vapour influences the immune system show clearly that effects can be demonstrated down to dose levels corresponding to exposure to amalgam. The clinical significance of these effects, on the other hand, is unclear. The observations based on animal experiments provide

evidence that genetic make-up and gender have a bearing on the nature and intensity of reactions.

Published surveys of the association between amalgam and multiple sclerosis are of limited sensitivity, but appear to rule out amalgam as a major aetiological factor in the development of MS. Available clinical information provides no guidance as to whether mercury from amalgam can affect the course of the disease of MS.

Experimental data prompt the question of whether removing amalgam in the event of autoimmune diseases is justified. No general reply to this question can be given; instead, in the current situation the circumstances must be weighed up in each individual case. Nevertheless, it would seem imperative for clinicians to bear this option in mind. The same applies to parasitic diseases, such as malaria.

#### ***Risk of kidney disease***

Over the past five-year period, another survey has emerged that shows an elevated risk of developing kidney disease among those who are occupationally exposed to mercury. This observation was made on a group of dentists whose exposure was fairly low. The survey confirms the findings of earlier surveys.

The question is whether this is an effect induced solely by mercury exposure or whether it is the result of a combination of factors. It would appear vital for nephrologists to devote attention to this issue.

#### ***Varying sensitivity between individuals***

There are strong indications of a gender difference in terms of mercury metabolism in data from animal experiments and in clinical observations. Information on what this may entail regarding differences in sensitivity to mercury exposure is entirely lacking. This is a fundamental shortcoming that invalidates every risk analysis.

The cases of acute or subacute mercury intoxication referred to above illustrate a pronounced polymorphism in the range of symptoms. This suggests that the toxic effect of mercury has several targets, and this probably contributes to the variation in sensitivity between individuals. This is not surprising, in view of the omnipotence of the mercury atom in the biochemical dynamics of the cell. For genetic reasons, particularly sensitive groups in the population may be expected to show equally marked polymorphism in their mode of reaction to amalgam.

In purely theoretical terms, it is highly probable — verging on certainty — that individuals with genetically conditioned deviant sensitivity to mercury exist. The clinical observations referred to above support this conclusion. Diagnosis is

a problem that requires further research. At present, the golden diagnostic standard appears to be blind provocation with realistic concentrations of mercury vapour. However, this method is too laborious, time-consuming and costly to be incorporated into clinical routine.

The most probable side-effect of amalgam seems to be a reaction mediated by the immune system. This does not exclude the possibility of genetically conditioned high sensitivity to mercury in the nervous system. Mercury is not the only environmental factor that provokes an immune-system-mediated reaction. Other metals and organic molecules can also induce such reactions in sensitive individuals.

There are no facts indicating that all those who believe that they are affected by amalgam are in fact so affected. It is therefore more probable that, for many people, the symptoms have other causes. But it is also likely that many people with side-effects from amalgam fillings are unaware of a causal connection.

There is no evidence that the frequency of pathological side-effects of amalgam due to genetically conditioned high sensitivity exceeds 1%. It is therefore impossible to demonstrate these states by means of epidemiological studies of representative population samples. It is unclear whether subclinical influence on mood and motor function can be caused by the mercury concentrations to which amalgam bearers are exposed. These effects have been observed in occupationally exposed persons within the same dose range.

## **5 Summary and conclusions**

The past five years' research has yielded further evidence that amalgam can give rise to side-effects in a sensitive portion of the population. Thus:

- Research in molecular biology has elucidated mechanisms that may underlie the toxic effects of mercury.
- Studies of the effects of mercury on the immune system in rodents have enhanced knowledge of the mechanisms whereby mercury affects the immune system. Clinical studies of occupationally exposed employees have objectively confirmed subclinical influence of mercury on the immune system at low levels of mercury exposure.
- The thyroid has been identified as the target organ for the toxic effect of mercury in occupational exposure to mercury vapour in low doses.



- Experimental studies of primates and rodents have revealed that mercury is accumulated and persists for years in the retina as a result of exposure to mercury vapour. The consequences of this accumulation are, however, unclear.
- Clinical studies of the effects of mercury on occupationally exposed workers, using modern diagnostic methods, have elucidated the connection between dose and effect. They have also identified and quantified neuropsychological symptoms at low exposure levels.
- The lowest exposure, in terms of urinary mercury secretion, that has been found to give rise to a demonstrable toxic effect has fallen from 30–50 µg/l till 10–25 µg/l. Accordingly, the safety margin that it was thought existed with respect to mercury exposure from amalgam has been erased.
- Studies of workers previously exposed to mercury have shown that prolonged exposure to mercury vapour, with mercury concentrations in urine of some 100 µg/l, may result in symptoms emanating from the nervous system that persist decades after exposure has ceased. This suggests that exposure causes lasting damage to the central nervous system, which complicates the interpretation of results of low-dose studies of occupationally exposed populations.
- Clinical reports of acute or subacute cases of mercury intoxication where modern diagnostic methods have been applied have revealed a remarkably high degree of polymorphism in human reactions to toxic mercury exposure.
- Both animal experiments and clinical observations have demonstrated gender differences in the toxicokinetics of mercury.
- Additional facts have come to light that may indicate that mercury vapour can affect human foetal development.
- Clinical provocation studies, with exposure to small quantities of mercury through skin exposure or inhalation, have confirmed that individuals with deviant high sensitivity exist.

With reference to the fact that mercury is a multipotent toxin with effects on several levels of the biochemical dynamics of the cell, amalgam must be considered to be an unsuitable material for dental restoration. This is especially true since fully adequate and less toxic alternatives are available.

With reference to the risk of inhibiting influence on the growing brain, it is not compatible with science and tested experience to use amalgam fillings in children and fertile women. Every doctor and dentist should, where patients are suffering from unclear pathological states and autoimmune diseases, consider whether side-effects from mercury released from amalgam may be one contributory cause of the symptoms.

Removal of existing amalgam fillings should not be undertaken unless there are medical reasons for doing so. The reason is that the risk of complications from the removal may exceed the risk of side-effects from the amalgam. The risk of removal is due mainly to the fact that dental substance is drilled away, which may itself result in problems with existing teeth.

## **6 Environmental medical views of risk management**

For medical reasons, amalgam should be eliminated in dental care as soon as possible. This will confer gains in three respects. The prevalence of side-effects from patients' mercury exposure will decline; occupational exposure to mercury can cease in dental care; and one of our largest sources of mercury in the environment can be eliminated.

Dental materials left in patients' mouths should be treated as drugs for administrative purposes. Accordingly, toxicological and clinical testing should be required. Reporting of side-effects should also take place according to the same norms that apply to drugs.

It is imperative for doctors and dentists to be made aware of the fact that all dental restoration materials can give rise to side-effects, and that this eventuality should always be considered when the patient's pathological state is unclear. Side-effects may conceivably both cause, and be contributory factors in, various pathological states.

## **7 Clinical management**

Special clinical units should be created with the function of investigating unclear pathological states when there is any suspicion of an environmentally related cause. These units should have access to all medical specialities and the research skills that are required for assessment and treatment of this category of patients. Mercury exposure from amalgam is only one of many conceivable agents that may conceivably induce syndromes that are difficult to diagnose. Units of this

kind may possibly be linked to environmental-medicine units at regional hospitals.

It is imperative for cost-effective routines to be created for diagnosis of the side-effects of amalgam. At present, the golden standard for specific diagnosis should be blind provocation with mercury vapour. However, this method is not suitable for routine clinical use.

It is essential to develop alternative clinical tests that are simple and cost-effective to use. This requires suspected cases to be assembled in a few locations and systematically studied with all available and relevant methods in a scientific manner.

## **8           Need for research**

In most studies of the effects of mercury, the subjects have been men. It is imperative to elucidate the differences, if any, between men and women in metabolism and the toxicokinetics of mercury after exposure to mercury vapour.

Epidemiological surveys of the *in utero* effects of mercury exposure on foetal brain development should be carried out to further clarify the hazards, if any.

Epidemiological studies designed to investigate associations, if any, between amalgam load and degenerative retinal diseases are urgently required.

Likewise, epidemiological studies designed to find any associations that may exist between thyroid disease and amalgam fillings are advisable.

Co-ordinated clinical studies of people who undergo amalgam removal on suspicion of side-effects from mercury should be carried out. Thorough investigations before, during and after removal, using all clinically available methods and focusing on the immune system, thyroid and nervous system, should be carried out. Muscle biopsy should be performed in cases where there is pronounced muscle pain.

Initiation of clinical and experimental basic research to clarify the mechanisms whereby mercury vapour affects the central nervous system is highly essential. Today, knowledge of these mechanisms is poor.

### Bibliography

- Adachi A, Horikawa T, Takashima T, Ichihashi M (2000) Mercury-induced nummular dermatitis. *J Am Acad Dermatol* 43: 383–385
- Ahlqwist M, Bengtsson C, Lapidus L, Gergdahl IA, Schutz A (1999) Serum mercury concentration in relation to survival, symptoms, and diseases: results from the prospective population study of women in Gothenburg, Sweden. *Acta Odontol Scand* 57: 168–174
- Alegre M, Pujol RM, Alomar A (2000) A generalized itchy flexural eruption in a 7-year-old boy. *Arch Dermatol* 136: 1055–1060
- Ask K, Akesson A, Berglund M, Vahter M (2002) Inorganic and methyl mercury in placentas of Swedish women. *Environ Health Perspect* 110: 523–526
- Bagenstose LM, Mentink-Kane MM, Brittingham A, Mosser DM, Monestier M (2001) Mercury enhances susceptibility to murine leishmaniasis. *Parasite Immunol* 23: 633–640
- Bangsi D, Ghadirian P, Ducic S, Morisset R, Ciccocioppo S, McMullen E, Krewski D (1998) Dental amalgam and multiple sclerosis: a case-control study in Montreal, Canada. *Int J Epidemiol* 27: 667–671
- Barregard L, Svalander C, Schutz A, Westberg G, Sallsten G, Blohme I, Molne J, Attman PO, Haglund P (1999) Cadmium, mercury, and lead in kidney cortex of the general Swedish population: a study of biopsies from living kidney donors. *Environ Health Perspect* 107: 867–871
- Bartolome B, Cordoba S, Sanchez-Perez J, Fernandez-Herrera J, Garcia-Diez A (2000) Baboon syndrome of unusual origin. *Contact Dermatitis* 43: 113.
- Berlin M. (1999). Mercury in dental fillings — an environmental medicine risk assessment. A literature and knowledge summary. In *Amalgam and Health*. Edited by Novakova V. pp 369. Swedish Council for Planning and Coordination of Research (FRN), Stockholm
- Boyd AS, Seger D, Vannucci S, Langley M, Abraham JL, King Jr LE (2000) Mercury exposure and cutaneous disease. *J Am Acad Dermatol* 43: 81–90
- Brenden N, Rabbani H, Abedi-Valugerdi M (2001) Analysis of mercury-induced immune activation in nonobese diabetic (NOD) mice. *Clin Exp Immunol* 125: 202–210
- Britschgi M, Pichler WJ (2002) Acute generalized exanthematous pustulosis, a clue to neutrophil-mediated inflammatory processes orchestrated by T cells. *Curr Opin Allergy Clin Immunol* 2: 325–331
- Bulat P, Dujic I, Potkonjak B, Vidakovic A (1998) Activity of glutathione peroxidase and superoxide dismutase in workers occupationally exposed to mercury. *Int Arch Occup Environ Health* 71 Suppl: S37–S39
- Casetta I, Invernizzi M, Granieri E (2001) Multiple sclerosis and dental amalgam: case-control study in Ferrara, Italy. *Neuroepidemiology* 20: 134–137
- Dalén, P (2000) En amalgamsanering 1916 ('An amalgam removal in 1916'). *Svensk medicinhistorisk tidskrift* 4: 219–223
- de Kretser DM, Huidobro C, Southwick GJ, Temple-Smith PD (1998) The role of the epididymis in human infertility. *J Reprod Fertil Suppl* 53: 271–275
- Drexler H, Schaller K H (1998) The mercury concentration in breast milk resulting from amalgam fillings and dietary habits. *Environ Res* 77: 124–9
- Echeverria D, Aposhian HV, Woods JS, Heyer NJ, Aposhian MM, Bittner Jr AC, Mahurin RK, Cianciola M (1998) Neurobehavioral effects from exposure to dental amalgam Hg(o): new distinctions between recent exposure and Hg body burden. *FASEB J* 12: 971–980

- Ellingsen DG, Efskind J, Berg KJ, Gaarder PI, Thomassen Y (2000a) Renal and immunologic markers for chloralkali workers with low exposure to mercury vapor. *Scand J Work Environ Health* 26: 427–435
- Ellingsen DG, Efskind J, Haug E, Thomassen Y, Martinsen I, Gaarder PI (2000b) Effects of low mercury vapour exposure on thyroid function in chloralkali workers. *J Appl Toxicol* 20: 483–489
- Engel P (1998) Beobachtungen über die Gesundheit vor und nach Amalgamentfernung ('Observation of health before and after amalgam removal'). *Schweiz Monatsschr Zahnw* 108: 811–813
- Ercal N, Gurer-Orhan H, Aykin-Burns N (2001) Toxic metals and oxidative stress part I: mechanisms involved in metal-induced oxidative damage. *Curr Top Med Chem* 1: 529–539
- Field AC, Caccavelli L, Fillion J, Kuhn J, Mandet C, Druet P, Bellon B (2000) Neonatal induction of tolerance to T(h)2-mediated autoimmunity in rats. *Int Immunol* 12: 1467–1477
- Goering PL, Fisher BR, Noren BT, Papaconstantinou A, Rojko JL, Marler RJ (2000) Mercury induces regional and cell-specific stress protein expression in rat kidney. *Toxicological Sciences* 53: 447–457
- Haut MW, Morrow LA, Pool D, Callahan TS, Haut JS, Franzen MD (1999) Neurobehavioral effects of acute exposure to inorganic mercury vapor. *Applied Neuropsychology* 6: 193–200
- Hock C, Drasch G, Golombowski S, Müller-Spahn F, Willershausen-Zonnchen B, Schwarz P, Hock U, Growdon JH, Nitsch RM (1998) Increased blood mercury levels in patients with Alzheimer's disease. *J Neural Transm* 105: 59–68
- Huang CS, Narahashi T (1997) The role of G proteins in the activity and modulation of GABA-induced currents in rat neurons. *Neuropharmacology* 36: 1623–1630
- Hultman P, Lindh U, Horsted-Bindslev P (1998) Activation of the immune system and systemic immune-complex deposits in Brown Norway rats with dental amalgam restorations. *J Dent Res* 77: 1415–1425
- Hultman P, Nielsen JB (2001) The effect of dose, gender, and non-H-2 genes in murine mercury-induced autoimmunity. *J Autoimmun* 17: 27–37
- Inerot A, Müller H (2000) Symptoms and signs reported during patch testing. *American Journal of Contact Dermatitis* 11: 49–52
- Karatas GK, Tosun AK, Karacehennem E, Sepici V (2002) Mercury poisoning: an unusual cause of polyarthritis. *Clin Rheumatol* 21: 73–75
- Khan AT, Atkinson A, Graham TC, Shireen KF (2001) Uptake and distribution of mercury in rats after repeated administration of mercuric chloride. *J Environ Sci Health Part A Toxic Risk Subst Environ Eng* 36: 2039–2045
- Kosan C, Topaloglu AK, Ozkan B (2001) Chronic mercury intoxication simulating pheochromocytoma: effect of captopril on urinary excretion. *Pediatrics International* 43: 429–430
- Kunkeler L, Bickers SCE, Bezemer PD, Bruynzeel DP (2000) (Un)usual effects of patch testing. *Br J Dermatol* 143: 582–586
- Königsberg M, Lopez-Diazguerrero NE, Bucio L, Gutierrez-Ruiz MC (2001) Uncoupling effect of mercuric chloride on mitochondria isolated from an hepatic cell line. *J Appl Toxicol* 21: 323–329
- Langworth S, Bjorkman L, Elinder CG, Jarup L, Savlin P (2002) Multidisciplinary examination of patients with illness attributed to dental fillings. *J Oral Rehabil* 29: 705–713

- Larsson Å (1998) Oral lichen och amalgam – finns det en förklaringsmodell? ('Oral lichen and amalgam --- does an explanatory model exist?') *Tandlakartidningen* 90: 35–39
- Laurans M, Brouard J, Arion A, Kauffmann D, Duhamel JF (2001) Familial mercury intoxication presenting with cardiovascular abnormalities and acrodynia. *Acta Paediatr* 90: 593–594
- Leong CC, Syed NI, Lorscheider FL (2001) Retrograde degeneration of neurite membrane structural integrity of nerve growth cones following in vitro exposure to mercury. *Neuroreport* 12: 733–737
- Letz R, Gerr F, Cragle D, Green RC, Watkins J, Fidler AT (2000) Residual neurologic deficits 30 years after occupational exposure to elemental mercury. *Neurotoxicology* 21: 459–474
- Li AM, Chan MH, Leung TF, Cheung RC, Lam CW, Fok TF (2000) Mercury intoxication presenting with tics. *Arch Dis Child* 83: 174–175
- Little MC, Watson RE, Pemberton MN, Griffiths CE, Thornhill MH (2001) Activation of oral keratinocytes by mercuric chloride: relevance to dental amalgam-induced oral lichenoid reactions. *Br J Dermatol* 144: 1024–1032
- Lofenius A, Sandborgh-Englund G, Ekstrand J (1998) Acute exposure to mercury from amalgam: no short-time effect on the peripheral blood lymphocytes in healthy individuals. *Journal of Toxicology and Environmental Health Part A* 54: 547–560
- Lucchini R, Cortesi I, Facco P, Benedetti L, Camerino D, Carta P, Urbano ML, Zaccaro A, Alessio L (2002) Effetti neurotossici da esposizione a basse dosi di mercurio ('Neurotoxic effects of exposure to low doses of mercury'). *Med Lav* 93: 202–214
- Luglie PF, Frulio A, Campus G, Chessa G, Fadda G, Dessole S (2000) Dosaggio del mercurio nel liquido amniotico umano ('Mercury dosage in human amniotic fluid'). *Minerva Stomatol* 49: 155–161
- Mahboob M, Shireen KF, Atkinson A, Khan AT (2001) Lipid peroxidation and antioxidant enzyme activity in different organs of mice exposed to low level of mercury. *J Environ Sci Health B* 36: 687–697
- Marcusson JA (1996) Psychological and somatic subjective symptoms as a result of dermatological patch testing with metallic and phenyl mercuric acetate. *Toxicol Lett* 84: 113–122
- Marcusson JA, Carlmark B, Jarstrand C (2000) Mercury intolerance in relation to superoxide dismutase, glutathione peroxidase, catalase, and the nitroblue tetrazolium responses. *Environ Res* 83: 123–128
- Mathiesen T, Ellingsen DG, Kjuus H (1999) Neuropsychological effects associated with exposure to mercury vapor among former chloralkali workers. *Scand J Work Environ Health* 25: 342–350
- Mattingly RR, Felczak A, Chen CC, McCabe Jr MJ, Rosenspire AJ (2001) Low concentrations of inorganic mercury inhibit Ras activation during T cell receptor-mediated signal transduction. *Toxicol Appl Pharmacol* 176: 162–168
- McGrother CW, Dugmore C, Phillips MJ, Raymond NT, Garrick P, Baird WO (1999) Multiple sclerosis, dental caries and fillings: a case-control study. *Br Dent J* 187: 261–264
- Meyer-Baron M, Schaeper M, Seeber A (2002) A meta-analysis for neurobehavioural results due to occupational exposure. *Arch Toxicol* 76: 127–136
- Monnet-Tschudi F (1998) Induction of apoptosis by compounds depends on maturation and is not associated with microglial activation. *J Neurosci Res* 53: 361–367
- Monsees TK, Franz M, Gebhardt S, Winterstein U, Schill WB, Hayatpour J (2000) Sertoli cells as a target for reproductive hazards. *Andrologia* 32: 239–246

- Moszczynski P (1999) Immunological disorders in men exposed to metallic mercury vapour. A review. *Cent Eur J Public Health* 7: 10–14
- Nadorfy-Lopez E, Torres SH, Finol H, Mendez M, Bello B (2000) Skeletal muscle abnormalities associated with occupational exposure to mercury vapours. *Histol Histopathol* 15: 673–682
- Nielsen JB, Hultman P (1999) Experimental studies on genetically determined susceptibility to mercury-induced autoimmune response. *Ren Fail* 21: 343–348
- Olivieri G, Brack C, Muller-Spahn F, Stahelin HB, Herrmann M, Renard P, Brockhaus M, Hock C (2000) Mercury induces cell cytotoxicity and oxidative stress and increases beta-amyloid secretion and tau phosphorylation in SHSY5Y neuroblastoma cells. *J Neurochem* 74: 231–236
- Oskarsson A, Schultz A, Skerfving S, Hallen IP, Ohlin B, Lagerkvist BJ (1996) Total and inorganic mercury in breast milk in relation to fish consumption and amalgam in lactating women. *Arch Environ Health* 51: 234–241
- Pamphlett R, Coote P (1998) Entry of low doses of mercury vapor into the nervous system. *Neurotoxicology* 19: 39–47
- Pamphlett R, Ewan KB, McQuilty R, Waley P (1997) Gender differences in the uptake of inorganic mercury by motor neurons. *Neurotoxicol Teratol* 19: 287–293
- Pamphlett R, Slater M, Thomas S (1998) Oxidative damage to nucleic acids in motor neurons containing mercury. *J Neurol Sci* 159: 121–126
- Park SH, Araki S, Nakata A, Kim YH, Park JA, Tanigawa T, Yokoyama K, Sato H (2000) Effects of occupational metallic mercury vapour exposure on suppressor-inducer (CD4+CD45RA+) T lymphocytes and CD57+CD16+ natural killer cells. *Int Arch Occup Environ Health* 73: 537–542
- Pendergrass JC, Haley BE (1997) Inhibition of brain tubulin-guanosine 5'-triphosphate interactions by mercury: similarity to observations in Alzheimer's diseased brain. *Metal Ions in Biological Systems* 34: 461–478
- Pigatto PD, Guzzi G, Persichini P (2002) Nummular lichenoid dermatitis from dental amalgam. *Contact Dermatitis* 46: 355–356
- Pike R, Lucas V, Stapleton P, Gilthorpe MS, Roberts G, Rowbury R, Richards H, Mullany P, Wilson M (2002) Prevalence and antibiotic resistance profile of mercury-resistant oral bacteria from children with and without amalgam fillings. *J Antimicrob Chemother* 49: 777–783
- Pizzichini M, Fonzi M, Gasparoni A, Mencarelli M, Rocchi G, Kaitsas V, Fonzi L (2001) Influence of amalgam fillings on Hg levels and total antioxidant activity in plasma of healthy donors. *Bull Group Int Rech Sci Stomatol Odontol* 43: 62–67
- Pizzichini M, Fonzi M, Sugherini L, Fonzi L, Gasparoni A, Comporti M, Pompella A (2002) Release of mercury from dental amalgam and its influence on salivary antioxidant activity. *Sci Total Environ* 284: 19–25
- Pollard KM, Pearson DL, Hultman P, Deane TN, Lindh U, Kono DH (2001) Xenobiotic acceleration of idiopathic systemic autoimmunity in lupus-prone bxs/b mice. *Environ Health Perspect* 109: 27–33
- Queiroz ML, Pena SC, Salles TS, de Capitani EM, Saad ST (1998) Abnormal antioxidant system in erythrocytes of mercury-exposed workers. *Hum Exp Toxicol* 17: 225–230
- Rao MV, Sharma PS (2001) Protective effect of vitamin E against mercuric chloride reproductive toxicity in male mice. *Reprod Toxicol* 15: 705–712
- Ritchie KA, Gilmour WH, Macdonald EB, Burke FJ, McGowan DA, Dale IM, Hammersley R, Hamilton RM, Binnie V, Collington D (2002) Health and neuropsychological functioning of dentists exposed to mercury. *Occup Environ Med* 59: 287–293

- Roether S, Rabbari H, Mellstedt H, Abedi-Valugardi M (2002) Spontaneous downregulation of antibody/autoantibody synthesis in susceptible mice upon chronic exposure to mercuric chloride is not owing to a general immunosuppression. *Scand J Immunol* 55: 493–502
- Rosenspire AJ, Bodepudi S, Mathews M, McCabe Jr MJ (1998) Low levels of ionic modulate protein tyrosine phosphorylation in lymphocytes. *Int J Immunopharmacol* 20: 697–707
- Sandborgh-Englund G ECLSS (1998) Mercury in biological fluids after amalgam removal. *J Dent Res* 77: 615–624
- Saxe SR, Wekstein MW, Kryscio RJ, Henry RG, Cornett CR, Snowdon DA, Grant FT, Schmitt FA, Donegan SJ, Wekstein DR, Ehmann WD, Markesbery WR (1999) Alzheimer's disease, dental amalgam and mercury. *J Am Dent Assoc* 130: 191–199
- Schionning JD, Larsen JO, Eide R (1998) A stereological study of dorsal root ganglion cells and nerve root fibers from rats exposed to mercury vapor. *Acta Neuropathol (Berl)* 96: 185–190
- Seidler A, Raum E, Arabin B, Hellenbrand W, Walter U, Schwartz FW (1999) Maternal occupational exposure to chemical substances and the risk of infants small-for-gestational-age. *Am J Ind Med* 36: 213–222
- Silbergeld EK, Sacchi Jr JB, Azad AF (2000) Mercury exposure and murine response to *Plasmodium yoelii* infection and immunization. *Immunopharmacol Immunotoxicol* 22: 685–695
- Sorensen FW, Larsen JO, Eide R, Schionning JD (2000) Neuron loss in cerebellar cortex of rats exposed to vapor: a stereological study. *Acta Neuropathol (Berl)* 100: 95–100
- Stromberg R, Langworth S, Soderman E (1999) Mercury inductions in persons with subjective symptoms alleged to dental amalgam fillings. *Eur J Oral Sci* 107: 208–214
- Strömberg R, Langworth S (1998) Förbättra hälsan efter borttagning of amalgam? ('Better health after removal of amalgam?') *Tandlakartidningen* 90: 23–27
- Toimela TA, Tahti H (2001) Effects of mercuric chloride exposure on the glutamate uptake by cultured retinal pigment epithelial cells. *Toxicology In Vitro : an International Journal Published in Association with BIBRA* 15: 7–12
- Torres AD, Rai AN, Hardiek ML (2000) Mercury intoxication and arterial hypertension: report of two patients and review of the literature. *Pediatrics* 105: E34.
- Urban P, Lukas E, Nerudova J, Cabelkova Z, Cikrt M (1999) Neurological and electrophysiological examinations on three groups of workers with different levels of exposure to mercury vapors. *European Journal of Neurology* 6: 571–577
- Vahter M, Akesson A, Lind B, Bjors U, Schutz A, Berglund M (2000) Longitudinal study of methyl and inorganic mercury in blood and urine of pregnant and lactating women, as well as in umbilical cord blood. *Environ Res* 84: 186–194
- Warfvinge K (1995) Mercury distribution in the mouse brain after vapour exposure. *Int J Exp Pathol* 76: 29–35
- Warfvinge K (2000) Mercury distribution in the neonatal and adult cerebellum after vapor exposure of pregnant squirrel monkeys. *Environ Res* 83: 93–101
- Warfvinge K, Bruun A (2000) Mercury distribution in the squirrel monkey retina after in Utero exposure to vapor. *Environ Res* 83: 102–109
- Warfvinge K, Hua J, Berlin M (1992) Mercury distribution in the rat brain after mercury vapour exposure. *Toxicol Appl Pharmacol* 117: 46–52
- Warfvinge K, Hua J, L'gdberg B (1994) Mercury distribution in cortical areas and fiber systems of the neonatal and maternal adult cerebrum after exposure of pregnant squirrel monkeys to mercury vapor. *Environ Res* 67: 169–208



- Vimercati L, Santarelli L, Pesola G, Drago I, Lasorsa G, Valentino M, Vacca A, Soleo L (2001) Monocyte-macrophage system and polymorphonuclear leukocytes in workers exposed to low levels of metallic mercury. *Sci Total Environ* 270: 157–163
- Wolffreys K, Oliveira DB (1997) Alterations in intracellular reactive oxygen species generation and redox potential modulate mast cell function. *Eur J Immunol* 27: 297–306
- Woods JS, Martin MD, Leroux BG (1998) Validity of spot urine samples as a surrogate measure of 24-hour porphyrin excretion rates. Evaluation of diurnal variations in porphyrin, mercury, and creatinine concentrations among subjects with very low occupational exposure. *J Occup Environ Med* 40: 1090–1101
- Wossmann W, Kohl M, Gruning G, Bucsky P (1999) Mercury intoxication presenting with hypertension and tachycardia. *Arch Dis Child* 80: 556–557
- Zabinski Z, Dabrowski Z, Moszczynski P, Rutowski J (2000) The activity of erythrocyte enzymes and basic indices of peripheral blood erythrocytes from workers chronically exposed to mercury vapours. *Toxicol Ind Health* 16: 58–64
- Zalups RK (2000) Molecular interactions with mercury in the kidney. *Pharmacol Rev* 52: 113–143

### Abbreviations

AB	β-amyloid
AchE	acetylcholinesterase
AD	Alzheimer's disease
CNS	central nervous system
DMPS	sodium 2,3-dimercaptopropane-1-sulfonate
GABA	γ-aminobutyric acid (gamma-amino butyric acid)
GPx	glutathione reductase
GR	glutathione disulphide reductase
G-6PD	glucose-6-phosphate dehydrogenase
GSH	reduced glutathione
GTP	guanosine triphosphate
Hg	mercury
ICAM-1	intercellular adhesion molecule 1
MS	multiple sclerosis
NAG	N-acetyl-β-D-glucosaminidase
PKA	protein kinase A
PKC	protein kinase C
PNS	peripheral nervous system
rT <sub>3</sub>	reverse T <sub>3</sub>
SOD	superoxide dismutase
TAA	total antioxidant activity
U-Hg	urinary mercury
<i>1 nmol Hg/mmol creatinine = 1.79 μg Hg/g creatinine</i>	
<i>1 μg Hg/g creatinine = 0.56 nmol Hg/mmol creatinine</i>	

WHY MERCURY FROM DENTAL AMALGAMS, VACCINES AND DIET SHOULD  
BE ELIMINATED AS MUCH AS POSSIBLE

BY

Boyd E. Haley, Professor of Chemistry

1. STUDIES ON THE BIRTH HAIR MERCURY LEVELS OF NORMAL CHILDREN SHOW THAT THE MAJOR CONTRIBUTOR TO MERCURY IN INFANT BIRTH-HAIR IS DENTAL AMALGAMS IN THE BIRTH MOTHER. AUTISTIC CHILDREN DIFFER GREATLY FROM NORMAL CHILDREN IN THAT THEY DRAMATICALLY LESS MERCURY IN THEIR BIRTH-HAIR AND MORE IN THEIR BODIES. THIS IDENTIFIES A SUBPOPULATION OF CHILDREN THAT CANNOT EFFECTIVELY EXCRETE MERCURY FROM CHRONIC LOW LEVEL EXPOSURES FROM DENTAL AMALGAMS AND VACCINES.
2. REVIEWING THE OLDER LITERATURE DATA CAN BE FOUND THAT INDICATES THE SAME SITUATION EXISTS FOR ALZHEIMER'S DISEASE (AD). THAT IS, AD SUBJECTS DEMONSTRATED ELEVATED BRAIN LEVELS OF MERCURY AND LOWER HAIR/NAIL LEVELS OF MERCURY. AS THE SEVERITY OF THE AD INCREASED THE LEVEL OF MERCURY IN THE NAIL MATERIAL DECREASED.
3. PREVIOUS RESEARCH HAS SHOWN THAT TREATING NORMAL BRAIN TISSUES WITH MERCURY INHIBITED THE SAME ENZYMES/PROTEINS KNOWN TO BE DRAMATICALLY INHIBITED IN AD VERSUS NORMAL CONTROL BRAIN TISSUES. MERCURY, AND ONLY MERCURY OF THE TOXIC METALS COULD DO THIS.
4. OTHER RESEARCHERS HAVE SHOWN THAT TREATMENT OF NEURONS IN CULTURE WITH MERCURY GENERATE THE DIAGNOSTIC HALLMARKS OF AD.
5. EXPOSING RATS TO MERCURY VAPOR EFFECTS THE ABERRANCIES IN IMPORTANT ENZYMES AS OBSERVED IN AD BRAIN.
6. THIMEROSAL, THE MERCURY CONTAINING PRESERVATIVE IN VACCINES, IS MORE TOXIC TO CERTAIN BRAIN ENZYMES THAN IS MERCURY CHLORIDE. IT ALSO IS LETHAL TO NEURONS IN CULTURE AT NANOMOLAR LEVELS (VERY LOW CONCENTRATIONS). THE TOXICITY OF THIMEROSAL IS GREATLY ENHANCED BY TESTOSTERONE (MAY EXPLAIN THE 4:1 BOY:GIRL RATIO IN THIS DISEASE.), ALUMINUM (FOUND IN MANY VACCINES) AND CERTAIN ANTIBIOTICS. THIS STRONGLY SUGGESTS THAT A "SAFE" LEVEL OF THIMEROSAL CANNOT BE ESTIMATED BY ANY REASONABLE APPROACH AT THIS TIME.

Mr. BURTON. After we have our hearings over the period of the next 6 months to a year, Representative Watson and myself, there will be a report issued that will go into all these details and itemize each one of these reports and what they were.

Ms. WATSON? Excuse me 1 second. I will be back in about 5 minutes.

Ms. WATSON. Thank you so much, Mr. Chairman.

Let me apologize to panel one for my absence for a few minutes. We have a highly secret briefing on the floor of Congress.

This is a question to Dr. Eichmiller and maybe you have responded to it: The ADA is telling its members that amalgam fillings are hazardous material, is that true?

Dr. EICHMILLER. The ADA is educating us members in the proper handling of the material as a hazardous waste, yes, that is true.

Ms. WATSON. Yet, the ADA resists telling the patients this salient fact. Would you agree with me today that dentists should tell a patient before putting in a mercury filling, and they should tell them that the filling is a hazardous material when removed? Would you agree to that?

Dr. EICHMILLER. I would agree that a practitioner should talk about all the risks and benefits of any filling material that is being placed, but to discuss it as a hazardous material from a waste disposal aspect, I am not sure that would be useful information for that patient.

Ms. WATSON. Why would you not tell them that?

Dr. EICHMILLER. It really doesn't relate to the therapeutic or the health effect of that material.

Ms. WATSON. As I understand from the research that has been done to this point, even a baby's tooth, if it has been filled, can give off the vapors. An adult, should they not know that if they had that tooth pulled or additional work done on that tooth, that there could be very hazardous vapors escaping? I want you to tell me, very directly, why you wouldn't want to tell patients the same things you tell the dentists. If there is even a trace element that could be toxic internally, why should you keep the patient in the dark but tell the dentist?

Dr. EICHMILLER. Well, we certainly don't want to keep the patient in the dark on anything. I think that is why we encourage dentists to talk about the risks and benefits, and if that dentist feels that the mercury release from that alloy is a risk, then he should discuss that with the patient. We certainly would not discourage that.

Ms. WATSON. Do you promote it?

Dr. EICHMILLER. We do promote discussion of all the risks and benefits of all the filling materials. The patients and dentists openly discuss this.

Ms. WATSON. Well, why for so long did you have a gag order on dentists telling the patient about the "silver" filling?

Dr. EICHMILLER. The Code of Ethics was there to protect patients. What it does is really restricts a dentist from being able to offer any type of treatment, whether it is any type of filling, as a cure for a disease when there is not good scientific evidence that is true or when it falls outside their expertise.

Ms. WATSON. Dr. Eichmiller, would you agree that mercury is a neurotoxic?

Dr. EICHMILLER. Yes, in some forms mercury is a neurotoxin.

Ms. WATSON. Yes or no, would you agree?

Dr. EICHMILLER. In some forms it is a neurotoxin, yes.

Ms. WATSON. Would you agree that in the filling of a child or an adult that they have within that filling what is highly toxic, and would you agree that calling it "silver" is very deceptive?

Dr. EICHMILLER. I don't think that we have been deceptive intentionally—

Ms. WATSON. You have been calling a mercury filling, 50 percent mercury, you have been calling that silver, have you not? Yes or no?

Dr. EICHMILLER. We have called them silver fillings, but we have also called them amalgam fillings.

Ms. WATSON. OK.

Dr. EICHMILLER. All of our patients—

Ms. WATSON. Have you explained what an amalgam filling contains?

Dr. EICHMILLER. All of our patient education information has explained the composition of an amalgam filling—

Ms. WATSON. When?

Dr. EICHMILLER [continuing]. And mercury is listed in there as a composition—

Ms. WATSON. When?

Dr. EICHMILLER. Over the last 10 years.

Ms. WATSON. Is it all the time? You know, I am astounded that people in a medical profession put up an argument. And do you know what I have been told? And I have got a letter right here. Do you want to pull that letter from the National Dental Association?

Their bottom line is that, if patients knew that they had a choice, if patients knew that amalgam contained as much as 50 percent mercury, that it would reduce the assessability to dental health care. So what they are saying to me, the bottom line is assessability rather than reducing the risk to health, and particularly for pregnant women and particularly for little children.

I still can't reconcile it in my mind why you, medically prepared, dentally prepared, providers wouldn't see any form of mercury in the body as a risk. Right now they are telling us on the West Coast that we shouldn't eat a lot of fish because of the mercury content, but, still, you are going to put these amalgams in people's mouths and not want to tell them that you are deceiving them. You know, people without a lot of education think silver is silver, and it really isn't.

For the life of me, I cannot understand that. Now I have worked very, very hard in California, and I will continue to work hard in Washington, DC, because I don't think poor people need to be deluded, need to be deceived. I am going to do everything that I can—I want you to take this back to the ADA and anyone here from the NDA—I am going to do everything I can to be open and honest, give people a choice, and rid their bodies of those substances that we know can be harmful.

If we are going to take it out of a thermometer, why would you even want to risk even a trace element of putting it in someone's mouth? Can you explain that to me?

Dr. EICHMILLER. In decisions on materials, we really have to use the entire body of the best available evidence. I think that is what the major health organizations have done, is to review the entire body of evidence related to the use of amalgam. That is how they came to their conclusions, was after weighing the entire body.

Now this is not a process that ends. It is a process that is ongoing. I know the FDA and HHS are currently pulling a panel together to review again the most recent evidence.

We at the ADA, with our Council on Scientific Affairs, do much the same thing. We will continue to assess the new evidence, and as new evidence is published and new theories come forward, we will certainly take those into account and we will review those.

Ms. WATSON. OK, that is your explanation, but I see a number of mercury-free dentists in the room right now, and that number is growing dramatically. I just want to ask you, how long do you think the ADA can continue to advocate for mercury when its membership base is rapidly abandoning mercury?

I just saw that in your ADA News that you talked about the tooth fairy and you talked about handling toxic amalgam waste, and then you talked about contact amalgam, and then you say, if we put a baby's tooth underneath the pillow, is that contact hazardous? Well, it is that kind of ridiculous play that really bothers me in the health delivery community, and your responses are really bothering me because I don't think there is anyone in the medical profession or dental profession that will disagree that mercury is toxic. Would you disagree?

Dr. EICHMILLER. As I said, I think in some forms we all know that mercury is toxic and in some doses, but it is the form and the dose of mercury that make it a poison.

Ms. WATSON. OK. And I just am completely amazed because I know what is going on here. You are looking at the bottom line. My dentist told me that, and then he stuck something in my mouth and I couldn't respond. It is because the amalgam is cheaper. So why disturb a good thing? I was appalled, as I am appalled at your responses.

Thank you, Mr. Chairman.

Mr. BURTON. Well, I think we will excuse this panel. But, as we excuse you, let me just say that, as we complete our report, one of the things that we have been able to do on my full committee, and hopefully as a subcommittee chairman, is we have been able to contact news organizations that are interested in the subject matter that we discuss. I just want the panel to know, especially Dr. Eichmiller, that when we get enough data that we think proves the case that we believe to be the case, we are going to go to every single one of those news organizations and try to make sure that they get all the facts, so that they can consider doing a case on "20/20," "60 Minutes," or something else.

That is something that we always do, and I think that the ADA ought to know that this isn't going to go away. I mean, you can tell she is committed, and I am, too, and we will continue to push for-

ward until we get mercury out of everybody's mouth, and it will happen; you can bank on it.

With that, thank you very much for this time.

[Applause.]

Mr. BURTON. On our next panel, we have one of our colleagues, I understand, with us, a distinguished Member of Congress, Mike Michaud, who represents the second district of Maine, so far north that it never quits snowing. [Laughter.]

We also have Dr. Chester Yokoyama, who is a dentist and a member of the Dental Board of California. We have Sandra Duffy, esquire, founding member of Consumers for Dental Choice Northwest from Lake Oswego, OR, and Mr. Emmitt Carlton, immediate past president of the Virginia Chapter of the National Association for the Advancement of Colored People [NAACP], of Alexandria, VA.

Would you all come forward, please, and take your place at the table? Would you all come forward and rise?

First of all, I want to apologize for the length of the hearing and the vote that we took on the floor. I didn't expect that to happen, so I apologize for you having to wait so long.

[Witnesses sworn.]

Mr. BURTON. Be seated.

Representative, Congressman, thanks for being so patient. Dog-gone it, usually, we don't make our colleagues wait that long. So you have my humble apology. You can proceed.

**STATEMENTS OF HON. MIKE MICHAUD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MAINE; CHESTER YOKOYAMA, D.D.S., MEMBER, DENTAL BOARD OF CALIFORNIA; SANDRA DUFFY, ESQUIRE, FOUNDING MEMBER, CONSUMERS FOR DENTAL CHOICE NORTHWEST; AND EMMITT CARLTON, IMMEDIATE PAST PRESIDENT, ALEXANDRIA, VA CHAPTER, NATIONAL ASSOCIATION FOR THE ADVANCEMENT OF COLORED PEOPLE**

Mr. MICHAUD. Thank you, Mr. Chairman. You don't need to apologize. Actually, I enjoyed listening to the last panel, having dealt with this issue in the State of Maine over the last 4 years.

Actually, we did get some snow last week in the northern part of my district, not much, but we did get some.

I do want to thank you for inviting me here today to talk to your subcommittee. Mr. Chairman, it is a great honor and a privilege. I know you have led the way in addressing the health risks of mercury in health care and trying to get our Federal agencies to recognize the breadth of this problem, and I know the ranking member, Chairwoman Watson, as a State Senator, you wrote the first law in the country addressing health risks in mercury fillings, a pioneer statute for subsequent bills and laws around the country.

Despite the strenuous efforts both of you have made, as I understand, major roadblocks have been erected. Thus, Federal agencies have not yet provided the warnings that science demonstrates they should. California regulators, despite repeated efforts, have still not implemented the law that you passed when you were in the legislature.

Perhaps, then, our experience in Maine to get some consumer disclosure can be of some help. I might add that it has been a long-going effort. The original law was just to ask for information, and the Dental Association came full force and opposed just advising consumers of mercury amalgams.

After several years, under the leadership of Senator John R. Martin, the last time around, the legislature finally passed my bill to require that information be distributed about mercury dental fillings. After another year of intense follow-through and passage of a second bill, we are able, actually, to implement it.

Thus, Maine was first in the Nation to have a brochure to tell people that they had better think twice before agreeing to have mercury fillings implanted in their children's teeth. The need for action in Maine was apparent. Mercury fillings were promoted as silver, even though they have almost twice as much mercury as silver. I wanted to stop this marketplace deception and, if you will, call a spade a spade. Thus, my bill calls for fillings to be labeled, "mercury amalgams," and we insisted that both posters and cover of the brochure say exactly that.

In coordination with the Atlantic Province, New England has a zero-mercury tolerance campaign. A major source of mercury is from the dental office. The report entitled, "Dentist the Menace," says dental offices are the No. 1 source of mercury in the waste water. I have seen no evidence from the other side to dispute that.

In my region we had a compelling need to reduce the use of mercury in dental offices for environmental reasons alone. Your experience in California, Congresswoman Watson, was that the Dental Board blocked enforcement of the law, and I am glad to see Dr. Chet Yokoyama from Los Angeles, the Dental Board member from California who is trying, I know, his hardest to get the information so that consumers will know what is going on.

In Maine, to ensure that the legislation was implemented, we gave the authority to write the poster and the brochure to the Bureau of Health, not to the Dental Board, and to impose a strict timeframe when that was to be done. Also, the director of health was also required to report back to the legislature in the following session with proposed rules which we could then adopt or amend.

The first draft of the Bureau of Health fell short from what the law actually required, but after a hearing, and again with intense involvements of consumer activists, the Maine Toxic Action Coalition and individual Maine dentists and physicians, we persuaded the bureau to write a stronger disclosure statement. Passage of this statement was harder than we expected because the Maine Dental Association vehemently opposed it, and we had to work very hard to make sure to get this passed. Actually, I do have a copy of it, and you can get it on the Internet as well.

I think dentistry is divided over whether to continue using mercury fillings. The number of mercury-free dentists is growing. Dentists I have talked to realize that there eventually will be an end to mercury in dentistry in the near, hopefully, future. It could be for different reasons, health reasons. It could be for consumer protection reasons. It could be for environmental reasons or it could be for all three.

Although I have had my differences with the Dental Association on this issue, I am still supportive of other areas as far as reimbursement rates for dentists. I think, when you look at Maine's law and what had happened, and listening to the testimony earlier, even the very fact, let alone banning mercury fillings, just the very fact that we were just trying to give the consumers advice on what potentially was being put in their mouths, they fought tooth and nail against that effort.

Hence, that is why when I submitted the bill in the second session, we changed the title to an environmental title; hence, went to the environmental committee. We had a very intense several work sessions on the bill. I will be glad to provide the committee with the documents that were presented at that time, if the committee so chooses.

So I want to thank you once again for inviting me here to say a few words about Maine's law and want to commend both the chairman and the ranking member for your strong position in this area. I really appreciate it. Thank you.

[The prepared statement of Hon. Mike Michaud follows:]



**Testimony of Congressman Michael H. Michaud  
Before the Subcommittee on Human Rights and Wellness**

Thank you for having me here today, Mr. Chairman, it's an honor to testify before my esteemed colleagues.

Chairman Burton, you have led the way to addressing the health risks of mercury in health care, and trying to get our federal agencies to recognize the breadth of this problem.

Congresswoman Watson, as a state Senator you wrote the first law in the country addressing the health risks of mercury fillings, a pioneering statute for subsequent bills and laws in other states.

Despite the strenuous efforts both of you have made, as I understand it, major roadblocks have been erected. Thus federal agencies have not yet provided the warnings that the science demonstrates they should, and California regulators, despite repeated efforts, have still not implemented the Watson Law.

Perhaps, then, our experience in Maine to get consumer disclosure can be instructive. After several-years the legislature passed my bill to require informed choice about mercury dental fillings. After another year of intense follow through and passage of a second bill, we were able to implement it.

Thus Maine has the first-in-the-nation consumer brochure that tells people they better think twice before agreeing to have mercury fillings implanted in their children.

The need for action in Maine was apparent. Mercury fillings were promoted as “silver,” even though they have almost twice as much mercury as silver. I wanted to stop this marketplace deception, and, if you will, call a spade a spade. Thus, my bill calls the fillings “mercury dental amalgam,” and we insisted that both the poster and the cover of the brochure say exactly that.

In coordination with the Atlantic Provinces, New England has a zero mercury tolerance campaign. A major source of mercury is from

dental offices. The report *Dentist the Menace* says dental offices are the #1 source of mercury in the wastewater, and I have seen no evidence from the other side to rebut it. In my region, we had a compelling need to reduce the use of mercury in dental offices for environmental reasons alone.

In 2001 we again introduced the bill, adding an environmental component. Senator John Martin and Representative Scott Cowger, co-chairs of the Environment Committee, reported the bill favorably and, after robust debate, our bill was adopted. The Legislature was persuaded by the strong consumer support for the bill, especially from Pam Anderson of Houlton; from environmental groups, including Maine Toxics Action Coalition; and from individual Maine dentists and physicians, including Dr. Jerry Vermette of Skowhegan and Dr. Tom Anderson.

But we couldn't stop there. We wanted the bill implemented.

Your experience in California, Congresswoman Watson, was that the dental board blocked enforcement of the law. Let me add I am pleased that, testifying with me is Dr. Chet Yokoyama from Los Angeles, the dental board member from California who is trying the hardest to get a fact sheet written with real consumer disclosures.

In Maine, to insure that this legislation was implemented we gave the authority to write the poster and the brochure to the Health Department, not the Dental Board, and imposed a strict time line. Also, the Director of Health was also required to report back to the legislature in the following session with proposed rules, which we could then adopt or modify.

The first draft by the Department of Health fell far short of what our law required. But after a hearing, and again with intense involvement of consumer activists like Pam Anderson, Kathleen Mcgee, Rosemary Fecteau, and Marjorie

Monteleon, we persuaded the Department to write a strong disclosure statement.

Passage of this statement was harder than we expected, as the Maine Dental Association decided to oppose it. But we got it, and I am proud to unveil this first-in-the-nation work.

Dentistry is deeply divided over whether to continue using mercury fillings. The number of mercury-free dentists is growing rapidly. Most dentists I talk to realize that the end of mercury in dentistry is near. It could be for health reason, it could be for consumer protection reasons, it could be for environmental reasons -- or it could be all three. Although I have had differences with the American Dental Association on this issue, it does not stop me from speaking favorably about our dentists in Maine. Our dentists are important members of our community and are a vital aspect of our health care system. Maine dentists provide top quality care and show amazing compassion for their patients. They came forward this year to support strong environmental regulation of

mercury. They accepted and posted the brochure. As their Congressman, I want to support them in their effort to provide information to their patients as they work to ensure the health and well being of all Mainers.

Now, my fellow Members of Congress, it is time to take this issue nationally. The citizens of Maine sent me here to keep working on this issue and it is my hope that all Americans will gain access to information on dental amalgams.

In this case, I hope the expression "So goes Maine, so goes the nation" will ring true. I would be happy to assist the Subcommittee in any way I can.

Mr. BURTON. Well, we appreciate your efforts. It is tough in the State legislature or in the Congress to get things done, and you are to be commended for taking that ball/bat all the way through. We appreciate that. I hope that you will join with Congresswoman Watson and myself to win this battle here as well, and we do appreciate it very much. Thank you for waiting so long as well.

Mr. MICHAUD. Yes, thank you.

Mr. BURTON. Dr. Yokoyama.

Dr. YOKOYAMA. Yes, thank you very much. I will just say, to the Honorable Mike Michaud, that California is looking at the brochure that they produced in Maine as a possible template for moving forward with a consumer-friendly fact sheet.

With that, I will thank you very much for allowing me to speak today and inviting me. I will say that, although I am a member of the Dental Board of California, I am not speaking on behalf of the board, nor am I authorized to speak on behalf of the board. My comments reflect my personal opinions. I am a mercury-free dentist practicing in the State of California.

I have been asked to comment on the subject of informed choices as it relates to dental fillings, and specifically mercury fillings. To do so, I would like to focus on the struggle, California's struggle to implement the California State Watson bill. This bill, as has been said here, that was passed in 1992, sponsored by the then-State Senator Diane Watson, recognized the misconception that silver fillings are not primarily silver, but mercury.

First of all, most people of that time, and many people even today, do not know that mercury is the main and majority ingredient in their filling material. Second, it was widely believed by dentists that there is no way that the mercury can be released because it was mixed together to form a solid metal. Both of these concepts are still around today, and neither add but are contrary to informed choices.

My first point: There is still today major misconceptions on the part of consumers and dentists alike concerning mercury in fillings. In 1992, the Watson bill became law. It called for the California Dental Board to make a fact sheet on the risks and efficacies of dental materials. The emphasis was on educating the dentists so they could educate their patients.

Again, the main reason was to shed light on the misunderstood issue of mercury in fillings. This would make for better consumer choices. Sadly, little progress was made in 7 years, and I jump to 1999, when the Consumers for Dental Choice and the Center for Public Interest Law petitioned the California Dental Board to write the fact sheet as called for in the Watson law.

The board contracted a behavioral scientist that contracted a dental materials professor to write the dental materials fact sheet. This dental materials expert appears to have worked alone. No toxicologists were asked to give input. The biography shows a distinct lack of available scientific articles on toxicology, on the toxicity of mercury, and the associated health risks.

Remember that the Watson bill's intent and the needs of the people of the State of California were to clarify the mercury misconceptions. So point two: The primary intent of the fact sheet explained or the explanation of health risks from mercury in dental

amalgam was not well-inspected and not well-documented, in my opinion.

In 2000, a new law by State Senator Liz Figueroa created a new board and required that dentists give a fact sheet to their patients. Again, this was an attempt to inform consumers about health risks of dental materials, and specifically of mercury.

A public informational hearing was convened to explore the question: What peer-reviewed scientific evidence exists that suggests health risks for pregnant women, children, and diabetics from mercury from dental amalgam? Now the reason why that question was posed like this was that the existing fact sheet in the State of California proclaimed that there was, "No research evidence that suggests pregnant women, diabetics, and children are at increased health risk from dental amalgam fillings in their mouth."

In my opinion, this statement is incorrect, and the implied conclusion that pregnant women and children are without risk is also false. It was proven at the informational hearing that was convened that there was research evidence that suggests increased health risk and health risks in general.

What is also clear is that there exists a strong, scientific controversy. These applied and assumed conclusions from reading the existing fact sheet in the State of California, in my opinion, are misinformation and should be corrected.

So point three: There has been a long struggle to implement the Watson bill in the State of California. In my opinion, this has not allowed full disclosure or informed choice. In my opinion, there should be an advisory issued, since the safety or harm of mercury fillings is not yet scientifically conclusive.

So the Dental Board of California should advise parents and pregnant women that, as a precaution, children and pregnant women should not be given amalgam fillings. This reflects the precautionary principle which requires action once the possibility of harm exists.

So my fourth point: In my opinion, if—and I quote the Dental Materials Fact Sheet—"There exists a diversity of various scientific opinions regarding the safety of mercury dental amalgams," and that, "these opinions are not scientifically conclusive," then, in my opinion, advisories should be made and cautions given.

So on the day that I was preparing this testimony I found in the Los Angeles Times an article entitled, "Warnings on Canned Tuna Urged." The subtitle was, "Advocates question why public health advisories on mercury fail to give specific advice about the most frequently eaten seafood in the country."

In all industries, including medicine, there is an acute awareness of dangers of mercury. Mercury is no longer used in medicine. Yet, we continue to insist that mercury amalgams stored in the mouth presents no health risk. Pregnant women are advised that mercury fillings are safe. Yet, dental personnel are warned not to touch the mixed amalgam with ungloved hands. Skin contact exposes the dental assistant to mercury, which is a substance known to the State of California to cause birth defects and reproductive harm.

I respectfully submit this testimony and thank you very much for the opportunity.

[The prepared statement of Dr. Yokoyama follows:]



**Statement by  
Chester Yokoyama, DDS  
To the Members of the Subcommittee on Human Rights  
and Wellness  
05/06/03**

Although I am a member of the Dental Board of California, I am not speaking on behalf of the Board, nor am I authorized to speak on behalf of the Board. My comments reflect only my personal opinions.

I have been asked to comment on the subject of informed choices as it relates to dental fillings and specifically mercury (Hg) fillings. To do so, I'd like to focus on California's struggle to implement the California State Watson Bill. This bill, that was passed in 1992, sponsored by then State Senator Diane Watson, recognized the misconception that silver fillings are **not** actually primarily silver but mercury. 1. Most people of that time and many people even today do not know that mercury is the main or majority ingredient in their filling material. 2. It was widely believed by dentists that there is no way the Hg can be released because it is mixed together to form a solid metal. Both these concepts are still around today.

Point #1 – There are still today, major misconceptions on the part of consumers and dentists alike concerning Hg in fillings.

In 1992, the Watson Bill became law. It called on the California Dental Board to make a "fact sheet" on the "risks and efficacies" of dental materials. The emphasis at that time was on educating the dentists so they could educate their patients. Again, the main reason was to shed light on the misunderstood issue of Hg in fillings. This would make for a better-informed choice for consumers. Sadly, little progress was made for 7 years. And, I might add, during this time it was still considered practicing outside the scope of dental practice to discuss with a patient the "risks and efficacies" of Hg amalgam because that would surely contain references to Hg getting into the body and that would be outside the scope of the mouth.

Today, it is the standard of care to discuss the risks and benefits of Hg amalgam before treating a patient with this therapy.

Point #2 – There was an effort to keep the word mercury out of the dental jargon.

So imagine what a discussion for the purpose of informed consent would sound like in 1992. “Doctor, I’m concerned about my baby I’m 4 months pregnant. I’ve heard that silver fillings have mercury in them.” “Well Mrs. Jones, you don’t have a thing to worry about because there is no Hg that escapes.”

Point #3 – It was well known but incorrect that Hg did **not** come out of fillings.

I jump ahead to 1999. Consumers for Dental Choice and The Center for Public Interest Law petitioned the California Dental Board to stop enforcement of the gag rule and to write the Fact Sheet as called for in the Watson Law. The Board contracted a behavioral scientist that contracted a dental materials professor to write the dental materials fact sheet. This dental materials expert appears to have worked alone. No toxicologists were asked to give input. Despite efforts to include scientific articles suggesting health risk, the bibliography lists in the biocompatible/toxicological section, only one primary science article not from a dental journal and very few primary science articles. The bibliography shows a distinct lack of the available scientific articles on toxicity of Hg and the associated health risk. Remember now that the Watson Bill’s intent and the needs of the people of the State of California were to clarify the Hg misconceptions.

Point #4 – The primary intent of the Fact Sheet, explanation of health risks from Hg in dental amalgam is not well inspected nor well documented.

2001, the Department of Consumer Affairs, Legislators and consumer groups criticized the draft fact sheet. The Board worked all year on the Fact Sheet amidst continued public attention and criticism. Board meetings involved testimony of the California Dental Association, who opposed further disclosures, against consumer, environmental, medical, and scientific groups. The Legislature then shut down the entire Dental Board. After

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being shut down, the lame-duck Board approved a Fact Sheet that many, and I believe contained deficiencies and omissions about the risks of mercury fillings.

Point #5 – It has been a struggle to bring a Dental Fact Sheet to the consumer because organized dentistry believes that Hg amalgam is completely harmless.

2002, a new law by Senator Liz Figueroa, created a new board, and required that dentists give the Fact Sheet to their patients. Again, this was an attempt to inform the consumers about health risks of dental materials and specifically Hg in Hg amalgam. The cumbersome fact sheet turned out to be difficult to understand, that is, not consumer friendly. Governor Davis appointed a new board. New President Alan Kaye appointed Board Member Chester Yokoyama to chair a committee to write a consumer-friendly fact sheet. A public informational hearing was convened to explore the question, “What peer reviewed scientific evidence exists that suggests health risks for pregnant women, children and diabetics from mercury from dental amalgam?” The reason the question was posed like this was that the existing fact sheet proclaimed that there was “no research evidence that suggests pregnant women, diabetics and children are at increased health risk from dental amalgam fillings in their mouth.” In my opinion this statement is incorrect and the implied conclusion that pregnant women and children are without risk is also false. It was proven at the informational hearing, that there was research evidence that suggests increased health risk and health risks in general. What is also clear is that there exists a strong scientific controversy. The implied and assumed conclusions from reading the existing fact sheet, in my opinion, are misinformation and should be corrected.

Point #6 - There has been a long struggle to implement the Watson Bill in the State of California. In my opinion, this has not allowed full disclosure and informed choice.

As a concerned citizen of the State of California and as a “mercury free” dentist practicing in the State of California, I am concerned with the full disclosure of all vital information necessary for a patient to make an informed decision. In my opinion, there should be an advisory issued since

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the safety or harm of mercury fillings is not yet “scientifically conclusive.” The Dental Board of California should advise parents and pregnant women that, as a precaution, children and pregnant women should not be given amalgam fillings. This reflects the “Precautionary Principal”, which requires action once the possibility of harm exists.

Point #6 - In my opinion, if “there exists a diversity of various scientific opinions regarding the safety of mercury dental amalgams” and that “these opinions are not scientifically conclusive” then advisories should be made and cautions given.

On the day that I was preparing for this testimony, I found in the Los Angeles Times, an article entitled “Warnings on Canned Tuna Urged.” The subtitle was, “Advocates question why public health advisories on mercury fail to give specific advice about the most frequently eaten seafood in the country.” In all industries, including medicine, there is an acute awareness of the dangers of mercury. Mercury is no longer used in Medicine. Yet, we continue to insist that Hg amalgam stored in the mouth presents no health risk. Let me repeat. The California Dental Board Dental Materials Fact Sheet states and implies that Hg in the mouth is safe and that there is no health risk. Additionally, the fact sheet states that there is no increased health risk for pregnant women and young children. Pregnant women are advised that Hg fillings are safe yet dental personnel are warned not to touch the mixed amalgam with ungloved hands. Skin contact exposes the dental assistant to Hg, which is a substance known to the State of California to cause birth defects and reproductive harm.

Questions: 1. Why does it take so long to get a consumer-friendly fact sheet?  
2.

Mr. BURTON. Thank you, Dr. Yokoyama. I think you make a very salient point. You can't touch it with your hands, but they will sure put it into your gums.

Ms. Duffy.

Ms. DUFFY. Chairman Burton and Ranking Member Watson, I am Sandy Duffy, and my day job is as a lawyer from Multnomah County, OR. That is the county where Portland is located.

I became involved in the mercury-free dental cause when my 48-year-old husband's prostate cancer treatment failed and he was sent home to prepare for the inevitable. With a 7-year-old son, it was not an answer that I was willing to accept.

In searching for help for my husband, I learned that mercury suppresses the immune system and that the primary source of mercury in our bodies comes from dental amalgams. I was astounded. I knew mercury to be a serious toxin and could not believe that the Federal Government hadn't done something about a toxic product found in 80 percent of American mouths. How could this be?

I now know that my lack of knowledge was not unique, that 60 percent of Americans are unaware of the fact that there is even a controversy over the safety of mercury amalgams. How has dentistry hidden this information? My written materials contain a comprehensive list, and I am going to mention just three of them.

They have accomplished this by: one, using the term "silver fillings" and hiding the fact that amalgams are 50 percent elemental mercury; two, by adoption of ethical rules by the dental trade associations and the dental regulatory boards which deem it unethical and fraudulent for dentists to tell patients that removal of mercury amalgam dental fillings removes a toxin from the body, and, three, by using dental regulatory boards to prosecute mercury-free dentists for advertising mercury-free dentistry and for violating these ethical rules by telling patients about the mercury toxicity.

These uses of ethical rules are essentially gag orders, and they have been particularly powerful and effective tools in intimidating mercury-free dentists from informing their patients about the existence of mercury in dental fillings and the risks of such fillings. The ADA led the way. They have an ethical rule, Rule 5(a), which states, "Removal of amalgam for the alleged purpose of removing toxic substances from the body, when performed solely at the recommendation or suggestion of the dentist, is improper and unethical."

While the ADA claims that it does not tell dentists not to talk about amalgams, this rule clearly tells the dentists not to speak about a specific topic, the topic of removal of amalgams from the human mouth. Mercury-free dentists are concerned that any speech critical of amalgam can be construed by a vigilant dental board as advocating removal of amalgam.

The Oregon Board of Dentistry adopted an even more onerous policy, which provided that it is a fraud for dentists to advocate to a patient the removal of amalgams. In Oregon, this law is the basis for revocation of a dentist's license.

Last year I was able to enlist the help of the ACLU to challenge this policy with the Board of Dentistry, and the ACLU convinced the attorney general of Oregon to recommend to the board that

they rescind its policy because it was unconstitutional abridgment of free speech. On March 8, 2002, the board did rescind that policy.

Last week I asked my mercury-free dentist what the rescission of this policy personally meant to him. He asserted that it took away a very effective gag order. He now feels free to advise his patients about the hazards of mercury in dental fillings, and he tells them about safe alternatives. He did not feel he could speak this freely before the rescission of the policy.

In May of last year, I flew to Des Moines, IA to testify before a legislative committee reviewing administrative rules, which was considering a similar Board of Dental Examiners rule. The legislative committee requested an opinion on the Constitutionality of the rules from the attorney general and, after intervention by the Iowa ACLU, the attorney general finally did issue an opinion, and it concluded, "Dentists do have a free speech right to voice a personal opinion. We advise the board to reassess the continued viability of the rule." The Iowa Board of Dental Examiners has scheduled a meeting for June 18, 2003 to rescind that Iowa rule.

The Arizona legislature took the unprecedented step of sending a letter of reprimand to its dental board for its extensive and expensive prosecution of a mercury-free dentist simply for being mercury-free.

I would like to make just a comment off my notes here about Dr. Eichmiller's comments about this gag order. He said that the rationale for the rule was to prevent dentists from promising health cures by removing amalgam. That is not what that ethical rule says.

We agree that dentists can't promise cures, just like an orthopedic surgeon can't promise to cure back pain if he gives them surgery. That is a distinction.

The experiences in Oregon, IA, and Arizona show that the mercury-using majority of dentists have exerted regulatory power to control the free-speech rights of mercury-free dentists, and they have interfered with the relationships between the patients and their dentists in order to protect the majority's unfettered use of mercury as a restorative material. The intended effect of this gag rule is anticompetitive. Mercury-using dentists are limiting the practice of mercury-free dentists who now account for 21 to 28 percent of practicing dentists. And here is a question that needs to be asked: On the issue of mercury amalgams, are Federal agencies protecting the health of citizens or the economic interests of mercury-using dentists?

Due to the time limits today, I will limit my remarks to just the National Institute of Dental and Cranial Facial Research. In the 1940's, the ADA successfully lobbied to get a separate division of the National Institute of Health for research related to dentistry. The NIDCR has been safely in the hands of mercury-using dentists ever since. They decide who gets taxpayer research dollars, what topics are researched, and what results are published.

While the ADA repeatedly claims that there are no credible studies linking mercury amalgam to specific diseases, the NIDCR research data base reveals that it has funded 543 studies related to amalgams since 1972. I have reviewed 222 studies in the data base. That represents the last 10 years' worth. These 222 studies,

paid for with taxpayer dollars, only 1 of those could I find that has ever been published, 1 out of 222.

Is the NIDCR sitting on a mountain of evidence that mercury amalgams are safe and effective? I think not. It would have been published in a timely manner and they would have been highly publicized by the ADA.

I urge this committee to request copies of all 543 of these research studies, not the abstracts, the studies that were actually done by the scientists and provide mercury-free advocates copies of these.

Finally, I would like to show you a prime example of the misleading information produced by the ADA for use by practicing dentists. Off to my right is the display of a brochure that mercury-using dentists buy from the ADA 100 or 500 at a time. On the front you can see that it says, "Is It Safe: Silver Fillings," and it continually throughout the brochure refers to silver fillings.

It posits questions that a patient might ask, and then it gives the answers which are the ADA answers. In the materials that I have provided to the committee I have a rebuttal to each one of those answers, and I also have their questions as well, and I have cites to each of the references that I used to do that.

In conclusion, the scope of this committee includes human rights. I submit that the continued use of mercury amalgam with the complicity of Federal agencies is a violation of the Nuremberg Code which prohibited human experimentation without informed consent. The code has been determined by the National Institute of Health to be applicable to its actions, and that includes the NIDCR. It is disturbingly appropriate to apply the code to the amalgam issue.

I urge you to continue to investigate this important health issue. Thank you.

[The prepared statement of Ms. Duffy follows:]

**Testimony of Sandy Duffy, J.D.,<sup>1</sup>**  
**May 8<sup>th</sup>, 2003, 2:00 p.m.**  
**Before the Government Reform Committee**  
**Wellness and Human Rights Subcommittee**

Chair Burton and other distinguished committee members:

**Background.**

I am Sandy Duffy. My day job is as a lawyer for Multnomah County, Oregon, the county where Portland is located. I became involved in the mercury-free dental fillings cause when my 48 year-old husband's prostate cancer treatment failed and he was sent home to prepare for the inevitable. With a 7 year-old son, it was not an answer I could accept.

In searching for help for my husband, I learned that mercury suppresses the immune system and the primary source of mercury for humans is mercury amalgam dental fillings. I was astounded. I knew mercury to be a serious toxin and could not believe that the federal government had not done something about a toxic product found in the mouths of 80% of Americans. How could this be?

**How to hide mercury in dental fillings.**

I now know that my lack of knowledge was not unique. 60% of Americans do not know that there is a controversy over the safety of mercury amalgam. It has been used by dentists for over 170 years, but dentistry, primarily through its lead organization the American Dental Association (ADA), has succeeded in hiding the fact that an amalgam is 50% elemental mercury. How has dentistry accomplished this? In these ways:

- By creating a "tri-partite" pyramid of dental associations: The ADA, state dental associations and local county dental societies where information flows from the top down
- By using the term "silver fillings" and hiding the fact that amalgams are 50% elemental mercury
- By lobbying for state laws that allow state dental associations to prepare a list of proposed dental board appointees from which the governor makes appointments to the state regulatory board

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<sup>1</sup> 5647 Bay Creek Drive, Lake Oswego, OR 97035; (503) 603-9333; email: [DentalChoice1@aol.com](mailto:DentalChoice1@aol.com)



- By intertwining the ADA with state dental boards. The national organization for state dental boards, the American Association of Dental Examiners, is actually located inside ADA headquarters
- By intertwining the ADA with federal agencies responsible for regulating the safety of dental devices and workplace safety, as well as the one directing federal dental research dollars
- By concerted disinformation campaigns. For example, the “Tripartite dental associations” lobbying efforts at the federal and state levels which assert that there is no evidence that mercury amalgam causes adverse health effects when weight of scientific evidence proves just the opposite
- By adoption of “ethical rules” by dental trade associations and dental regulatory boards which deem it unethical or fraudulent for dentists to tell patients that removal of mercury amalgam dental fillings removes a toxin from the body
- By using dental regulatory boards to prosecute mercury-free dentists for advertising mercury-free dentistry or violating the “ethical rules” by telling patients about mercury toxicity

#### The “gag order.”

The use of “ethical rules” have been a particularly powerful and effective tool in intimidating mercury-free dentists from informing patients about the existence of mercury in dental fillings, and the risks of such fillings. The ADA led the way for the states’ regulatory boards when it adopted Ethical Rule 5A which declares:

*“removal of amalgam... for the alleged purpose of removing toxic substances from the body, when ....performed solely at the **recommendation or suggestion** of the dentist, is improper and unethical.”*

While the ADA claims that it does not tell dentists not to talk about amalgam, this rule clearly tells a dentist not to **speak** about a specific topic – the removal of amalgam. Mercury-free dentists are concerned that any speech critical of amalgam can be construed by a vigilant dental board as advocating removal of amalgam.

The Oregon Board of Dentistry adopted an even more onerous policy which provided that:

*"It is a **fraud** ... for a dentist to **advocate** to a patient the removal of ... amalgam restorations solely to substitute a material that does not contain mercury ..."*

In Oregon, fraud is a basis for revocation of a dentist's license. This policy also tells a dentist not to advocate, i.e., not to **speak** on a specific subject – the removal of amalgams.

Last year I was able to enlist the help of the ACLU to challenge this policy of the Oregon Board of Dentistry. The ACLU convinced the Oregon Attorney General's Office to recommend that the Board rescind its policy because it was an unconstitutional abridgement of free speech. On March 8, 2002, the Board did rescind the policy.

Last week I asked my mercury-free dentist what the rescission of this policy personally meant to him. He asserted that it took away a very effective gag order. He now feels free to advise his patients about the hazards of mercury in dental fillings and safe alternatives. He did not feel he could speak this freely before the rescission of the policy.

And then in May of last year I flew to Des Moines, Iowa, to testify before a legislative committee reviewing administrative rules, which was considering a similar Board of Dental Examiner's rule. The Iowa rule states that:

*"**Recommending** removal of restorations or removing [them] ... for the alleged purpose of removing toxic substances from the body, when such activity is initiated by the dentist, is an improper and unacceptable treatment regimen."*

And, again, unacceptable treatment regimens can subject the dentist to license revocation, which has actually occurred in Iowa.

The legislative committee requested an opinion on the constitutionality of the rule from the Attorney General. After intervention by the Iowa ACLU, the Attorney General finally issued an Attorney General's Opinion which concluded:

*"Dentists do have a free speech right to voice a personal opinion and to in good faith counsel patients free of unwarranted governmental intervention. The Dental Board must be cautious in the application of this or a similar rule to avoid encapturing fully-protected speech. In light of the law summarized in this opinion, we advise the Board to reassess the continued viability of subrule 27.7(8)..."*

The Iowa Board of Dental Examiners has scheduled a meeting for June 18, 2003, to rescind the Iowa rule.

The Arizona legislature actually took the unprecedented step of sending a letter of reprimand to its Dental Board for its extensive and expensive prosecution of a mercury-free dentist. The Arizona Goldwater Center suggests that the cure to this problem is appointment of mercury-free dentists from mercury-free dental associations to the Dental Board. This will mean wresting the control of appointment lists from the ADA affiliate state dental associations.

The experiences in Oregon, Iowa and Arizona show that the mercury-using majority of dentists have exerted regulatory power to control the free speech rights of mercury-free dentists and interfered with their relationships with their patients in order to protect the majority's unfettered use of mercury as a restorative material. The intended effect of these gag orders is anticompetitive. Mercury-using dentists are limiting the practices of mercury-free dentists who now account for 21-28% of practicing dentists.<sup>2</sup>

**NIDCR research results.**

Here is a question which needs to be asked: On the issue of mercury amalgams, are federal agencies protecting the health of citizens or the economic interests of mercury-using dentists? Due to time limits today, I will limit my remarks to just the National Institute of Dental and Craniofacial Research (NIDCR).

In the 1940's the ADA successfully lobbied to get a separate division of the National Institute of Health (NIH) for research related to dentistry. The NIDCR has been safely in the hands of mercury-using dentists ever since. They decide who gets taxpayer research dollars, what topics are researched and what results are published. While the ADA repeatedly claims that there are no credible studies linking mercury amalgam to specific diseases, the NIDCR research data base reveals that it has funded 543 studies related to amalgam since 1972.

I've reviewed the studies performed over the past ten years and only one NIDCR study has been published. Is NIDCR sitting on a mountain of evidence that mercury amalgams are safe and effective? I think not. It would have been published in a timely manner and highly publicized by the ADA. I urge this Committee to request copies of all 543 of these research studies (not abstracts) and to provide mercury-free advocates copies as well to evaluate the quality of the research and the results of the research.

**"Silver fillings" brochure.**

And, finally, I would like to show you a prime example of the misleading information produced by the ADA for use by practicing dentists to convince their patients about the safety of mercury amalgam when they express concern about the use of mercury in dentistry.

<sup>2</sup> Christiansen research Institute and Dental Products Magazine.

**DISPLAY BROCHURE BLOW UP**

The front of the brochure purports to give information about "silver fillings." In many states it is a violation of the consumer protection laws to describe a product by a component which represents a minor constituent of the product. Since mercury is, by far, the primary ingredient of mercury amalgam dental fillings, this brochure represents an intent to mislead consumers into believing "silver fillings" are primarily composed of the precious metal silver and to hide the substantial toxic mercury content.

The brochure sets out questions a patient might ask about mercury amalgam and the ADA's responses. I have attached to written copies of my remarks here today, several documents which may prove to be of interest to you, including a table which is essentially a rebuttal of the misinformation contained in this brochure along with citations to supporting documentation.

**Conclusion.**

The ADA has already made contact with every member of Congress advocating rejection of HR 1680, the Watson/Burton bill which includes a requirement for informed consent before placement of mercury amalgams. The ADA has made it clear that its goal is to continue to keep the American public in the dark about the risks of mercury amalgam.

The scope of this Committee includes Human Rights. I submit that the continued use of mercury amalgam with the complicity of federal agencies is a violation of the Nuremberg Code which prohibits human experimentation without informed consent. The Code has been determined by the NIH to be applicable to its actions, which includes NIDCR. It is disturbingly appropriate to apply the Code to the amalgam issue.

On a happier personal note, my husband had his amalgams removed, went through mercury detoxification, is alive and well, working full-time and involved in many activities with our almost 13-year-old son.

I want to thank you Chair Burton, ranking member Congresswoman Watson, and other Committee members for the opportunity to shine some light on the subject of mercury in dental fillings and to urge you to continue to investigate this important health issue.

**Silver fillings, free speech spur debate**

03/08/02

ANDY DWORKIN

Drama will play in an unlikely forum this afternoon when the Oregon Board of Dentistry debates a rule that limits what dentists can tell patients about the health benefits, real or imagined, of removing their silver amalgam fillings.

Fillings regulation may sound dull. But for the dental business, the debate over mercury-containing fillings is just as divisive and loud as societal arguments about gun control, the Vietnam War or scoring figure-skating contests. It's the Protestant revolt -- questioning a basic practice of dentistry for more than 150 years.

The more extreme members of each side accuse the other of trying to defraud the public to make a fast buck. The debate has led to lawsuits, a pending federal bill and the firing of California's entire state dental board.

"Man, it's a really hot issue," said Fred Berman, director of a toxicology resource center at Oregon Health & Science University. "There's certainly enough controversy and enough people on both sides of the issue. Sorting it out is the problem."

The great majority of dentists, backed by the Oregon and American dental associations, say silver amalgam fillings are safe except for a very small group of people with mercury allergies. The bulk of scientific research backs that position. Last month, the Food and Drug Administration released a review of research on fillings that said "no valid scientific evidence has ever shown that amalgams cause harm to patients."

"All the mainstream scientific literature that I've read indicates that the silver filling -- even though it contains about 50 percent mercury and even though it does leach mercury vapor in small amounts -- has no negative effect on human health," said Gordon Empey, dental director for Multnomah County Health Department.

But a vocal minority of dentists and patients, called "anti-amalgamists," think silver fillings pose serious health risks. They point out that amalgam fillings are half mercury by weight and that mercury is a toxic metal. They also note that a few nations, including Canada and Germany, have advised pregnant women and young children to use other types of fillings.

"There's a strong and growing number of dentists who are opposed to using mercury," said Charlie Brown, a Washington, D.C., lawyer with Consumers for Dental Choice, an anti-amalgam group that Brown said grew out of "a national victims' group of people who have gotten sick from mercury in their mouth." A rule barring fraud What the nine-member dental board will consider today is a

1990 rule that says "it is a fraud and a violation of the Dental Practice Act for a dentist to advocate to a patient the removal of" properly working amalgam fillings, just to substitute a filling material that doesn't contain mercury. Fraud is grounds for the board to remove a dentist's license to practice.

The board passed that rule to keep dentists from selling expensive filling-replacement procedures by claiming they would cure diseases, said Jo Ann Bones, the board's executive director. Some anti-amalgamists claim that the silvery fillings cause ills -- including asthma, depression, diabetes, multiple sclerosis and Lou Gehrig's disease -- and say that removing the fillings can cure those diseases. There is almost no scientific evidence to support such claims. But the board's rule has a serious flaw, according to Sandra Duffy, a Lake Oswego lawyer leading today's effort to kill the regulation. By governing what dentists can say, not what they do, it is "an unconstitutional abridgment of free speech," she said.

The board never investigated or disciplined any dentist for violating that rule. But at least a few Oregon dentists said they feel it limits their speech.

"I have always been fearful to tell the patients that mercury is not good for you," said Amy Khajavi, a Portland dentist who doesn't use mercury fillings and who plans to speak at today's hearing. Khajavi said she has never heard from the board about her views. "Nobody has approached me directly saying, 'Don't do that.' But there was the fear that my license could be jeopardized."

**Free speech.** At Duffy's urging, the American Civil Liberties Union sent a letter to Attorney General Hardy Myers saying the policy violates Oregon and U.S. free speech protections. The ACLU also said the board adopted the rule without following the right legal process, including a public hearing.

The ACLU could get an easy win. Bones said the board's lawyer already told members that they either need to reword or rescind the rule to address those worries. The lawyer will recommend rescinding the rule this afternoon, she said. That's mostly because the board does not "recommend what materials dentists should use," Bones said. She added that "there was no intention for that to be a gag order."

Bones said the board could still discipline a dentist who convinces patients to replace perfectly good amalgam fillings by making bogus health claims. To do that, the board would have to have a complaint and determine that the dentist was not following "acceptable patient care," as defined by standard dental teaching and practice. "The bottom line is, would any reasonable dentist have done this," Bones said.

The ACLU would be satisfied with that, said Julia Markley, the lawyer who wrote Myers. The group is worried about a policy limiting speech, not necessarily limits on actions.

"I would hope the Board of Dentistry would protect our health and prohibit dentists from doing certain things," Markley said.

A matter of discipline But rescinding the rule while still considering discipline for dentists who do pull and replace amalgam fillings would not satisfy anti-amalgamists, Brown said. If that happens, he said, there will still be a de facto rule against replacing amalgam for health reasons, and he'll urge the ACLU to pursue a lawsuit.

Brown added that he hoped to get the ACLU interested in the issue in other states. It's part of a broader campaign against mercury fillings. That effort's most notable success has been in California, where the legislature dissolved the state dentistry board last year after it delayed issuing a warning about the health pros and cons of amalgam.

The legislator who led that effort, Diane Watson, is now a member of the U.S. House. She has drafted a bill that would phase out the use of amalgam fillings entirely over five years, an idea that heartens Brown's group. "We now feel we can move to our top goal, which is to abolish mercury dental fillings," he said. You can reach Andy Dworkin at 503-221-8239 or by e-mail at [andydworkin@news.oregonian.com](mailto:andydworkin@news.oregonian.com).

**CONSUMERS FOR DENTAL CHOICE NW**

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**May 2, 2003**

**Why has the National Institute of Dental and Craniofacial Research (NIDCR) spent 100's of millions of dollars on over 500 research studies regarding the safety and effectiveness of mercury amalgam dental fillings and then failed to publish the results?**

Mercury-using dentists claim there is no "credible" proof that mercury amalgams cause health harm. They choose to rely on the information dispensed by the American Dental Association (ADA), state affiliates, and local dental societies. These are referred to by the ADA as the "Tri-partite Dental Associations". Despite the existence of overwhelming, peer-reviewed scientific studies to the contrary, these dental trade organizations continue to claim mercury amalgam is "safe."

In March 1991, the FDA Dental Products Panel met to assess the scientific evidence regarding the toxicity of dental amalgam. The Panel agreed that the information presented raised questions warranting further research. In November 1991, the FDA Committee to Coordinate Environmental Health and Related Programs (Risk Assessment Subcommittee and Benefits Subcommittee on Amalgam) reached a similar conclusion, and proposed that well designed scientific studies be conducted to precisely define potential toxic effects of amalgam.

In May 1994 the U.S. Public Health Service (USPHS), Agency for Toxic Substances and Disease Registry (ATSDR), published *The Toxicological Profile for Mercury (TP-93/10)*.<sup>1</sup> It identified the need for many additional studies on the health effects of metallic, mercuric, methylmercuric and phenylmercuric mercury. (Pages 185-188)

The 1999 Update of *The Toxicological Profile for Mercury* notes that:

"whether the levels of exposure to mercury vapor from dental amalgam are sufficiently high to cause adverse health effects, and exactly what those effects are *continues to be researched and debated by scientists and health officials*. U.S. government summaries on the effects of dental amalgam conclude that

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<sup>1</sup> The "Tri-partite dental associations" cite this document as proof that the FDA has found no evidence of links between the use of amalgams and the onset of health problems. However, this document certainly did not conclude that amalgam is "safe." In fact, it recites the MRLs (minimum risk levels, i.e. a safe level) in blood for chronic and acute mercury exposures; identifies the estimates of daily intake from amalgam; and, concludes: "Thus, both MRLs are below estimated exposure levels from dental amalgam." This is an astounding statement. This report, used by pro-mercury dentistry, asserts that mercury from amalgams causes plasma mercury levels in excess of government established safe levels! (Page 125)



there is no *apparent* health hazard to the general population, but that *further study is needed to determine the possibility of more subtle behavioral or immune system effects, and to determine the levels of exposure that may lead to adverse effects in sensitive populations.*" (Page 7)

The 1999 report repeatedly states that more research is needed, and that the research already conducted is dated and methods of determining exposure levels and effects were not very precise. (Examples: Pages 33, 43, 44, 45, 47, 49, 65 etc)

What, if anything, has the federal government done about facilitating research on this important health and environmental<sup>2</sup> issue?

Consumers for Dental Choice NW has recently become aware that hundreds of studies on the safety and effectiveness of mercury amalgam have been paid for by the National Institute of Dental and Craniofacial Research (NIDCR), a division of the National Institute of Health (NIH). (A list of 222 studies from 1994-2003 is enclosed.) To the best of our knowledge, only one of these studies has been published. That study of 1127 Air Force military men, presents evidence that men with amalgam dental fillings had four times as much mercury in their urine, and 90% of that mercury was the kind that comes from amalgam (inorganic).<sup>3</sup> This study corroborates a 1991 World Health Organization (WHO) document (#118) which concluded that mercury amalgam dental fillings are the number one source of mercury body burden in humans.

Freya Koss, Development Director for our national organization, Consumers for Dental Choice in Washington D.C., called NIDCR to inquire about the publication status of all of these taxpayer supported studies. She was told by Sally Wilerding, (301) 496-4263, that they would be published, but the exact publications had not yet been determined.

What USPHS didn't apparently know in 1993 when it called for more studies on mercury amalgam was that the NIDCR had already funded 321 studies between 1972-1993 (lists enclosed). Most, if not all, of these studies have not been published. I have been a trial attorney for 25 years; a common jury instruction is instructive in this situation:

The party which has the power to produce evidence, but fails to do so, shall have that evidence construed against him.

The NIDCR has the power to produce the results of 543 taxpayer-paid studies which were conducted specifically to determine the safety and effectiveness of mercury amalgam dental fillings. It has failed to do so. If these studies proved mercury amalgam to be safe, there is no doubt the studies would have been published and the ADA would have publicized the results. The only logical conclusion to be drawn from the failure to publish these studies is that they support the position of proponents of mercury-free dentistry, i.e. mercury amalgam is neither safe nor effective as a dental restorative material.

<sup>2</sup> Dental offices have been determined to be the number one source of mercury in wastewater treatment systems. These systems do not have the technology to remove mercury and it is discharged in the water effluent to waterways and in the "sludge" which is used as fertilizer on croplands. [www.mercurypolicy.com](http://www.mercurypolicy.com) (June 4, 2002)

<sup>3</sup> Kingman, A., *Mercury Concentrations in Urine and Whole Blood Associated With Amalgam Exposure in a US Military Population*, J Dent Res 77(3):461-471, March, 1998.

These studies are important and should be added to the body of scientific studies which have already been published. The Food and Drug Administration (FDA), Dental Division, is poised to conduct another review of the scientific studies to determine what classification should be given to mercury amalgam.

NIDCR should be asked for copies of all of these studies by the Government Reform Committee. Consumers for Dental Choice requests that the Committee provide a copy of those documents to us. Consumers for Dental Choice has contact with scientists who can evaluate these studies for their contribution to the body of science on amalgam.

It is important for the Government Reform Committee to know that scientists who have, in the past, conducted studies and concluded that mercury amalgam poses health hazards, cannot get funding from NIDCR (personal communication with Boyd Haley, PhD.) The scientists who are getting grants for NIDCR studies on amalgam are those who are approved by the ADA and who have been reluctant to make any conclusion critical of amalgam. (For example, Frederick Eichmiller, DDS, director of the ADA Health Foundation Paffenbarger [dental] Research Center, has had studies funded by NIDCR; he also writes pro-amalgam editorials for the ADA website<sup>4</sup>).

Dr. Kingman's military study, mentioned above, was funded by NIDCR. The authors conclude that: (a) even though men with amalgam have more mercury in their urine than men without amalgam, and 90% of that mercury is inorganic, the kind found in amalgams, the source of the inorganic mercury could be from some mercury exposure other than amalgam; (b) that this study cohort had more dental care than the general population [and therefore the findings are not applicable to the general population?]; and, (c) that there were no *observable* adverse health effects from increased body burden of mercury in the study cohort. Apparently, out of the 543 studies funded by NIDCR, this study was published because it was the strongest support for continuing the use of amalgam for tooth restorations.

However, it is important to know that in this study the average level of mercury in the urine (4.5 ug/L) was similar to that found in dentists in a study conducted at the University of Washington (<4.0 ug/L). The scientists in that study looked for subtle adverse health effects and found memory deficits and other neurological problems.<sup>5</sup>

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<sup>4</sup> Dr. Eichmiller makes the scientifically preposterous argument that amalgam is a compound similar to "sodium and chlorine (both hazardous in their pure state) [which] combine to form ordinary table salt, [and similarly] the mercury in dental amalgam combines with other metals to form a stable dental filling." [www.ada.org/public/media/newsrel/amalgam0207/nr-06.html](http://www.ada.org/public/media/newsrel/amalgam0207/nr-06.html) He would flunk high school chemistry. An amalgam is a mixture and the properties of each of the components remains the same in a mixture, i.e. mercury remains highly toxic and vaporizes and leaches out of the amalgam. Table salt is a compound, i.e. a new product which has different properties from the components. David M. Eide (Grant High School chemistry teacher), *The Oregonian*, Letters to the Editor, December 30, 2000; Guzzi, et al, *Should amalgams be removed?* The Lancet, 360:2081, Dec. 21/28, 2002.

<sup>5</sup> Echeverria, D, et al, *Neurobehavioral effects from exposure to dental amalgam mercury: new distinctions between recent exposure and mercury body burden*, FASEB Journal, 12:971-980 (August 1998).

-----Original Message-----

**From:** Joyce Van Haaften [mailto:jevha@earthlink.net]

**Sent:** Wednesday, November 13, 2002 8:10 PM

**To:** Leo Cashman; Mary Davis; Sandra Duffy; Charlie Brown

**Subject:** Board meeting

Colleagues:

The board decided to rescind the "Gag rule", but was set to adopt three new rules in its place. I had been told earlier that there would be no opportunity for public input, but just before they started, they said we could speak. Of course we were not prepared, but we still stated our case well, I thought. I summarized the science and assured them that I could provide documentation for everything I said. I happened to have the Tox. Profile for hg with me as well as the IDA statement from the legislative hearing. The IDA had said that 1 - 3 micrograms of Hg are released per day. The US document said 3-17. Why didn't the IDA use the official govt figures? Mary challenged the allergy angle and told them that the Allergy Institute does not even test for hg because it's a toxin, not an allergen. I gave several reasons why a dentist might need to recommend removal. They asked some reasonable questions. By the time we were done, the two ladies from the AG's office seemed to be backtracking. That is when we finally realized that they had been set to adopt the three new rules and they gave us a copy. Pam G of the AG's office defended their discipline of Hufford and Hanus (Hanus seven years ago) but admitted that in medicine a lot can change in seven years. They decided to wait for the AG's opinion and wait to work on the new rules. They said they wanted input from Mary and me on the proposed rules. We were told that they would keep us informed about any new proposal. WOW!

No one came from the Register or the ACLU. Neither of us had a tape recorder. Actually the board was quite cordial, thanked us for coming and said they had learned some things. 7 of 9 members were there plus several people who came for an earlier rule discussion. Mary handed out her books afterward and we made some important connections. This might sound hard to believe, but I thought that the two AG women, (Pam G and Teresa Weeg) were more of a problem than the board. If we can get a couple of new board members, things could change fast. Gov Vilsack has made some improvements already, it seems. The tone of the meeting was so much different than it was when Charlie helped us a few years ago. I am seriously considering trying to get appointed to the board as a public member.

I will fax Charlie the rules that they had been set to adopt. The last two were probably OK, but the first requires that a physician diagnose need for removal and the rules do not necessarily allow for a difference of opinion on amalgams, I'm afraid. Maybe Marvin can scan the rules so I can e-mail them. Mary, if you do not recall things in the same way I did, please say so or add to what I said. I have your copy of the proposed rules. Sorry.

I am going to "hit the hay" as we say in rural Iowa. I will say a prayer for everyone involved in the Dan Burton Hearing tomorrow.

Take care,

Joyce

JULIA E. MARKLEY  
Phone: (503) 727-2259  
Email: markj@perkinscoie.com

May 7, 2003

The Hon. Hardy Myers  
Attorney General  
Oregon Department of Justice  
Room 100  
Justice Building  
1162 Court Street NE  
Salem, OR 97301-4096

**Re: Oregon Board of Dentistry Policy Regarding Amalgam Fillings**

Dear Attorney General Myers:

On behalf of the ACLU and its clients, we are writing this letter regarding the written policy issued by the Oregon Board of Dentistry ("Board") regarding amalgam fillings. On October 10, 2001, Mr. Charles G. Brown sent a letter to you urging you to find that the Board policy was unconstitutional under Article I, section 8, of the Oregon Constitution, and the First Amendment to the United States Constitution. To our knowledge, you have not yet responded. We are now requesting that you promptly advise the Board to repeal its policy, either on the ground that it is unconstitutional or that, as a matter of administrative law, the Board had no statutory authority to adopt the policy.

The Board's policy on amalgam fillings provides:

Silver amalgams are a safe and cost effective restorative material when properly placed in cases which warrant its usage. It is fraud and a violation of the Dental Practice Act for a dentist to advocate to a patient the removal of clinically-serviceable amalgam restorations solely to substitute a material that does not contain mercury unless evidence suggests that the patient has mercury intolerance.

Board of Dentistry Meeting Minutes, Sept. 7, 1990, Section IX.

Because the Board's policy expressly prohibits dentists from "advocating" a particular viewpoint, the policy is unconstitutional under Article I, section 8, and the First Amendment.

[Duffy Attachment 4]

The Hon. Hardy Myers  
May 7, 2003  
Page 2

Moreover, because the Board's policy appears to be an administrative rule, it is invalid because the Board failed to follow the Oregon Administrative Procedures Act ("APA") when it adopted that policy.

The Board is a state actor. ORS 679.230 established the Board, and ORS 679.250 empowers the Board with licensing, regulatory, and enforcement powers. ORS 679.020(2) requires dentists to obtain a state license to practice dentistry. The Board may discipline dentists for, among other things, "unprofessional conduct." ORS 679.140(1)(c). Discipline includes suspension or revocation of a license. ORS 679.140(5)(c)(d).

Article I, section 8, of the Oregon Constitution, provides: "No law shall be passed restraining the free expression of opinion, or restricting the right to speak, write, or print freely on any subject whatever." In *State v. Robertson*, 293 Or 402, 649 P2d 569 (1982), the Supreme Court established a framework for determining whether a law, on its face, violates Article I, section 8. That framework requires that the Court first determine whether the challenged provision is "written in terms directed to the substance of any 'opinion' or any 'subject' of communication." *Robertson*, 293 Or at 412. If the provision is not directed to the substance of any opinion or subject of communication, but at a type of harm that the legislature is entitled to prescribe, then a second and possibly a third level of scrutiny is applied. *Id.* at 414-17.

The Board's policy is written in terms directed to the substance of a particular opinion. Under the policy, a dentist is prohibited from advocating the removal of clinically serviceable amalgam restorations in certain circumstances. By contrast, it appears that dentists are permitted to advocate the opinion that a patient should *retain* an amalgam restoration. The fact that the Board's policy may also be directed at the prevention of potential fraud does not cure the policy's constitutional deficiency.<sup>1</sup>

The policy's prohibition of advocating removal of amalgam fillings is particularly concerning in light of the legitimate scientific debate regarding the safety of amalgam fillings. One manufacturer's (Dentsply's) statement of the side effects of amalgam includes various health warnings that, under the Board's policy, dentists cannot pass along to their patients. In support of raising public awareness of the hazards of amalgam fillings,

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<sup>1</sup> Even if the Board's policy must be construed as commercial speech, the analysis and conclusion under Article I, section 8, is the same as noncommercial speech. *Moser v. Frohnmayer*, 315 Or 372, 376, 845 P2d 1284 (1993) (applying traditional Article I, section 8, test to commercial speech).

The Hon. Hardy Myers  
May 7, 2003  
Page 3

California Congresswoman Diane Watson has issued a statement and sponsored a bill, and the California Medical Association and the National Black Caucus of State Legislators have passed resolutions. Additionally, Health Canada, the Canadian Health Department, has issued a statement containing health advisories regarding and limits on the use of amalgam fillings.

Under the First Amendment, "Congress shall make no law . . . abridging the freedom of speech, or of the press." 42 USC § 1983 provides a cause of action for a plaintiff who can show that a person, acting under color of state law, deprived him or her of a federal constitutional right. Under an analysis similar to the analysis under Article I, section 8, the Board's policy is unconstitutional under the First Amendment. The policy discriminates against a particular viewpoint.

In addition to the constitutional issues, the Board's policy also suffers from a fatal deficiency under the APA and ORS chapter 679. The Board is an administrative agency. ORS 183.310(1); ORS 679.230. As such, it has only those powers that the legislature grants and cannot exercise authority that it does not have. *SAIF Corp. v. Shipley*, 326 Or 557, 561, 955 P2d 244 (1998). ORS 679.250(7) expressly authorizes the Board to make rules necessary for regulating the practice of dentistry. The APA defines "rule" as "any agency directive, standard, regulation or statement of general applicability that implements, interprets or prescribes law or policy, or describes the procedure or practice requirement of an agency." ORS 183.310(8). The Board's policy, therefore, is a "rule" within the meaning of ORS 183.310(8), as it is a statement that prescribes policy and applies to all licensed dentists in Oregon. Accordingly, the rulemaking procedures prescribed in the APA apply. See ORS 183.335 (outlining notice and comment procedures that agency "shall" follow when adopting any rule).

The Board, however, failed to follow ORS 183.335 when it adopted its policy regarding amalgam fillings. For example, ORS 183.335(1) requires an agency to give at least 21 days' notice in the Secretary of State's Bulletin of its proposed action. ORS 183.335(2) mandates specific requirements for the content of that notice. Instead of giving any notice, the Board simply approved the policy at its meeting on September 7, 1990. See Board of Dentistry Meeting Minutes, Sept. 7, 1990, Section IX. The Board then published the approved policy in its Fall 1990 newsletter. See *Amalgam Restorations*, 5 Board of Dentistry News 2 (1990).

In sum, the Board's policy on amalgam fillings is unconstitutional under both Article I, section 8, of the Oregon Constitution, and the First Amendment to the United States Constitution. The policy, therefore, is invalid. The policy, which meets the definition of an administrative rule, also is invalid because the Board failed to comply with the notice

The Hon. Hardy Myers  
May 7, 2003  
Page 4

and comment provisions for the adoption of administrative rules. ORS 183.335. Accordingly, the ACLU urges you to advise the Board that it should repeal its policy immediately and promptly notify all Oregon dentists that it has repealed its policy regarding amalgam fillings.

If the Board does not repeal its policy within 20 days from the date of this letter, we will be forced to consider litigation of the matter. Our clients presently include several practicing Oregon dentists who wish to inform their patients about the hazards of amalgam fillings. Additionally, we have spoken with a patient who recently discovered that her amalgam fillings have been adversely affecting her health. We sincerely hope that this matter will not need to be litigated, however, and we look forward to working with you for a prompt and lawful resolution of this matter.

Very truly yours,

Julia Markley  
Cooperating Attorney for the ACLU

JEM:sek

cc: Jo Ann Bones, Oregon Board of Dentistry  
David Fidanque, ACLU of Oregon  
Jann Carson, ACLU of Oregon  
Andrea Meyer, ACLU of Oregon  
Michael H. Simon, Perkins Coie LLP  
Sandra Duffy  
Charles G. Brown

**PRO-AMALGAM  
DENTISTS AND THE  
ADA ASSERT THAT:**

1. Mercury in dental amalgams chemically binds with the alloy metals and results in an inert substance. The ADA also frequently claims that the components of amalgams are analogous to sodium and chlorine which are hazardous in their pure form but combined to form ordinary table salt.

2. If mercury is emitted from amalgams, it is only in very minute amounts.

3. The small amounts of mercury emitted from amalgams are not bioavailable.

4. There is no credible scientific evidence supporting a link between silver fillings and systemic diseases or

**MERCURY-FREE DENTISTS AND ANTI-MERCURY  
ACTIVISTS RESPOND:**

1. An amalgam is a mixture and the properties of the components remain the same, i.e. a mercury atom remains a mercury atom and remains highly toxic, vaporizing and leaching out of the amalgam. Table salt is a compound, i.e. a new molecular structure which has different properties than the individual components. *Guzzi, et al, The Lancet, 360:2081, Dec 21/28,2002*; David M. Eide (Grant High School chemistry teacher), *The Oregonian*, Letters to the Editor, Dec. 30, 2000.

2. The average amalgam weighs 1 gram and is 50% mercury. As much as 50% of the mercury in an amalgam has been found to have vaporized after 5 years, and 80% after 20 years. Pleva J, "Dental mercury - a public health hazard", *Rev Environ Health 10(1):1-27 (1994)*; Pleva J, *Mercury from dental amalgams: exposure and effects*, *Int J Risk & Safety in Med*, 1992, 3: 1-22.

An exacting study conducted in 1991 evaluated the amount of mercury emitted from a common amalgam in a test tube with 10 ml of water. This study showed that "the over-all mean release of mercury was 43.5 mcg per cm<sup>2</sup>/day, and the amount remained fairly constant during the duration of the experiments (2 years)." This was without pressure, heat or galvanism as would have occurred if the amalgams were in a human mouth. Chew, CL, et al, *Long-term dissolution of mercury from a non-mercury-releasing amalgam*, *Clinical Preventative Dentistry*, 13(3):5-7, May-June (1991).

3. Mercury vapor from amalgam is the single largest source of systemic mercury intake for persons with amalgam fillings. Average daily exposure for mercury is 3-17 ug. per day; for fish is 3 ug per day; for air it is .04 ug per day; and, for water .05 ug per day. WHO Document 118, p.36, 1991; A 1998 study by NIDR concluded that amalgams were the primary source of mercury in the urine of military personnel. A. Kingman et al, National Institute of Dental Research, "Mercury concentrations in urine and blood associated with amalgam exposure in the U.S. military population", *Dent Res*, 1998, 77(3):461-71.

4. Dr. Murray Vimy, Clinical Associate Professor, Faculty of Medicine, University of Calgary, prepared a document which sets out dental journal articles from 1957 to 1984 which very clearly show that mercury amalgams cause gingivitis and periodontal



chronic illnesses.

disease. This document can be downloaded from the website: <http://www.testfoundation.org/vimyresponds.htm> In turn, periodontal disease has been linked to cardiovascular disease and pre term, low birthweight babies. Greenwell H, et al, *Emerging concepts in periodontal therapy*, Drugs, 2002;62(18):2581-7.

A 2001 scientific study corroborates the role of mercury in Alzheimer's. The researchers concluded: "...that this visual evidence [of neurodegeneration] and previous biochemical data strongly implicate mercury as a potential etiological factor in neurodegeneration." Leong, CW, et al, *Retrograde degeneration of neurite membrane structural integrity of nerve growth cones following in vitro exposure to mercury*, NeuroReport, 12(4):733-37, March 2001.

The "previous data" included a study in which the authors concluded that: "We believe one ...[theory of the pathogenesis of Alzheimer's] could be mercury vapor to which the majority of individuals are continuously exposed [from dental amalgam]. By reducing levels of viable brain tubulin, mercury vapor could exacerbate the conditions related to the onset of symptoms identified with Alzheimer's." Pendergrass, JC, et al, *Mercury vapor inhalation inhibits binding of GTP to tubulin in rat brain: similarity to a molecular lesion in Alzheimer diseased brain*, NeuroToxicology 18(2):315-324 (1997).

Mercury is a potent neurotoxin and many peer reviewed scientific studies have found evidence that amalgam fillings may play a major role in central nervous system diseases such as depression, schizophrenia, memory problems, ALS and Parkinson's's, [www.home.earthlink.net/~berniew1/amalg6.html](http://www.home.earthlink.net/~berniew1/amalg6.html)

A Canadian study found that blood levels of five metals, including mercury, were able to predict with 98% accuracy which children were learning disabled. Other studies found mercury causes learning disabilities and impairment, and lowers IQ. Marlowe, M, et al, "Main and interactive effects of metallic toxins on classroom behavior", J Abnormal Child Psychol, 1985, 13(2):185-98; Moon C et al, "Main and Interactive Effect of Metallic Pollutants on Cognitive Functioning," Journal of Learning Disabilities, April, 1985; Pihl, RO et al, "Hair element content in Learning Disabled Children", Science, Vol 198, 1977, 204-6; Gowdy JM et al, "Whole blood mercury in mental hospital patients", Am J Psychiatry, 1978, 135(1):115-7. Also see above website.

There are 1000's of other studies showing adverse health effects from mercury in general, and amalgam in particular. [www.altcorp.com](http://www.altcorp.com), [www.amalgam.org](http://www.amalgam.org), [www.bioprobe.com](http://www.bioprobe.com), [www.iaomt.com](http://www.iaomt.com) [www.home.earthlink.net/~bernie1/amalg6.html](http://www.home.earthlink.net/~bernie1/amalg6.html)

5. If amalgam was bad for you, dentists would be the canary in the mine and, in

5. A CDSPi Report (supplies malpractice insurance to dentists) was published in the Journal of Canadian Dentists in 1994. It reports that suicide rates among dentists are double those of

fact, they have no more health problems than anyone else.

other professions; 20% of dentists at any given time are on long term disability due to mental or nervous conditions including depression, increased alcohol consumption, fatigue, insomnia, ulcers and heart problems.

Female dentists have increased spontaneous abortion rates and increased breast pathology, compared to the general population. Wiksztrajis, Med Pr 24:248 (1967 Lithuania).

6. No other country has banned the use of dental amalgam.

6. Most other developed countries have issued limited bans, or mandated health warnings regarding the use of mercury amalgam including: Canada, Great Britain, France, Austria, Norway, Sweden, Switzerland, Japan, Australia and New Zealand. Swedish National Dept. of Health, *Mercury Amalgam Review Panel*, 1987; Heavy Metal Bulletin, Dec 2000, Vol 6, Issue 3.

A Swedish National Mercury Amalgam Review Panel and a similar Norwegian panel found that "from a toxicological point of view, mercury is too toxic to use as a filling material." *Id.*; Press Release, *Swedish Council for Planning and Coordinating Research (FRN)*, Stockholm, 19 February, 1998; Norwegian Board of Health, Report 2652, <http://www.helsetilsynet.no>

7. A few people can be allergic to amalgam, but there are only 50-100 reported cases.

7. In a clinical study, allergy tests performed on fourth year dental students found 44% of them allergic to mercury. E.G. Miller et al, "Prevalence of Mercury Hypersensitivity among Dental Students", *J Dent Res.* 64:Abstract 1472, p338,1985; D.Kawahara et al, "Epidemiologic Study of Occupational Contact Dermatitis in the Dental Clinic", *Contact Dermatitis*, Vol 28, No.2, pp114-5,1993.

The Clifford Immune Reactivity Test is used to test dental patients for biocompatibility with dental materials. A review study of that test showed that 93% of patients tested were immune reactive to mercury. Clifford Consulting & Research, Inc, *Dental Materials Reactivity Testing*, Colorado Springs, Colo, <http://www.cclab.com> & Peak Energy Performance, Inc., *Dental Materials Biocompatibility Testing*, <http://www.peakenergy.com>

An important new study from the United Kingdom found that mercury can cause allergic and immunotoxic reactions, but there are no dose-response studies for immunologically sensitive individuals and, therefore, "it has not been possible to set a level for mercury in blood or urine below which mercury related symptoms will not occur." Kazantzis, G., *Mercury exposure and early effects: an overview*, *Med Lav* 2002 May-June;93(3):139-47.

8. The U.S. Public Health Service, including the National Institutes of Health, the Food and Drug Administration, the Centers for Disease Control and the World Health Organization have all concluded that amalgam is a safe and effective restorative material for dental fillings.

8. In 1993 the PHS Director, Dr. James O. Mason, in an introductory letter to the **USPHS** CCEHRP report states: "Because the possibility of adverse health effects resulting from the use of dental amalgam **cannot be fully discounted based on available scientific evidence**, I am requesting the National Institutes of Health, the Centers for Disease Control and Prevention, and the Food and Drug Administration to undertake an expanded and targeted program of research, professional and consumer education and product regulation."

That report, at page 3 states: "In the absence of adequate human studies, the Subcommittee on Risk Assessment **could not conclude with certainty whether or not the mercury in amalgam might pose a public health risk.**"

The **USPHS**, Agency for Toxic Substances and Disease Registry also has a publication entitled: *Toxicological Profile for Mercury Update TP – 93-10 (1993)* which specifically states that "the continuous exposure to mercury from amalgam fillings is **not without risk to patients.**" At p. 25.

The American Dental Association never acknowledges that there is a **1999** Update of the **USPHS** publication which clearly states that amalgam is the primary source of human body burden.

Two presenters at an **NIH/NIDR** Technology Assessment Conference in 1991 presented significant documentation of adverse effects of mercury amalgams. The Final Statement of this conference was written by W.D. McHugh and the Conference Editor was Joyce a. Reese; both are dentists. The Final Statement from that Conference is not a strong endorsement of the safety of mercury amalgams. It states: "**While the current evidence supports the concept that existing dental restorative materials are safe, it must be recognized that the supporting data are incomplete.**" (Advances in Dental Research, Vol. 6, page 143, Sept. 1992.)

One of the presenters of the adverse effects of mercury amalgam wrote to protest the Final Statement. The **NIH** responded to him thus: "The recognition of the paucity of data on the subject, especially with regard to mercury, was the reason for using the term 'Technology Assessment' rather than 'Consensus Development.' Our guidelines for a Consensus Development Conference do require the statement to be data-based to the extent possible .... In regard to the studies you presented being ignored, they were definitely considered and discussed at length, but not emphasized in the Final Statement."

In response to public uproar after the airing of the CBS *60 Minutes* segment called: "Is there poison in your mouth?" the **FDA** held a Dental Products Panel Meeting on March 15, 1991. At page 208 of a transcript of that meeting, there is a list of Panel Recommendations. It includes: "Without the addition of any

statements that reflect that the Panel feels that there is any unsafety [sic] to the use of dental amalgam as a restorative material, I would ask the Panel, now, that the information under review today, if that information raises questions that warrant further research. I will poll the Panel for a yes or no vote." All Panel members voted "yes," therefore all agreeing that questions about the safety of amalgams had arisen. **The Panel made no declaration that amalgam was safe or harmless.**

The latest **FDA** Consumer Update (December 31, 2002) informs consumers that Canada limits the use of mercury amalgam in pregnant women and it indicates that the **FDA** is reviewing the scientific studies related to the safety of mercury amalgam. While the FDA has up until now indicated that there was insufficient scientific proof that mercury amalgams cause adverse health effects, **it has never declared mercury amalgam to be safe.**

A World Health Organization (**WHO**) Scientific Panel in 1995 concluded that **there is no safe level of mercury exposure.** The Chairman of the panel, Lars Friberg stated that **"dental amalgam is not safe for everyone to use."** L.T.Friberg, "*Status Quo and perspectives of amalgam and other dental materials*", International symposium proceedings, G.Thieme Verlag Struttgart, 1995.

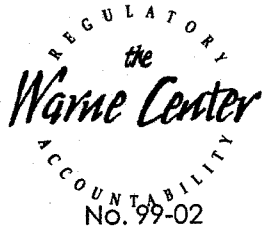
Additionally, the **U.S. EPA** found that mercury amalgam fillings which are removed from dental patients are hazardous waste and must be sealed airtight and disposed of as such. "*Amalgam declared hazardous*", Dentistry Today, February, 1989, p1.

And, finally, a Canadian Government study for **Health Canada** concluded that any person with any amalgam fillings receives exposure beyond that recommended by the USPHS standard. Mark Richardson, Environmental Health Directorate, Health Canada, *Assessment of Mercury Exposure and Risks from Dental Amalgam*, 1995, Final Report; G.M. Richardson et al, "*A Monte Carlo Assessment of Mercury Exposure and Risks from Dental Amalgam*", Human and Ecological Risk Assessment, 2(4): 709-761.

Prepared by:

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# VIEWPOINT

## Fillings and freedoms

*Arizona dentists try to silence a colleague through re*

by Mark L. Genrich

In the March, 1999 edition of "Inscriptions," the journal of the Association, Dr. Terry Lee – a widely respected Phoenix dentist as the "dentist who lost his license."

There is just one problem with that statement: It's not true.

That falsehood, however, is an apt metaphor for Dr. Lee's treatment by the Arizona Board of Dental Examiners, the state agency that regulates the practice of dentistry in Arizona.

Obfuscation and rank dishonesty have ruled the process.

Dr. Lee did not lose – nor has he ever lost -- his license, despite the actions of a group of dentists who seem to have conspired to throw Dr. Lee out of dentistry simply because of his beliefs.

Dr. Lee happens to believe that amalgams – mercury fillings – are harmful additions to the body. He has been practicing dentistry in Arizona for many years and during that time he has openly, actively, articulated his beliefs to patients and, indeed, anyone else who would listen, the benefit being "mercury-free."

muzzled, unable to give patients the benefits of their education, tra  
belief.

A bipartisan group of Arizona legislators, including the Majority an  
leaders in the Senate as well as the Majority Leader and Majority V  
House, recently highlighted the essence of the regulatory outrage. I  
the dental board the legislators voiced their concern that the board  
inappropriately adopting new standards of practice through enforce  
against Dr. Lee rather than through the legal rule-making process.

The legislators noted that the proposed standards in the case of Dr.  
require dentists to embrace mercury amalgams in communications  
patients, despite earlier assurances from the board to the Legislatu  
consumers in Arizona would have full access to mercury free dentis

For his "heretical" belief, Dr. Lee was dragged through a long and c  
process involving court filings, an administrative hearing, and, fina  
the Arizona Board of Dental Examiners. The dental board is a regu  
created by statute to "examine, license and maintain standards for  
profession in Arizona."

The 11-member board is dominated by dentists -- six of them servir  
along with three lay persons and two licensed dental hygienists, al  
the governor for 4-year terms. There is a built-in prejudice against  
dentists, because governors routinely pick their nominees from a li  
... the powerful Arizona Dental Association.

Not long ago the dental board voted to allow Dr. Lee to keep his lic  
dentist members of the board were absent when the vote was taker  
was given probation. Most significantly of all, however, Dr. Lee wa  
continue practicing dentistry -- precisely as he had practiced it bef  
further board action in the months ahead.

Is there a remedy for such arbitrary discrimination against "mercu  
dentists? Gov. Jane Hull could fill a future dental board vacancy w

The debate over the safety of mercury in dental fillings is ar though the government of Canada has urged dentists to stop the teeth of children. Canadian officials also believe it is un amalgams in women of childbearing age or in people with k addition, the government of Great Britain has directed that amalgams on pregnant women. The governments of Austria and Sweden have already announced plans to stop or limit t mercury amalgams."

Clearly, reasonable medical and scientific minds can disagr mercury-based fillings. Resolution of those particular dispu to individual patients fully armed with all of the facts.

Many dental organizations, however -- including the Ameri Association -- have issued edicts saying no dentist may rem except at the initiation of the consumer. Removal of amalga of the dentists, they say, "is improper and unethical." Imagi

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dentists: Gov. Gary King could have a serious conversation with the dentist who is not beholden to the good ol' boy network of the Arizona Dental Board -- perhaps a representative from the Arizona Holistic Dentists Association.

The ultimate answer, of course, is for the Arizona Dental Board to honor their own statutes -- including the Regulatory Bill of Rights -- and, finally, simply adhere to standards set openly, fairly, by the regulatory board.

*Mark L. Genrich is director of the Warne Center for Regulatory Accountability at the Goldwater Institute. Permission to reprint is granted provided credit is given to the authors and the Goldwater Institute. Full text is available online at [www.goldwaterinstitute.org](http://www.goldwaterinstitute.org)*



Mr. BURTON. Thank you very much. Ms. Duffy, those studies that you referred to, that you could only see one, you only got one?

Ms. DUFFY. There was only one that had actually been published in Pub. Med.

Mr. BURTON. Are those pretty voluminous, those studies?

Ms. DUFFY. Actually, I can get you a list of all of those studies, and I actually have provided those to your assistants at this time.

Mr. BURTON. I understand, but what I was wondering is, you said you thought we should get all those several hundred studies, and I just wondered how voluminous they are, because I don't know that I have enough staff to go through all those. [Laughter.]

Ms. DUFFY. But, you know what, if you got those, we would find some staff out here to go through them.

Mr. BURTON. All right, you tell us what studies we should be asking and we will try to get the committee and the full committee to subpoena those, ask for them first, subpoena them if we don't get them, and if we have to, we will figure out another way to get them, but we will figure out a way to get them.

Ms. DUFFY. I will be very happy to do that, and that will happen next week.

Mr. BURTON. OK.

Ms. WATSON. May I just add, too—

Mr. BURTON. Yes.

Ms. WATSON [continuing]. In listening to Dr. Eichmiller, he said there is some vagueness about this scientific research. What I would like to do, once we receive those, is go through and publish that material, so that there will be empirical evidence to support the claim. Apparently, you are telling us only one has been made public. I would like to see what was in those others and why they weren't made public. So, if the Chair agrees, I think once we go through and look very closely at the data there, then we should make it public.

Mr. BURTON. Well, we definitely will do that—

Ms. WATSON. Yes.

Mr. BURTON [continuing]. Representative Watson, and we will have a report that will go into all this before this is over.

Ms. WATSON. And let's do a big press conference.

Mr. BURTON. We will probably do that, too.

Ms. WATSON. Yes.

Ms. DUFFY. OK, this will be very important for the FDA, which is planning to have another dental panel before they classify mercury amalgams and have a rule on that. So this body of evidence would obviously be relevant.

Mr. BURTON. Well, we will try to make sure that the FDA and HHS and CDC and all of them hear from us, I promise you.

Ms. DUFFY. Thank you.

Mr. BURTON. They know we are here. [Laughter.]

Ms. DUFFY. Thank you.

Mr. BURTON. I promise you they know we are here.

Mr. Carlton.

Mr. CARLTON. Mr. Chairman, thank you. I am Emmitt Carlton. I am immediate past president of the Virginia NAACP. The NAACP has endorsed the Watson/Burton bill and similar State

bills. I am honored to appear in front of the lead sponsors of this bill, Chairman Burton and Ranking Member Watson. The NAACP salutes you for your national leadership. I am especially happy to be here, Mr. Chairman, since I am from Indianapolis.

We learned a lot about the so-called "silver" dental fillings. They are about 50 percent mercury. We have learned that mercury is toxic, that it is a neurotoxin. Because mercury is neurotoxic, the development of the brains of children are particularly at risk as are pregnant women and children; that mercury in health care is being banned or phased out of almost all health care uses; that mercury fillings are toxic material going into the mouth and a hazardous waste coming out; that toxic mercury vapors emanate from the fillings; that the FDA has never approved mercury dental fillings as being safe, even though you would think so from looking at the ADA's brochure they passed out.

We have learned that the Government of Canada recommends that children and pregnant women not receive mercury fillings. One would think that we, as Americans, given Canada's decision, would have a choice not to get mercury fillings, but, in general, Medicaid requires dentists to put mercury back in children's bad teeth, and so does the Bureau of Indian Affairs. Poor children still get mercury fillings or they get no fillings at all.

Is high cost the reason why our children do not have a choice in dental fillings? Probably not. In ongoing price surveys of 300 cities you can find on a great Web site called bracesinfo.com, a pattern is clear. For permanent teeth, one-surface fillings, mercury fillings cost a little more than resin fillings, and generally children only need one surface filling. For baby teeth, the cost of mercury fillings is a little less than resin, but we must ask, why do we even allow mercury to go into baby's teeth?

One possible reason for continuing to use mercury fillings may be dental convenience because the dentist can do the procedure for mercury fillings a little faster, 2 minutes faster, we learned in some State testimony.

Another possible reason is inertia. Mercury fillings have been the most common filling for a long time. Or there may be another reason, callous indifference to the poor children of America.

As we have learned from Ranking Member Watson, there is a lot of action going on at the State level in the Medicaid policy: mercury fillings or no fillings. State Representative Karen Johnson, Republican of Arizona, Assemblyman Jerome Horton, Democrat of California, have both introduced bills to stop their States from dictating that mercury goes into children's mouths.

Obviously, we are on the same panel with former Maine Senate president Mike Michaud. He talked about his work. Obviously, he is now in Congress. It is also a pleasure to be here on this panel with Dr. Yokoyama and Ms. Duffy.

I am pleased to inform the subcommittee that these consumer choice changes are favored by many in organized dentistry. The National Dental Association, the largest association of African-American dentists, has testified in favor of changing Medi-Cal to allow choices for the consumer. The California Dental Association, the largest State affiliate of the ADA, testified for the Horton bill in California. The International Association of Oral Medicine and

Toxicology, the American Academy of Biological Dentistry, both National Associations of Mercury-Free Dentists have been working as well on the issue.

We commend the dental groups and individual dentists who want low-income consumers to have choices the rest of us have. So we want to work with those who will increase the number of dentists that serve the poor. We want to work to change the Medicaid system, the third-party payment system, at the bottom of the economic realm, to spur changes in the third-party payment system in general, including private insurance and public employee insurance. The NAACP resolution endorses changing the third-party payment system on fillings so consumers have a choice and so all dentists may participate.

Finally, we want to create a system that is more fair to dentists. The time for transition out of mercury fillings is now. We don't want to punish or straitjacket our dentists. We want a payment mechanism so that dentists can fully participate in the transition to mercury alternatives.

In summary, don't leave poor children behind. We don't want a two-tiered system that leaves mercury fillings on Indian reservations, in the inner cities, in the barrios and Appalachia. All of America's children deserve what Canada's children and Sweden's children, and increasingly America's middle-class children, get: a mercury-free childhood. It is time to offer alternatives to mercury fillings for all Americans as the first step toward ending their use once and for all.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Carlton follows:]

160

**STATEMENT OF  
EMMITT H. CARLTON, JR.  
VIRGINIA NAACP IMMEDIATE PAST PRESIDENT**

**NAACP SUPPORT OF  
H.R. 1680**

**House Government Reform Committee  
Human Rights and Wellness Subcommittee  
May 8, 2003**

I am Emmitt Carlton, Immediate Past President of the Virginia NAACP. Our national association, the National Association for the Advancement of Colored People, passed a resolution last year endorsing the Watson-Burton bill and similar state bills. We were very concerned that children, all children, not be faced with exposure to mercury through so-called silver fillings. I am honored to appear in front of the lead sponsors of this bill, Chairman Burton and Ranking Member Watson, and we at the NAACP salute you for your national leadership.

This much is known about amalgam dental fillings:

- They are about 50% mercury.
- Mercury is toxic to all living organisms; it is a neurotoxin, it is bioaccumulative, and it is the most volatile heavy metal.
- Mercury in health care is being banned or phased out of almost all other health care uses.
- Mercury fillings are toxic material going into the mouth, and a hazardous waste coming out.
- Toxic mercury vapors emanate from the fillings.
- The Food and Drug Administration has never approved mercury dental fillings as being safe, instead simply grandfathered them into existence.
- The National Institute of Dental and Craniofacial Research never completed a peer-reviewed study showing the fillings are safe.
- The American Dental Association has never conducted a peer-reviewed study showing the fillings are safe.
- Alternative dental materials are available for all uses. Already, between one-fifth and one-third of dentists practice mercury-free dentistry; that is, they no longer place mercury in children, or adults.
- Because mercury is a neurotoxic, the developing brains of children are at particular risk to mercury exposure. Because mercury goes through the placenta to the fetus and through the breast milk to the infant, pregnant women and nursing mothers likewise face particular risks to mercury exposure.
- The government of Canada recommends that children and pregnant women not receive mercury fillings.

One would assume, at the very least, that Americans would have a choice NOT to get mercury fillings. That they would not be forced into a position of exposure to mercury fillings. But such is not the case.

In general, Medicaid requires dentists to put mercury in children's back teeth. So does the Bureau of Indian Affairs. Poor children still get mercury fillings -- or they get no fillings at all.

Is this because about everyone gets mercury fillings? Not anymore. The most common filling material today, according to the American Dental Association, is no longer mercury fillings. It is resin, also known as composite.

Is high cost the reason why our children do not have a choice in dental fillings? Probably not. In ongoing price surveys of 300 cities you can find on [www.bracesinfo.com](http://www.bracesinfo.com), a pattern is clear. For permanent teeth, one-surface fillings, mercury fillings cost a little MORE than resin fillings. Generally, children only need one-surface fillings; it's adults that need the two- and three-surface fillings. For baby teeth, the cost of mercury fillings is a little less than resin, but we must ask why do we ever allow mercury to go into baby teeth? There is no good reason.

One possible reason for continuing to use mercury fillings may be dental convenience, because the dentist can do the procedure for mercury fillings a little faster. Another possible reason is inertia -- mercury fillings have been the most common filling. Or there may be another reason -- a callous indifference to the poor children of America.

We call on the Center for Medicare and Medicaid Services (CMS) and the states to change their policies and allow Medicaid families to have choices.

The NAACP has long focused on the issue of environmental justice. For example, many Americans think that lead paint problems for children are a thing of the past. Not so -- in the inner cities, the problem persists.

The NAACP adopted a resolution supporting the Watson-Burton bill only after a thorough and deliberative process. My home NAACP branch in Alexandria, Virginia, and the Los Angeles, California branch began the process by adopting similar resolutions and transmitting them to the national NAACP Resolutions Committee. The national NAACP health staff, headed by Willarda Edwards, M.D, reviewed the resolution, gave it a positive recommendation, and forwarded it to be debated in the NAACP Resolution Committee. The Committee endorsed the Resolution, and submitted to NAACP National Convention delegates for a convention vote in Houston. After a robust floor debate, the resolution was adopted. The NAACP Board of Directors gave final approval to the resolution at its meeting two months later. As you can see, the NAACP takes time to consider carefully any policies before adopting them, and has a multi-tiered process before acting.

Action has begun at the state level to end the Medicaid policy of mercury fillings or no fillings. State Representative Karen Johnson, Republican of Arizona, and Assemblyman Jerome Horton, Democrat of California, have both introduced bills to stop their states from dictating that mercury goes into children's mouths. Both bills are progressing; the Johnson bill is awaiting a floor vote in the Arizona House, and the Horton bill cleared the Health Committee in the California Assembly overwhelmingly. We understand that the State of Maine is changing its policies to allow choice, a change prompted by passage of the law written by then Senate president Mike Michaud, a law which gives consumers disclosures about the risks of mercury fillings.

Senate president Michaud is now Congressman Michaud, and it is an honor to sit on the panel with him, as well as with California Dental Board member Chet Yokoyama and consumer advocate Sandy Duffy from Oregon.

I am pleased to inform the Subcommittee that these changes are favored by many in organized dentistry. The National Dental Association, the largest organization of African-American dentists, favors changing Medi-Cal to allow choices for consumers. So does the California Dental Association, the largest state affiliate of the American Dental Association, who testified for the Horton bill in California. So, too, the International Association of Oral Medicine and Toxicology and the American Academy of Biological Dentistry, both national associations of mercury-free dentists. We commend the dental groups and individual dentists who want low-income consumers to have choices that the rest of us have.

Ending the “mercury fillings or no fillings” for the poor should trigger three major steps forward.

First, it will increase the number of dentists who will serve the poor. Mercury-free dentists now account for between one-fifth and one-third of all America’s dentists, according to surveys by the Christiansen Research Institute and Dental Products magazine, and the number is growing fast. These dentists cannot, in conscience, participate, because they won’t put mercury in children’s teeth. Testimony submitted to the California Assembly Health Committee suggests an immediate increase in participation. The American Academy of Biological Dentistry, a national organization of mercury-free dentists, predicted some of their members would start participating, and San Francisco dentist Terecita Dean said she was ready to start participating as soon as she could put non-mercury alternatives into children’s bodies.

Second, by changing Medicaid, the third-party payment system at the bottom economic rung, we can spur changes to the third-party payment system in general, including private insurance and public employee insurance. Moderate-income Americans on limited insurance plans frequently face a situation where they, too, must get mercury fillings for their families. The NAACP resolution endorses changing the third-party payment system on fillings, so consumers have a choice AND so all dentists may participate. It’s time that the insurance companies and government agencies re-evaluate these policies. It’s time to end mercury for the poor and choice for the rich.

I am pleased to note that Rhode Island has taken a major step in that direction. A statute enacted there permits public employees to get non-mercury alternatives.

Third, we will create a system that is more fair to dentists. The time for transition out of mercury fillings is now. We don’t want to punish or straitjacket our dentists; rather, we want a payment mechanism so dentists can fully participate in the transition to mercury alternatives.

Don't leave the poor children behind. Don't saddle them with the burden of mercury toxicity. Don't create a two-tiered system of environmental justice, where we leave the mercury fillings on the Indian reservations, in the inner cities, in the barrios, and in Appalachia. All of America's children deserve what Canada's children, and Sweden's children, and increasingly America's middle-class children get: a mercury-free childhood.

The leading rationale I have heard for using mercury fillings is that they have been used for 150 years, so how harmful can they be? That is no rationale at all -- as a country, we've done other things for 150 years (or more) that are wrong. It's time to offer alternatives to mercury fillings for all Americans, as a first step toward ending their use once and for all.



Mr. BURTON. Thank you, Mr. Carlton. One of the things you said, Mr. Carlton, that stuck with me was that you said the mercury fillings are less expensive?

Mr. CARLTON. We have seen on this Web site in some cases they are less; in some cases they are more. We were surprised by that. We thought that in baby teeth, basically, less; with adult teeth, basically, there is a price difference.

So the only thing we were trying to illustrate is it is not simply a price thing, and maybe it takes longer to fill them, and there are multiple reasons why there is some opposition.

Mr. BURTON. But, Dr. Yokoyama, you are a dentist.

Dr. YOKOYAMA. Yes.

Mr. BURTON. If the cost is very similar to, say, composite fillings or something else, why would you use mercury?

Dr. YOKOYAMA. That is a good question.

Mr. BURTON. I mean, why is the ADA fighting so hard, if it is not an economic issue?

Dr. YOKOYAMA. It is twofold really. I think it is an economic issue. It is also a convenience—

Mr. BURTON. Well, how is it an economic issue? Can you tell us?

Dr. YOKOYAMA. Well, I am unfamiliar with the information that was just given about the cost. I am not familiar with the exact cost compared throughout the United States, but I can say that economically it is common knowledge in dentistry that a composite filling will cost more than a mercury filling because it is more difficult to do.

The degree of difficulty really comes from perhaps familiarization with the materials. It appears that, as you familiarize yourself more with the composite materials, it becomes less of a factor. So I will say that familiarization and ease of placement might make an amalgam less expensive at this time, but as we transition, the amount of added difficulty might become much less.

Mr. BURTON. What I can't understand—and I am not going to ask a lot of questions of this panel because I think you have acquitted yourself very well in your statements, but what I can't understand, if it is not a major economic factor, then why in the world is the ADA fighting this so much? I mean, they know that mercury is toxic. They know there is a risk. They know that they are probably looking down the barrel of a gun at some point. Why in the world—the logic alludes me. Can you explain that to me?

Dr. YOKOYAMA. That is a rhetorical question. I do not know myself.

Mr. BURTON. Did that guy leave that represents them? He did? The heat was on. [Laughter.]

One second. You haven't been sworn in. Who are you, sir?

Mr. LORSCHIEDER. Dr. Lorscheider.

Mr. BURTON. Oh, I am sorry. You were not at the table.

Mr. LORSCHIEDER. I was going to answer the question which you posed, Congressman.

Mr. BURTON. OK, go ahead real quickly, sure.

Mr. LORSCHIEDER. Though I am not a dentist, I have had this explained to me by—

Mr. BURTON. You look like you are choking a chicken or something. [Laughter.]

Mr. LORSCHIEDER. Though I am not a dentist, I have had this explained to me by a couple of dentists at two different dental schools, and the issue really comes down to this. The examples I will use are just very simple, round figures, and any dentist here can correct me on this.

But if you go to a dentist and ask for a silver filling, everything is predicated on chair time, and it is going to take the dentist perhaps 4 minutes to put that amalgam filling in, remove the old one, put a new one in, or drill out some of the tooth, prepare it, and put the filling in. For that, the charge might be \$100.

Now if you, instead, say to the dentist that you would like a composite filling of some sort, glass ionimer or some other material, your first visit to the dentist can take as long as 30 minutes because you are going to be in the chair while the tooth is excavated, and then a silicon rubber impression mold is made of that excavation in order to prepare a casting. Then you will go back a second time for about 10 minutes while the dentist removes the temporary filling that he put in, while he then cements in the casting and burnishes it, and so forth, to get the occlusal bite quite clear.

Now, by rights, since the dentist has now invested 40 minutes of chair time into the preparation of that tooth, if he charged you \$100 for 4 minutes of time for an amalgam, theoretically, he should charge you \$1,000 for 40 minutes of chair time. But what is going to happen, if he charges \$1,000 for 40 minutes of chair time, you are soon not going to go back to that dentist. So the dentist ends up charging about \$300 to \$350 for that casting, that composite casting, that he has put in the tooth.

So if you rate it all on the basis of per-unit-chair-time, the dentist has lost money by putting that composite in versus the amalgam. I have had two dentists, one at Oregon and at Illinois, explain this to me because they knew I wouldn't understand the business of dentistry. But this is really the bottom-line issue. It is an economic issue for dentists.

Mr. BURTON. Let me ask one more question and then I am going to yield to Ms. Watson. And that is, Dr. Yokoyama—

Dr. YOKOYAMA. Yes?

Mr. BURTON [continuing]. You are a non-mercury dentist?

Dr. YOKOYAMA. Yes.

Mr. BURTON. Can you tell us from your experience the difference in time and cost as relates to what the gentleman just said?

Dr. YOKOYAMA. Time and cost, I can only estimate, as I really haven't done mercury fillings in 10 years. So I don't know what I would charge, even if I did them right now.

But the fee that I charge is substantially more for a composite filling when I do a direct composite filling. That is, a casting, as Dr. Lorscheider is mentioning, which is different—I mean that is a totally different procedure than to try to refill a tooth. You can fill it with mercury amalgam or you can fill it with composite.

I suppose, as my skills get better, the time becomes more like the time that I would spend trying to fill a tooth with amalgam versus composite, but I know that it is a technique-sensitive material and it takes longer to do.

Mr. BURTON. OK, thank you very much.

Dr. YOKOYAMA. Economically, I am not sure how that plays out, but it is more difficult.

Mr. BURTON. I just was wondering what the primary reason was, if the cost of the materials was pretty much the same, why there would be such opposition to that.

Representative.

Mr. MICHAUD. Yes, Mr. Chairman, all I can say is I know, when I put the first bill in—and, mind you, the original bill I submitted was just to inform about the health effects—at that time a lobbyist told me privately, when I was really amazed that they were opposed, let alone it wasn't to ban it or anything, just to get the information out there. The concern was that if they admit that there might be some toxics put into the mouth, the concern was liability and later on down the road suits brought against the dentist for putting mercury fillings into the mouth. That might be one of the reasons why they are so adamant about any legislation dealing with mercury amalgams.

Mr. BURTON. Well, I think as time goes by, with new scientific evidence and new information coming out, through your efforts or Ms. Watson's, or somebody else, I think that risk becomes greater and greater. It seems like they would get on with it if they could see the inevitable.

Ms. Watson.

Ms. WATSON. I want to first say to the Honorable Mike Michaud, thank you so much for coming and sharing your experience with us. Would you tell my good friend, John Martin, that I said hello? We have worked together on other issues, and I hope to work through you and him and people like yourself around this country on furthering the kind of legislation that in the long run will benefit the health of Americans. So thank you very much.

Dr. Yokoyama, I want to thank you for taking your own time to come here. I know what a difficult task you have. May I ask you, what brought you to the position of being a mercury-free dentist?

Dr. YOKOYAMA. Well, when I was working as a hospital dentist, I would use amalgam almost primarily for the patients that were developmentally disabled, and we would bring them into the OR and do all of their dentistry all at one time. I could see that this was doing a lot of amalgam all at once. My feelings slowly over the years became more—I became more aware of the problem and saw that, as I was doing this large amount of amalgam, that I felt that it was not doing the patient the justice that they deserved and I stopped doing it.

I have evolved over time to make my practice completely mercury-free. There are several other reasons for changing in myself, and I could go into that, but I think you are asking me what brought me to do this, and that is the reason.

Ms. WATSON. I am very interested in the fact that you were working on developmentally disabled young people.

Dr. YOKOYAMA. Yes.

Ms. WATSON. And I have my own theories, too. As a school psychologist in my other life, I would walk into schools in the lower-socioeconomic areas and the teacher would say, "Every child in here is mentally retarded. I want these children tested." She would hand me 36 of their folders.

And I said, "Well, why do you think so?" "Well, it is the way they speak. They speak in two-word sentences." I said, "You would, too, if it is: 'Get up,' 'Shut up,' 'Sit down,' 'Eat up.'" [Laughter.]

And I thought about it, why should these children have problems with their academic studies? What are the circumstances in their environment that could attribute to that? I mean, I am talking about years ago in the late sixties and early seventies, where we found, one, it was the lead in paint on the cribs, and the kids would get up and teething, chew, and get the lead in their bodies.

Then we found out in buildings—you know, in Los Angeles we throw uprisings now and then—and we found that new construction had within it asbestos. I was horrified. I had a crew out there cleaning up during the 1992 uprising, and someone ran to me and said, "There is asbestos in the air."

So when you put all of these together and then when we know there is mercury involved in what goes in our mouth, then I can understand why our children are not functioning up to par.

So that was my intent: to inform people as to what might impact on the health of themselves and their children.

Putting together this fact sheet seems to be a task that only a nuclear physicist could do. [Laughter.]

Can you tell us—and I was very impressed by you on point one, explained point two very concise, very clear, and those kids that I had to test would understand. If you could, what would you have in your brochure that would be informative to patients?

Dr. YOKOYAMA. Well, I did mention that I really feel that a caution or an advisory is warranted for pregnant woman and children, young children.

Ms. WATSON. Similar to what we do with cigarettes?

Dr. YOKOYAMA. Similar, yes.

Ms. WATSON. What a concept.

Dr. YOKOYAMA. That is the primary thing that I am right now working toward in California. Second, I will say that I applaud Mr. Michaud's efforts in Maine because I really think the consumer-friendly look and readability of that document far outstrips the California document that was basically made for dentists' consumption.

So, as we develop a consumer-friendly, readable fact sheet, I would like two things. I would like to update what we know now as to the science, the things that have come up recently since 2001, and I would also like to make it much more a brochure that someone could pick up and say, "Gee, I didn't know that. I'm glad I saw that in here."

Ms. WATSON. Dr. Yokoyama, is there a fair factor here with dentists with the gag order and in the Code of Ethics? Was that a fair factor? Was that intimidation? And then I am going to go to Mrs. Duffy.

Dr. YOKOYAMA. OK. You have pressed a point and—

Ms. WATSON. I intended to. [Laughter.]

Dr. YOKOYAMA. Yes. It is hard for me to talk about intimidation, but I do feel that I am not supported—or how should I say this?

Ms. WATSON. Just say it.

Dr. YOKOYAMA. I love the support and the feeling here in this chamber today because that is giving me so much more a good feel-

ing toward going out and doing the work that I am doing. So I will just say that.

Ms. WATSON. Thank you.

Mr. BURTON. Would you yield?

Ms. WATSON. Sure.

Mr. BURTON. I would like to pin this down a little bit.

[Applause.]

Mr. BURTON. Are you saying that the Dental Association or organization in California is not that supportive? [Laughter.]

Dr. YOKOYAMA. Well, I think that is their position, yes.

Mr. BURTON. Yes. OK, thanks.

Ms. WATSON. If I might just say that we will back you up with anything that you need.

Dr. YOKOYAMA. Well, I appreciate that. Thank you very much.

Ms. WATSON. I still am very close to people in California, and if they try to come after you, just let us know. [Laughter.]

Dr. YOKOYAMA. Thank you.

[Applause.]

Ms. WATSON. Mrs. Duffy, I must commend you—see, it takes one person, just one person, a citizen like yourself, who realized something was wrong, and you have made a difference. You have raised an issue that has been bothering me for a long time, and that is a provider's first amendment rights. How could you ever tell a certified board member who is a doctor, a dentist, a chiropractor, a whatever, that they could not explain to their patients the truth about something, a procedure or an ingredient in whatever they put in a product, or what is in the medication they provide to you?

Now the Chair of this committee is very concerned about inoculations, vaccinations, and so on. I have warned a lot of people in my district not to get the flu vaccine, not to get the chicken pox vaccine, because you are getting a little bit of the germ, the virus. If your health is not good, put it together. You know, connect the dots.

Not everyone can tolerate. If you are allergic, like I am, to many, many things, then there are certain things that I cannot put into my body. Through the process of trial and error, I found that out, and I finally got medical attention. You know, use a histamine. That wasn't it. I was allergic to certain foods.

So, anyway, first amendment rights, and you went that route, and I would like you to explain a little more because I think you have hit on something. I am going to raise these questions with the ADA.

Is anyone here from the ADA who wants to admit that they are here from the ADA? [Laughter.]

I wish the doctor had stayed in the room. But I think there is a problem, and if you have gone through your medical training and you know the scope of practice, why they would not allow you to tell your patients just simple information. I think it is a violation of first amendment rights. You have pursued this, and I would like you to elaborate just a little more.

Ms. DUFFY. OK. One of the things that the ADA has done here is to put the dentists in a horrible position because, if the dentists don't give the information to the patients that they need to give—"Here are the risks for this procedure; here are the alternatives to

this procedure”—and something goes awry, that dentist is going to be sued for failure to warn. I mean that is a real typical kind of a case that you are going to have.

And, yet, the ADA is telling dentists: There are certain things we don't want you telling your patients. So they have interfered in really a sacrosanct fiduciary relationship between a patient and their doctor.

On the other hand, the ADA—and it has been sued around the country, and it files Motions to Dismiss, and it says: We should not be in this lawsuit because we didn't place mercury amalgams in these patients' mouths. You shouldn't be looking at us. Basically, they are saying everything except: Go after the dentist; don't go after us.

So they really are not friends to the dentists either. I think that the sooner the dentists realize that, that they will actually embrace your bill here federally; they will embrace my bill in Oregon, and they will embrace bills in every State and use it as cover to get out from under using amalgam. They will just say, "It's not legal anymore. We're not using it anymore." And they are really foolish not to do that.

Ms. WATSON. Thank you so much.

And, Mr. Carlton—

Mr. BURTON. Excuse me. Would the gentlelady yield?

Ms. WATSON. Yes.

Mr. BURTON. First of all, I have to leave, and Ms. Watson, although she is in the other party, she is going to chair the rest of this meeting, and that is rare. [Laughter.]

Ms. WATSON. We work together.

Mr. BURTON. That is rare, but I have great confidence in her.

[Applause.]

Ms. WATSON. Thank you. Thank you.

Mr. BURTON. If you guys keep that applauding up, I may not leave. [Laughter.]

But let me just say that I really appreciate your patience here today, and I appreciate your testimony. We are going to continue this fight, as I said, with Ms. Watson for many months, maybe years to come, and we will get the job done eventually. So thank you very much, and she will take care of you for the rest of this.

Ms. WATSON [assuming Chair]. Thank you so much, Mr. Chairman.

Mr. Carlton—Congressman Michaud, do you have to leave now? If you do, please feel free to get up and leave. We appreciate your spending the time with us.

Mr. MICHAUD. Well, thank you very much. I do have another meeting I have to run off to. I really appreciate it, and thank you very much once again for inviting me here.

Ms. WATSON. We appreciate the time you spent with us.

Mr. MICHAUD. Thank you.

Ms. WATSON. Yes.

[Applause.]

Ms. WATSON. Mr. Carlton, your testimony was so cogent because you are getting to something that people want to avoid, and that is, when we talk about the poor and we talk about our ethnic communities, they are the ones that really suffer. What we are finding,

we just started a National Diabetic Association, and the reason why we did this, because their ADA, American Diabetic Association, had the background, the expertise, the products, and so on, in my area, but the people who seemed to be most afflicted by diabetes/hypertension are the last to know what the ADA offers.

I think you put your finger right on it. That is why I am directing this to you. What can we do to highlight the fact that our communities are being underserved, and we know that. We have seen studies that show in the African-American community and also in the Hispanic community people are underserved, and the outreach just doesn't go deep and far enough into the community.

Can you give us some suggestions or advice—

Mr. CARLTON. Yes.

Ms. WATSON [continuing]. As to what we can do?

Mr. CARLTON. Thank you, ranking chairman, Congresswoman Watson.

The NAACP salutes this committee, the subcommittee, and salutes you in particular, for your putting a spotlight on a very serious issue. A lot of people don't know anything about this. They get their dental fillings. They think it is the only thing they have; they don't have any consumer choice.

So when Members of Congress sponsor legislation, especially legislation that runs into opposition, we are very grateful because it allows us to rally around you and to support you and say, "Look, this is the sort of thing we ought to be doing in health care."

The NAACP has been doing this for a long time. In fact, I think back in the 1930's Dr. Montague Cob set up the first subcommittee of the NAACP. Access to health care has always been an issue. I mean, we have done four major health care conferences in the last 10 years, hooked up with major organizations, started health committees at the branch level, because if we want to get the information out in the community, you have to do it at the branch level. That is what I did when I was a branch president. We had a health committee to get the information out there.

There are always things that affect people disproportionately in poor communities and ethnic communities. We just have to keep working and getting the word out because that is really the first barrier. If people know, we have informed consumers of choice, that is the first stage. If you get funding after, that is even better.

I know President Fume put out a call to every NAACP branch in the country a couple of days ago, a minority AIDS/HIV initiative, to fully fund that in this Congress. So, again, thank you for your efforts.

Ms. WATSON. Thank you so much for being here.

Both panels, are there last-minute statements or words you would like to leave with us? If so, just state your name into the microphone, come up to this mic. Dr. Haley.

Mr. HALEY. Yes, my name is Boyd Haley, chairman of chemistry, University of Kentucky.

What I would like to make a comment was with the safety of dental amalgams and looking at people that were exposed environmentally. The change is that, as we age, the compound that removes mercury from the body called glutathione drops dramatically after the age of 50 and it keeps going down. So a person that is

responding well and taking care of the mercury toxicity from dental amalgams when they are 30, 40, and 50 years old runs into a different situation as they age or as they become ill, and the levels of glutathione scientifically have been proven to drop after that, and those people lose their protection against removing mercury. It drops dramatically. And when they reach the age of 60–65, they are much more susceptible to mercury toxicity than they are when they are 40.

So while they can say that amalgams are safe and we put them in people and they have no problems, I think that they really fall flat on their faces when they go and they look at the percent of glutathione drop in an aged person versus a young person and saying that these people still are safe from amalgam exposure.

Ms. WATSON. Thank you so very much.

I am also thinking about looking at nickel in jewelry that we wear next to our skin. I am very highly allergic to nickel and it is in most cheap jewelry.

Somebody is pointing to their mouth. Did you want say something?

Ms. DUFFY. And braces for children contain nickel.

Ms. WATSON. Yes. So we are going to look into that, too.

I just refuse to accept the notion that African-American children are retarded or Hispanic-American children, or whatever. That has not been my experience as a teacher as well.

So I have taken a personal look and been on a personal mission to gather evidence to show why children have such a difficult time when they live in very poor areas and overcrowded areas and live together. So I carried a bill when I was in the senate that said, "Violence is a health condition" because I find that when children live in a violent environment, it affects their ability to deal with the concrete.

So, I mean, there are just so many things, so many factors, that we hope 1 day to remove, and there are environmental conditions that we hope to address as well. So this is my mission. This is the one I will be on as long as I am in public office.

I want to thank all of you who have come in and shared with us your expertise. It is very important that you do not give up the fight, and it is a fight. It is a challenge.

You have to understand, we live in a capitalistic society, and all that we do is framed within that box. So we have to get around that. We have to appreciate what factors in the environment, what factors that go into our bodies are part of that environment, and we can't just focus on the bottom line.

I really want to say in California that we have dealt, through propositions, with these kinds of issues. So we looked at the herbicides and pesticides and other toxic substances that we use in our environment. We listed them, and mercury was at the top.

So we have been struggling. It is not easy because you are developing policy. Dr. Yokoyama, I just want to tell you, don't give up; don't get deterred, but I don't think he is. I don't think he is. [Laughter.]

Dr. YOKOYAMA. I'm inspired, let me say.

Ms. WATSON. Because, as I said, it took us 14 years on the smoking issue, smoking policy, anti-smoking policy, and I used to



carry—we had propositions passed—and I used to carry the budget line for the media, and the tobacco industry came in with an open checkbook. Anybody that was on foot, even in a wheelchair, with blood running through their veins was given a blank check to lobby me. [Laughter.]

Very interesting. When I write my book—but we prevailed. As you know, California was the first State to say: No smoking in our airspace. It spread across the country. Now it has spread around the globe.

So, as I said to you, Ms. Duffy, you know, it just takes one person and a team of people and continuing on their mission to bring it to fruition.

So, with that, I want to say that we are going to work on this bill. I have a good partner in Congressman Burton. He is very committed. His staff is committed, and we are not going to give up, even if we have to subpoena the ADA in.

With that, thank you very much. Have a good evening and good night.

[Applause.]

Ms. WATSON. And I will now adjourn this meeting. Thank you again.

[Whereupon, at 6:11 p.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

[Additional information submitted for the hearing record follows:]

Subcommittee on Human Rights and Wellness  
United States House of Representatives

*Re: Written testimony to the Subcommittee from Georgia Huffman-Rux, Vancouver, Washington*

Dear Chairman Burton and Congresswoman Watson:

In 1996 I learned about mercury amalgam toxicity. I decided to make an inquiry about this issue with my own dentist. He told me that the alternative material – white fillings – were “too expensive.” He also told me that he was no longer placing mercury fillings and, placing his hand on my shoulder, looked at me most sincerely and said “I am not putting anything in your mouth that would be harmful.” He then proceeded to place two (2) “silver” fillings. I was convinced that they did not contain mercury.

In December 2000 I learned that “silver” fillings are 50% mercury. This gave me a great deal of concern. I did not know whether my dentist had been dishonest with me or whether the person who told me that “silver” fillings are 50% mercury was mistaken. I researched the issue and discovered that “silver” fillings are, indeed, 50% mercury.

In January 2001 I took my 14 year old daughter to a pediatric dentist because she needed a cleaning. While we were in the waiting room, I told the dental assistant that I did not want fillings that had mercury in them. The assistant said that the fillings were not mercury – that they were silver. She then took me into the treatment area. I told the dentist that I knew that silver fillings were 50% mercury and that I wanted my daughter to have white composite fillings. The dentist’s response was: “fine, but they will cost more.” He also told me not to mention the word “mercury” out in the waiting room.

In April 2001 I decided to confront my own dentist about the dental work he had done on me in 1996. I told him that he had lied to me about the presence of mercury in the fillings. My dentist agreed that he might have “mislead” me, but mercury was perfectly safe. I told him that the research I had done said otherwise. I asked for my dental records so I could find a mercury free dentist.

Also in April 2001, I took my 14 year old daughter to the orthodontist. My daughter and I were talking about mercury dental fillings. A dental assistant working on another patient interrupted us and said that amalgam only contained a “trace” of mercury. I told her that I did not think that 50% was a trace.

On June 12, 2001 I took my 14 year old daughter back to the same pediatric dentist for a cleaning. I was told that she had 2 cavities. Again, I told the dentist that I did not want mercury fillings. Again, he said they were not mercury fillings but silver fillings. I told him I knew that they were 50% mercury and that I did not intend to have him continue as my daughter’s dentist. I did not have him treat the diagnosed cavities. The next dentist I

took my daughter to was mercury-free and said that she had no cavities that needed filling.

As you can see, mercury-using dentists not only don't warn dental consumers about the risks of mercury amalgam, they affirmatively lie about the mercury as a component of amalgam dental fillings. This shows that our federal and state legislators will have to legislate informed consent which includes the actual wording of the notice. You cannot count on mercury using dentists to give accurate or honest information when it comes to mercury containing dental fillings.

Many people are not as lucky as I have been. I had someone tell me about the mercury content of dental fillings. My research into the matter verified the truth of that. Our government should protect us from harm when the professionals we count on will not do so. I feel mercury using dentists know that they are harming people by placing mercury amalgams and they are lying to keep consumers from knowing what they are doing. It is time to stop this health harming practice.

It is also important that mercury free dentists be able to advertise and speak freely about their mercury free practices so that people know there is a controversy and so that they know they have an alternative to a mercury based dental treatment.

Sincerely,

  
Georgia Huffman-Rux

TESTIMONY BEFORE THE  
COMMITTEE ON GOVERNMENT REFORM  
U.S. HOUSE OF REPRESENTATIVES

NOVEMBER 14, 2002

RICHARD D. FISCHER, D.D.S.



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November 14, 2002

Dental amalgam ("silver") fillings contribute more mercury to the body burden in humans than all other sources (dietary, air water, vaccines, etc.) combined.<sup>1,2</sup> These fillings contain 50% mercury - which is more neurotoxic than lead, cadmium, or even arsenic.

To put this in perspective, the amount of mercury contained in one average size filling exceeds the U.S. E.P.A. standard for human exposure for over 100 years. Put in other terms, it takes only ½ gram of mercury (the amount in one filling) to contaminate all fish in a 10 acre lake.<sup>3</sup>

Mercury vapor escapes from dental amalgam fillings and is readily absorbed into the body. It accumulates in all body tissues and has been shown to cause pathophysiology. Many studies have confirmed this. Furthermore, in the case of pregnant women with amalgam fillings, the mercury readily passes from her bloodstream through the placental barrier and accumulates to even higher levels in the developing fetus' organs than it does in the mother's. Mercury from dental amalgam has also been shown to concentrate in mother's milk, providing not only a prenatal, but a perinatal and a postnatal exposure<sup>4</sup> for the developing child, whose immune system and central nervous system are exquisitely vulnerable to this poison.

Scrap amalgam mercury, that unused portion of the filling material remaining after the filling is placed into a tooth, must by law be handled as a toxic waste disposal hazard.<sup>5</sup> It cannot be thrown in the trash, buried in the ground or incinerated. It must be stored in an air-tight vessel until properly disposed of. Yet some will justify storing this same mixture in peoples' mouths just inches from the brainstem and declare it harmless!

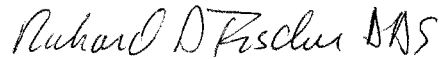
Governments of other countries (Canada, Germany, Sweden, France, Norway and the United Kingdom) have placed restrictions and/or issued advisories against the use of mercury in dental fillings - particularly in children and pregnant women.

In addition to the direct mercury exposure to humans from dental fillings, there exists a significant secondary route of exposure from dental offices. Published research shows that between 14% and 75% of the mercury found in municipal waste waters originate from dental offices. Mercury in this form ultimately finds its way into our rivers, lakes, bays and oceans where it undergoes a bioconversion by bacteria into methyl mercury - the form which commonly contaminates fish and shellfish. In this form, when eaten, 90-100% of the mercury is absorbed. It was this compound which caused the tragedy in Japan's Minimata Bay in the 1970's when hundreds of people were poisoned and many died from eating mercury contaminated fish.

In conclusion, there is no scientific debate over the following facts regarding mercury from dental fillings:

1. Mercury is more toxic than lead, cadmium or even arsenic
2. Mercury escapes from dental amalgam fillings continuously as a vapor
3. 74-100% of inhaled mercury vapor is absorbed into the human body
4. Inhaled mercury vapor from dental fillings accumulates in the body to levels which cause pathophysiology

Respectfully submitted,



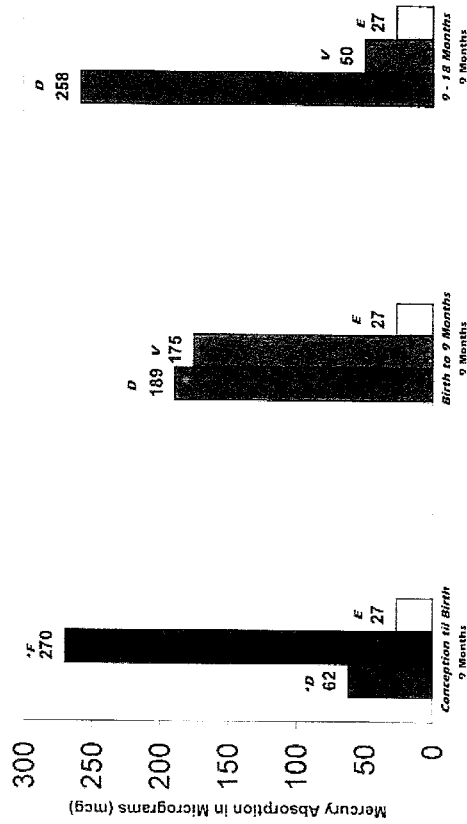
Richard D. Fischer, D.D.S., F.A.G.D.  
Past President, International Academy of Oral Medicine and Toxicology

#### References

1. World Health Organization (WHO) Environmental Health Criteria 118 document on inorganic mercury.
2. Aposhian, *et al.*, FASEB J. 6:2472-2476, 1992.
3. Clarkson & Friberg - Biological Monitoring of Toxic Metals. Plenum Press, N.Y., 1988.
4. Electric Power Research Institute, EPRI Technical Brief: "Mercury in the Environment," 1993; and EPRI Journal, April, 1990.
5. Vimy, *et al.*, Maternal - fetal distribution of mercury (<sup>203</sup>Hg) released from dental amalgam fillings. *American Journal of Physiology* 258:R939-45. April 1990.
6. Council on Dental Materials, Instruments and Equipment. Recommendations in dental mercury hygiene. 1984 JADA. 109:617-9, October 1984.

**AVERAGE FETAL/INFANT ABSORBED DOSES OF MERCURY  
(A TIME LINE)**

- D = Dietary = Red
- F = Fillings = Black
- V = Vaccines = Blue
- E = EPA Limit (Adults) = Green



\*Contributed from Mothers Absorbed Doses Transferred to Fetus via Placenta

**References for data on graph:**

**“Exposure to mercury in Canada: a multimedia analysis” Richardson, et. al., Water Air and Soil Pollution, 80:21-30, 1995.**

**World Health Organization (WHO) Environmental Health Criteria 118 document (EHC118) on inorganic mercury, 1991.**

**Integrated Risk Information System (IRIS) online. National Center for Environmental Assessment, Cincinnati, Ohio.**

**Physicians’ Desk Reference, 53<sup>rd</sup> Edition, 1999, Medical Economics Company, Inc.**



**Mercury/Amalgam Mercury: Maternal-Fetal Transfer/Mothers' Milk/Effects**

- Amin-Zaki, L; et al.** Methyl Mercury Poisoning in the Iraqi Suckling Infant: A Longitudinal Study over Five Years. *J Appl Toxicol.*, 1(4):210-4, 1981.
- Aschner, M; et al.** Metallothionein Induction in Fetal Rat Brain and Neonatal Primary Astrocyte Cultures by In Utero Exposure to Elemental Mercury Vapor. *Brain Res.*, 778(1):222-32, 1997.
- Berlin, M; et al.** Prenatal Exposure to Mercury Vapor: Effects on Brain Development. *The Toxicologist*, 12(1):7(A245), 1992.
- Danielsson, BR; et al.** Foetal and Maternal Distribution of Inhaled Mercury Vapour in Pregnant Mice: Influence of Selenite and Dithiocarbamates. *Pharmacol Toxicol.*, 67(3):222-6, Sep 1990.
- Danielsson, BR; et al.** Behavioral Effects of Prenatal Metallic Mercury Inhalation Exposure in Rats. *Neurotoxicol Teratol.*, 15(6):391-6, 1993.
- Drasch, G; et al.** Mercury Burden of Human Fetal and Infant Tissues. *Europ J Pediatrics*, 153(8):607-10, 1994.
- Drasch, G; et al.** Mercury in Human Colostrum and Early Breast Milk. Its Dependence on Dental Amalgam and Other Factors. *J Trace Elem Med Biol.*, 12(1):23-7, Mar 1998.
- Eccles, CU; Annau, Z.** Prenatal Methyl Mercury Exposure: II. Alterations in Learning and Psychotropic Drug Sensitivity in Adult Offspring. *Neurobehav Toxicol Teratol.*, 4(3):377-82, May 1982.
- Fredriksson, A; et al.** Behavioral Effects of Neonatal Metallic Mercury Exposure in Rats. *Toxicology*, 74(2-3):151-60, Sep 1992.
- Fredriksson, A; et al.** Prenatal Coexposure to Metallic Mercury Vapour and Methyl Mercury Produce Interactive Behavioral Changes in Adult Rats. *Neurotoxicol Teratol.*, 18(2):129-34, Mar 1996.
- Grandjean, P; et al.** Cognitive Deficit in 7 Year Old Children With Prenatal Exposure to Methyl Mercury. *Neurotoxicol Teratol.*, 19(6):417-28, 1997.
- Grandjean, P; et al.** Cognitive Performance of Children Prenatally Exposed to ASafe@ Levels of Methyl Mercury. *Environ Research*, 77(2):165-72, May 1998.
- Kuntz, WD; et al.** Maternal and Cord Blood Background Mercury Levels: A Longitudinal Surveillance. *Amer J Obstet Gynecol.*, 143(4):440-3, 1982.
- Lutz, E; et al.** Concentrations of Mercury, Cadmium and Lead in Brain and Kidney of Second Trimester Fetuses and Infants. *J Trace Elem Med Biol.*, 10(2):61-7, 1996.
- Monnet-Tschudi, F; et al.** Comparison of the Developmental Effects of Two Mercury Compounds on Glial Cells and Neurons in Aggregate Cultures of Rat Telencephalon. *Brain Res.*, 741(1-2):52-9, Nov 1996.
- Needleman, HL.** Behavioral Toxicology. *Environ Health Perspect.*, 103(S6):77-9, Sep 1995.
- Newland, MC; et al.** Behavioral Consequences of In Utero Exposure to Mercury Vapor: Alterations in Lever-Press Durations and Learning in Squirrel Monkeys. *Toxicol Appl Pharmacol.*, 139(2):374-86, Aug 1996.
- Ong, CN; et al.** Concentrations of Heavy Metals in Maternal and Umbilical Cord Blood. *Biometals*, 6(1):61-6, 1993.
- Oskarsson, A; et al.** Exposure to Toxic Elements Via Breast Milk. *Analyst*, 120(3):765-70, 1995.
- Oskarsson, A; et al.** Total and Inorganic Mercury in Breast Milk in Relation to Fish Consumption and Amalgam in Lactating Women. *Arch Environ Health*, 51(3):234-51, 1996.
- Roeleveld, N; et al.** Mental Retardation and Parental Occupation: A Study on the Applicability of Job Exposure Matrices. *Brit J Ind Med.*, 50(10):945-54, Oct 1993.
- Soderstrom, S; et al.** The Effect of Mercury Vapour on Cholinergic Neurons in the Fetal Brain: Studies on the Expression of Nerve Growth Factor and its Low- and High-Affinity Receptors. *Brain Res Dev Brain Res.*, 85(1):96-108, Mar 1995.
- Takahashi, Y; et al.** Number of Amalgam Fillings in Pregnant Rats and Mercury Concentration in Their Fetuses. *J Dent Res.*, 71SI:571, A445, 1992.
- Takahashi, Y; et al.** Mercury Content in Tissues of Pregnant Rats with Dental Amalgam. *J Dent Res.*, 71(4):1094, A67, 1992.
- Urbach, J; et al.** Effect of Inorganic Mercury On In Vitro Placental Nutrient Transfer and Oxygen Consumption. *Reprod Toxicol.*, 6(1):69-75, 1992.
- Vimny, MJ; et al.** Maternal-fetal distribution of mercury (<sup>203</sup>Hg) released from dental amalgam

- fillings. *Amer J Physiol*, 258(RICP 27):R939-45, 1990.
- Vimy, M.J; et al.** Mercury from Maternal ASilver Fillings in Sheep and Human Breast Milk: A Source of Neonatal Exposure. *Biolog Trace Element Res.*, 56:143-52, 1997.
- Warfinge, K; et al.** Mercury Distribution in Cortical Areas and Fiber Systems of the Neonatal and Maternal Adult Cerebrum After Exposure of Pregnant Squirrel Monkeys to Mercury Vapor. *Environ Res.*, 67(2):196-208, 1994.
- Warfinge, K; et al.** The Effect on Pregnancy Outcome and Fetal Brain Development of Prenatal Exposure to Mercury Vapour. *Neurotoxicology*, 15(4), 1994.
- Yang, J; et al.** Maternal-Fetal Transfer of Metallic Mercury Via the Placenta and Milk. *Ann Clin Lab Sci.*, 27(2):135-41, Mar 1997.
- Yoshida, M; et al.** Distribution of Mercury in Guinea Pig Offspring After In Utero Exposure to Mercury Vapor During Late Gestation. *Arch Toxicol.*, 58(4):225-8, 1986.
- Yoshida, M; et al.** Distribution of Mercury in Neonatal Guinea Pigs After Exposure to Mercury Vapor. *Bull Environ Contam Toxicol.*, 43(5):697-704, Nov 1989.
- Yoshida, M; et al.** Milk Transfer and Tissue Uptake of Mercury in Suckling Offspring After Exposure of Lactating Maternal Guinea Pigs to Inorganic or Methyl Mercury. *Arch Toxicol.*, 68(3):174-8, 1994.
- Zanoli, P; et al.** Prenatal Exposure to Methyl Mercury During Late Gestation Affects Cerebral Opiatergic System in Rat Offsprings. *Environ Res.*, 74(1):48-53, 1997.

[http://www.bioprobe.com/reviews.asp?review\\_id=18](http://www.bioprobe.com/reviews.asp?review_id=18)

## Supplemental Testimony

Dr. Norwood asked me if I, in light of my determination that Mercury fillings are harmful to patients, tell patients to have their Mercury fillings removed. My answer was, and still is "no".

I appreciate this opportunity to clarify my response. There are two reasons I do not suggest patients have their Mercury fillings out:

- 1) I am, like Dr. Norwood, a dentist. Since I am not a Medical Doctor, I am not qualified to render a Medical diagnosis. Therefore, it would be wrong for me to suggest that the Mercury fillings in a patient caused his or her problem. Similarly, it would be unethical for Dr. Norwood to advise that same patient that his or her condition was not caused by the Mercury. In either case a Dentist would be making a Medical diagnosis, and neither of us is qualified to do so.
- 2) Secondly, the American Dental Association (of which both Dr. Norwood and I are members) requires us to abide by its "Principles of Ethics and Code of Professional Behavior". According to its advisory opinion 5.A.1, "The ADA has determined that the removal of Amalgam restorations from the non-allergic patient for the alleged purpose of removing toxic substances from the body, when such treatment is performed solely at the recommendation or suggestion of the Dentist, is improper and unethical." While I have always followed this "advisory opinion", it does pose some ethical dilemmas - in light of immunological and toxicological research published in many prestigious peer-reviewed scientific journals. The ADA spokesman claimed that only "about 100" people have ever been reported to be "allergic" to Mercury. The published research tells us something quite different. A minimum of 5% of the North American population is allergic to Mercury according to the North American Contact Dermatitis Association. Among Dental personnel that figure has been found to be as high as 30%.

More importantly, the ADA conveniently confuses "allergy" and "toxicology". It is important to understand that allergy represents only a small percentage of adverse immunological reactions. The patient who experiences an allergic reaction to Mercury is the lucky one - assuming he is properly diagnosed by a Medical doctor and then gets his fillings removed. Because this patient is only briefly exposed to this unstable mixture, he is the least likely to experience chronic Mercury poisoning and its sequelae. For the *Pro-Amalgamists* to ignore the symptoms of Mercury toxicology, pathophysiology and the majority of immunology undermines their credibility and raises questions of their intent.

Any Health Care Professional has an ethical obligation to "*First, Do No Harm*". Scientists refer to this obligation as the "*Precautionary Principle*". This principle acknowledges gaps in scientific knowledge, uncertainty and risks - as exemplified by recent historical health hazard lessons including ionizing radiation, asbestos, benzene, DES and Mad Cow disease - and now Mercury Dental fillings. More than 75 scientists from 17 countries issued a statement following the "International Summit on Science and the Precautionary Principle" (September 20-22, 2002). They urged governments "to adopt the Precautionary Principle in environmental and health decision making under uncertainty when there are potential risks." The Precautionary Principle states that if a

comparable procedure exists which would not expose a person to a similar risk or harm, we have an obligation to err on the side of caution and use a less risky procedure.

We listened to the testimony of the *Pro-Amalgamists* in their defense of the use of Mercury fillings claiming there is "no proof" that Mercury absorbed into a child's brain from its ( or its Mother's) fillings causes any specific disease.

This is a shocking attitude especially when voiced by someone whose profession is to care and safeguard the health of his patients! Would that same "Health Professional" allow a young child to play in the middle of a highway because he has "no proof" that a truck is barreling down the road towards him?

Dr. Mackert further rationalizes his advocacy of Mercury fillings (particularly in fidgety children!) by claiming that gold is just as toxic as Mercury, and that composite fillings are even worse. This is a variation of the old bromide "it is better to deal with the devil we know rather than the devil we don't know." This excuse represents the final refuge of the truly desperate.

Dr Mackert repeatedly refused Chairman Burton's request to urge the ADA to fund or facilitate simple inexpensive experiments, which would settle this Mercury filling issue once and for all. As a long term member of the ADA myself, I was embarrassed by Dr. Mackert's unwillingness to cooperate. Perhaps, Dr Mackert is reluctant to learn what many of us have come to understand: having Mercury fillings is fine, unless you happen to inhale!

It is easy to endorse the use of Mercury fillings until you become familiar with the science. I ought to know. I used Mercury for the first 10 years of my practice. But once a Dentist becomes aware of the science, that endorsement becomes extremely difficult, if not impossible.

If your focus is on the life of the filling rather than the life of the patient, than you may conclude that Mercury fillings are fine. However, if that is your focus. I am not sure what it is that you are practicing, but "It's not Health Care."

Respectfully Submitted,  
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Subcommittee on Human Rights and Wellness  
United States House of Representatives  
Washington

**Attorneys at Law**

Shawn Khorrami

**Re: Written testimony re the Watson Law, the California Dental Board, and organized dentistry's gag rule**

Dylan Pollard

Dear Chairman Burton and Congresswoman Watson:

Stephanie Casale

I am a California lawyer who has closely followed the activities of the Dental Board of California, and have been involved in litigation against the board and against the American and California dental associations.

Patricia Mitchell

Matt C. Bailey

Up until quite recently, the Dental Board of California used to enforce the ADA gag rule to stop dentists from advertising they were mercury-free or from advocating a mercury-free practice. In fact, as late as 1999 the Board president said a dentist could not have a mercury-free dental practice. While the Dental Board has backed off its harassment of mercury-free dentists, it still has not carried out a mandate written fully 11 years ago to write a statement about the health risks of mercury fillings.

Elizabeth A. Pechota

**Of Counsel**

David Berke

1. The Dental Board through 2000

Charles G. Brown

In the late 1980s and throughout the 1990s, the Dental Board investigated and prosecuted dentists for advocating mercury-free dentistry. The case of Mark Hulett was instructive, where a count against Dr. Hulett was advertising he was mercury-free.

James S. Turner

In 1992, state Senator Diane Watson wrote a statute directing the dental board to write a fact sheet of the "risks and efficacies" of dental fillings. The legislative history made clear the statute was about stating the risks of mercury fillings. The board's first fact sheet refused to associate any risks with mercury fillings; the fact sheet was then condemned by the Department of Consumer Affairs for its deceptive omissions.

May 28, 2003  
Page 2 of 6

Oakland lawyer James Wheaton filed a freedom of information request seeking the studies the board relied upon to write the Fact Sheet; the board replied that it had used no studies at all, but rather the word of a single board member.

In May 1999 the Board's policy came into the open. At a hearing where mercury-free dentists Andrew Landerman sought to have his license reinstated, the board president stated, "An amalgam-free practice does not fit the standard of practice in California." Landerman's petition was denied, but the comments set off (as noted later by the *Los Angeles Times*) a hailstorm of criticism by the Board.

Consumers for Dental Choice and the Center for Public Interest Law, consumers groups based in Washington, D.C., and San Diego, respectively, filed a petition to the Board requesting two actions: (1) an end to enforcement of the ADA gag rule, and (2) proper implementation of the Watson Law.

In a newsletter in June 2000, the Board confirmed it was proceeding, and it stated with specificity what would go into the Fact Sheet.

## 2. The Dental Board in 2001

The proposed Fact Sheet was the work product of a consultant with no experience in the field, who in turn relied upon a dentist whose expertise was "dental materials" (the properties, but not the toxicity of fillings). Neither person ever appeared before the Board to defend the work. One board member served as the liaison; he was a pediatric dentist with an interest in the preservation of mercury fillings.

The Board unveiled the proposed fact sheet at its May 2001 meeting in San Diego. The proposal did none of the things the board promised in its December 1999 resolution and its June 2000 newsletter. It so closely mirrored the discredited 1993 Fact Sheet that, for example, it changed "amalgam has been used for 150 years" to "amalgam has been used for 150 years." (It being just eight years from the earlier fact sheet, even the math wasn't very good.) The proposal was condemned by the Davis Administration's Department of Consumer Affairs, by the two initial petitioners (Consumers for Dental Choice and the Center for Public Interest Law), by a number of dentists, and by a large number of consumers. The Board promised to look at it again, and hold a more complete hearing in Los Angeles in May.

On June 5, Diane Watson was elected to Congress in a special election. She immediately began work on properly implementing the Watson law. Her assistant Lois Hill-Hale attended both news conferences and the hearing in L.A. described below.

May 28, 2003  
Page 3 of 6

Instead of meeting in June, the Board cancelled the meeting just 24 hours before its date. The decision set up an uproar. Leading Los Angeles clergymen had not only planned to attend, but had invited congregants. Consumers and dentists, likewise upset, came to the meeting anyway. Kathleen Hamilton, Director of the Department of Consumer Affairs, sent her Deputy, Lynn Morris, to preside at the hearing in the Board's absence. The Board sent an investigator to apologize. His interchange with Anita Vazquez Tibau, California Director for Consumers for Dental Choice, was captured on camera and played on several TV stations that week. Deputy Director Morris conducted the hearing, assisted by another Davis Administration official, Mike Luery, also a Deputy Director of the Department of Consumer Affairs, and by Congresswoman Watson's assistant Lois Hill-Hale.

At the conclusion of the hearing, Luery announced that he had been talking with the office of state Senator Liz Figueroa, and had announcement: Figueroa was drafting legislation to shut down the dental board and replace it with a new one.

The Board then moved north for two meetings on the issue. The Board did not cancel again, but it never produced the consultant who wrote the fact sheet. He stayed hidden from public view, and remains so. Yet he did get additional money for extra work, work necessitated for his initial poor performance.

The Board attempted to re-convene in San Francisco to take up the Fact Sheet, but refused to give notice as required under the Open Meetings Act. I filed suit on behalf of Consumers for Dental Choice. The Attorney General's office recognized the Board was in error, so we agreed that the Board could meet but could not vote on the issue. Proper notice is essential on an issue of such magnitude.

Meeting in Oakland in August, the Board appeared to recognize the fact sheet had problems. This finally occurred at the fourth consecutive convening of the board, and after a statewide campaign of "say the 'M' word" had compelled it to talk about mercury, at last. The Board brought forth a Fact Sheet that deleted the deceptive word "silver," and at last called the fillings "mercury fillings." At the meeting, it adopted a resolution to insert the point that certain scientific authorities believe the fillings constitute a health risk. It then sent the Fact Sheet back for yet another rewriting. Unfortunately, it was not rewritten. Instead, bits and pieces were added, so that an inconsistent and indeed incoherent work product emerged, one that at most point refused to acknowledge any risks with mercury fillings.

The Legislature then took a step that no lobbyist with institutional memory can remember ever happening: it shut down a state agency. It has let some expire under Sunset review, but never simply shut one down, then creating a new one in its place. A move to shut it down immediately failed by one vote. Later, the vote to shut it down effective December 31, 2001, succeeded.

May 28, 2003  
Page 4 of 6

The Board was shut down for one and only one reason: it hid the mercury issue from the public, in direct violation of the 1992 Watson law. Since then, some efforts have been made to rewrite history, saying there were turf disputes between dental groups. Indeed, certain tensions did exist, but they were all "inside baseball" in the Capitol. The Legislature takes such strong action of agency abolition because the Board's malfeasance had entered the public realm. The only issue in the media, the only issue debated at meeting after meeting, the only issue involving the executive and judicial as well as legislative branches of government was the mercury issue.

When he signed the new law, authored by Senator Figueroa, Governor Davis' statement made clear that the new law's gravamen against the Board was the mercury issue. His press statement, issued October 10, 2001, stated:

"Governor Davis signed SB 134 (Figueroa), the Dental Board sunset reform bill. One of the reforms in the bill requires a dentist to provide a fact sheet on possible health risks related to mercury to a patient prior to performing a dental restoration that could involve the use of dental amalgam. The bill also requires new patients to receive and acknowledge receipt of the mercury risk fact sheet."

The Dental Board had one last shot. Rather than hand the issue to the new Board, the one that could have credibility, it convened a lame-duck session in Los Angeles in November, a month after the Governor had signed its political death warrant. With a bare quorum present, and over strenuous objections, it passed a Fact Sheet riddled with ridiculous scientific claims, an absence of frank talk about risks, rank inconsistency, and even grammatical errors. The only public member present voted No.

### 3. The New Dental Board in 2002-03

In appointing the new Board, Governor Davis, to his credit, recognized the emergence of mercury-free dentists as recognizing a growing segment of the profession (surveys indicated between one-fifth and one-third of dentists are mercury-free). Among the six dentists he appointed, one, Chester Yokoyama of Los Angeles, is mercury-free. Not to the Governor's credit, however, he has yet to appoint a single public member. The board, and more importantly the public, is greatly disadvantaged by not having public members appointed by the Governor to write a consumer-friendly fact sheet.

As noted by Governor Davis, the Figueroa amendment to the Watson law made a significant change: it required that the dentist give the Fact Sheet to the patient. The statute thus implied the need for a consumer-friendly product, not the hodge-podge bequeathed by the old board. Thus, board President Alan Kaye appointed Dr. Yokoyama to chair this committee.



May 28, 2003  
Page 5 of 6

The Board duly had hearings on the issue in Los Angeles in November 2002, hearing from scientists about the huge risks of mercury fillings and from spokespersons from the American and California dental association representatives (not scientists) saying they are safe. As with all hearings on mercury in California, this hearing drew a sizeable crowd of consumers and dentists supporting a ban. Support came, among others, from the Black Nurses Association and clergy groups concerned that poor children are being left behind.

A breakthrough in January 2003 should have broken the stalemate: Proposition 65 disclosures were ordered sent to dental offices.

A California law enacted in 1986, known as Proposition 65, requires disclosure of toxins in workplaces and places of commerce. Soon after enactment, the state of California listed mercury as a toxin causing, among other things, birth defects and other reproductive harm. One would suppose that the American and California dental associations, being representatives of a health profession, would have immediately complied. Instead, working with the manufacturers of mercury amalgam, they embarked on a judicial and political strategy that blocked notification for well over a decade. First, they mounted a lengthy court challenge, losing the case in the United States Court of Appeals in 1996, then delayed settlement of the case they lost. Second, ADA and CDA mounted a disinformation campaign: ADA promoted amalgam as "silver," while CDA told lawmakers, the public, and even its members (!) that there are only "traces" of mercury in amalgam (the figure is 43 to 54%, according to the California Dental Board). In 2001, I decided that waiting on the manufacturers would not give consumers the information to which they were entitled, and believed that it was time for dentists to comply with the law with or without the approval of corporate and trade association maneuvering. On behalf of As You Sow, a California consumer group, my firm investigated compliance in Los Angeles County. Finding none, I noticed several dozen California dentists for Proposition 65 violations.

Having exposed their members to massive exposure by its dilatory tactics, CDA had no choice but to intervene, then settle the case. Attorney General Bill Lockyer also intervened, and played a crucial, positive role in moving the case to a successful closing. The case split CDA and ADA; the latter filed motions in the Superior Court, San Francisco, opposing the settlement. Nonetheless, the court ordered the case settled in January 2003. The court order required the California Dental Association (CDA) to prepare postings to go up in all dental office which contain the following language:

**NOTICE TO PATIENTS:**

**PROPOSITION 65 WARNING:** Dental Amalgam, used in many dental fillings, causes exposure to mercury, a chemical known to the state of California to cause birth defects or other reproductive harm.

May 28, 2003  
Page 6 of 6

In March, CDA mailed the notice to all California dentists (members and non-members).

One would suppose that this agreement should end the dispute about making appropriate disclosures in the Fact Sheet. It has not. Indeed, at the latest Dental board meeting (on April 4 in San Diego), the Fact Sheet situation was in a stalemate. The board president had reverted to defending the term "silver" to describe amalgam. The board even refused to endorse a bill to give Medi-Cal families a choice not to get mercury fillings. Both stances represented reversals of previously stated positions.

As of this writing, the Board has not written a Fact Sheet that complies with the Watson law. Despite signing the above agreement, CDA now insists that the Board not change from the discredited 2001 Fact Sheet, and, disappointingly, the dental board president sent out a memorandum to keep a Fact Sheet that mirrors the 2001 one. Yet the statute calls for updates as new science emerges, and such science was methodically presented at the November hearing. Since 2001, virtually every agency has changed its stance: the FDA has published the Health Canada warnings that pregnant women and children should not get mercury fillings, and EPA and the National Academy of Science have warned that one woman of child-bearing age in 12 already has so much mercury to be at risk to have retarded children. So have private associations, including the California Medical Association (who has adopted two resolutions about mercury's risks) and (by signing the Proposition 65 warnings) the CDA.

At the Congressional hearings before the Burton committee on May 8, Board member Dr. Yokoyama was a witness, testifying about the frustrations of producing a Fact Sheet. Chairman Burton and Congresswoman Watson promised full support in getting the information out to California consumers. Congressman Mike Michaud testified about a different scenario, a successful disclosure effort in Maine, implementing a law he wrote while a state Senator.

The issue of whether the New Board will break with, or revert to, the ways of the old Board is up in the air. Board member Yokoyama will present an excellent Fact Sheet at the next meeting, July 11, 2003, in San Francisco.

An Aye vote on the Yokoyama Fact Sheet will determine whether California consumers, 11 years after passage of the Watson bill, will learn the risks of mercury fillings. A No vote may send another dental board to the dustbin of history.

Very Truly Yours,

LAW OFFICES OF SHAWN KHORRAMI

By:   
SHAWN KHORRAMI, ESQ.

Chairman Dan Burton  
Congresswoman Diane Watson  
Subcommittee on Human Rights and Wellness  
United States House of Representatives

Re: Testimony to the Subcommittee re Mercury Fillings and Dental Boards

Dear Chairman Burton and Congresswoman Watson:

During the 1980s and 1990s, the Minnesota Board of Dentistry engaged in a campaign to intimidate and, in some cases, destroy mercury-free dentists. The result of this campaign was an apparently unwritten gag rule that has caused mercury-free dentists in Minnesota to refrain from talking honestly to their patients about the dangers of mercury in so-called silver fillings, and to use circumlocutions (e.g., "cosmetic dentistry") to describe their practices to the public. Minnesota was not the only state in which harassment of mercury-free dentists occurred. Dental boards across the country have conducted similar campaigns. We are submitting this written testimony in the hope that you will look into the practices of the dental boards of Minnesota and other states.

Nowhere in Minnesota law are mercury-using dentists favored over mercury-free dentists. But the Minnesota Board of Dentistry, allying itself with organized dentistry and against consumers, acted as if this were the case until quite recently. Between 1983 and 1996, the board investigated, harassed, sued, and finally destroyed the state's most prominent mercury-free dentist, Dr. Gary Jacobson. Between approximately 1990 and 1998, the board investigated nearly every other mercury-free dentist in Minnesota, not because of patient complaints but because other dentists complained about the competition.

Because Minnesota elected an Attorney General in 1998 who refuses to act on requests from the dental board to investigate mercury-free dentists, the board recently ceased filing such cases. But the dental board never notified Minnesota dentists that it would cease enforcing the gag rule. Thus, mercury-free dentists are left to wonder whether the failure to file such cases represents a hiatus or a new policy. Rightfully, then, mercury-free dentists still speak cautiously about mercury to their patients and still refuse to advertise or otherwise advise the public in straightforward terms that they are mercury-free. It should go without saying that mercury-free dentists make no effort to force their mercury-using colleagues to stop referring to amalgams as "silver" fillings. Thus, the gag rule helps mercury-using dentists perpetuate the deception that silver fillings are primarily silver. Amalgam is not primarily silver; mercury constitutes the largest single component of amalgam (50-72%) depending on the manufacturer.

Mercury dental fillings cost both of us dearly. Removal of mercury fillings quickly and totally eliminated colitis in one of us (Kip) and the paralysis of multiple sclerosis in the other (Mary).

It is essential that consumers be told amalgams contain mercury—and that it leaches out continuously as a bio-accumulative toxin 24 hours a day.

We ask the Subcommittee on Wellness and Human Rights to look at the dental boards, in Minnesota and other states, to determine if either the antitrust laws or the First Amendment is being violated.

Sincerely,

Mary A. Puff

Kip Sullivan