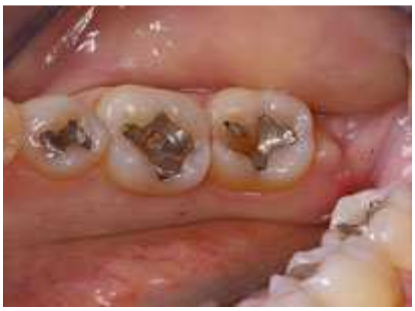
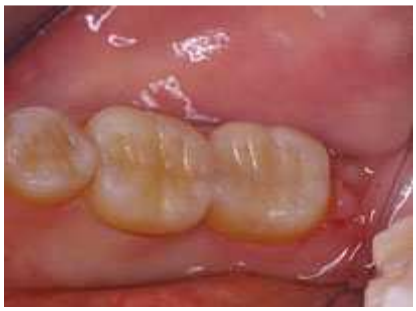
# Mercury Filling Toxicity



BEFORE



AFTER

Each amalgam filling has as much mercury as a thermometer, and its poisonous vapors are constantly emitted from the teeth to the brain, a particular risk, according to the U.S. government, to the developing brain of the child. The fetus is at the greatest risk of all if the pregnant woman has dental fillings drilled out or implanted, because of the proven transport of mercury through the placenta. So too is the nursing infant of a woman with amalgam dental fillings, because of the transport of mercury into the breast milk.
If a single large amalgam filling contained 1 gram of mercury (1 million micrograms) and lost a significantly toxic 10 micrograms per day there would be enough mercury for 100,000 days or about 274 years of exposure. A small tenth of a gram mercury filling would last 27 years. So enough mercury is within amalgam fillings to provide a consistent chronic toxic exposure for the life of most fillings.

Consumers aren't being told the truth, that amalgam fillings contain 50% mercury, a known neuro toxin. Worse, they are deceived: the ADA still uses the deceptive word "silver" to describe a product that is mainly mercury, thus hiding the product's main ingredient. The ADA has a "gag rule" and enforces it through state dental boards, which prohibits dentists from initiating discussion critical of amalgam's health effects.
Substitutes exist for amalgam, including composite (or resin), ceramic, porcelain and gold. Because of the slightly higher cost of placing composites, the most commonly used alternative dental filling, Medicaid and barebones insurance plans force children to use amalgam, even though it is well known that some will have adverse reactions.

Mercury is a multipotent cytotoxin that intervenes in the primary processes of the cell by bonding strongly with *sulfhydryl* 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. Mercury is toxic because it induces production of free oxygen radicals and modifies the redox potential of the cell.

How can the FDA and EPA honestly believe they are protecting the general public from environmental mercury exposure when they crack down on emissions from coal fired electric utilities and limit the consumption of seafood while at the same time they completely ignore the most prevalent source of environmental mercury exposure in the non-occupationally exposed population, dental 'silver' amalgam fillings?
According to Professor Boyd Haley, *Professor and Chair of the Department of Chemistry, Professor in the College of Pharmacy and in the Department of Biochemistry at the University of Kentucky and an NIH Postdoctoral Scholar in the Department of Physiology, at Yale University Medical School:*
"There is a total lack of high quality epidemiological research that would show amalgams to be causal or safe and not involved in human health problems. In the USA, the American Dental Association (ADA), FDA, National Institute of Health (NIH) and especially NIDCR have totally dropped the ball in regards to doing significant studies in this area as they are the only agencies with the funds and data bases available for such research. However, research from Sweden has demonstrated that removal of dental amalgams from about 700 subjects with neurological problems led to clinical improvements in about 70% of the subjects, along with a significant drop in the blood mercury levels of the subjects.

"There are also reports that individuals with multiple sclerosis had less deleterious events when their amalgams were removed. Research has shown that individuals who died of idiopathic dilated cardiomyopathy have 20,000 times more mercury in their heart tissue that found in other forms of heart disease. This was published in a 1999 issue of the *Journal of American Cardiology*. Yet no NIH grants or programs have been developed to pursue this lead. This is consistent with American NIH supported research to never follow up on numerous such leads as these, if mercury is implicated. Se we should not be surprised to see an NIDCR sponsored and orchestrated review panel come to the decision that amalgams are safe. Don’t look for causes of mercury induced diseases and you won’t find any seems to be the mantra of the NIDCR and NIH.

"But we must also ask ourselves why we cannot find after spending billions of tax dollars, the cause of Alzheimer's disease, MS, ALS, and Parkinson's while we readily find the cause of diseases like AIDS, polio, etc. I think it is because scientists are not funded to look for causation in certain areas, like heavy metal or mercury toxicity. We have solved numerous other diseases, but not the neurological diseases mentioned above. If these diseases have their basis in mercury exposure, then we will never solve them following the path of ignoring basic research in the area of mercury toxicity and just believing what the dental establishment tells us. Are we to be dumb enough to believe that newly placed dental amalgams, which contain about 500,000 micrograms mercury/gram amalgam, which break down and need replacement do not loose a huge amount of mercury in the number of years they are in our mouths, and that this mercury ends up in our central nervous system?

"If a single small one gram amalgam lost 5 to 10 micrograms per day (a toxic exposure) then it would take about 137 to 274 years to loose all the mercury. Also, if 5 to 10 micrograms per day were lost from this amalgam this would amount to 0.365% to 0.73% of the mercury per year. So you don't have to have a great loss per year to experience a toxic exposure.

"Studies on populations with dental amalgams and fish consumption have shown that the major contributor to mercury body burden is the subject's dental amalgams, not fish. So to speak, the dental claim that fish is the major exposure to humans is a red herring.

"Further, mercury vapors from dental amalgams enter the brain with ease and are oxidized to Hg2+, the toxic form, and cause damage to the same biochemical systems found damaged in Alzheimer's diseased brain. This has been proven by exposing rats to mercury vapor and by exposing neurons in culture to Hg2+. Several studies, including one from the NIH, have shown that dental amalgams are the major contributor to human body burden. Why would anyone with good sense recommend placing a material in human mouths that can easily be shown to release mercury at a constant rate for many years-- especially knowing that mercury concentrates in the fetus with an average of mercury in the infant's cord blood being 1.7 times that in the birth mother's blood?
"Mercury is an *element*, not a *compound*. The mercury that is emitted from a dental amalgam is pure mercury vapor and its release can be measured and quantified quite easily. Using a mercury vapor sniffer or, for more elegant experiments, by using a mercury cold-vapor analyzer after collecting the water in which an amalgam has been placed for a few hours or less, have confirmed the release of mercury from dental amalgams.

"Further, electron microscopy of dental amalgams clearly shows droplets of mercury liquid in dental amalgam pores. Heating the amalgam releases this mercury quickly and causes the droplets to disappear. A massive German university study found toxic levels of mercury in the saliva of several thousands of subjects and the amount was correlated to dental amalgams.

"There is no scientific controversy about the nature and amount of mercury being emitted from a dental amalgam. The only controversy is maintained by the inaccurate and manipulated data (as well as Congressional lobbying efforts) put forth by the pro-amalgam elements in organized dentistry, including the dental branch of the FDA and the NIDCR.

Would one expect dentists from the NIDCR to admit, after scores of years of denial, that mercury released from dental amalgams could cause medical deficits? In light of the recent FDA record on *Vioxx* and the contaminated flu vaccines, citizens should severely question their input to this report. The FDA has steadfastly refused to test or evaluate dental amalgam safety for the past 40 years even though they are 50% mercury and everyone agrees some of this mercury is constantly being released—the argument is how much. I have measured the mercury emitting from a dental amalgam and it is not insignificant. So it is my opinion that the bureaucrats in the FDA dental branch will do anything to prevent a solid, unbiased study in this area that simply shows that amalgams in a sealed test tube still releases a lot of mercury and that this level increases dramatically (about 8-10 fold) on brushing 30 seconds with a standard toothbrush. The latter fact is incredibly easy to demonstrate.

"The initial question of mercury leaving amalgams and entering the body is a question of science, not administration or legal judgment. For example, in the Congressional hearing chaired by Congressman Dan Burton, the spokesman for the American Dental Association fought against funding for a simple, straightforward, inexpensive research project that would put the matter or mercury release from dental amalgams to rest.

"The proposed project entailed making about 200 dental amalgams of one spill each outside the mouth so that these amalgams would be of identical weight and surface area. These amalgams were to be divided into 10 lots of 20 each and sent to the best academic laboratories in the USA to have the amount of mercury they released per day determined by analytical experts. The results from these 10 top flight laboratories would be used as an absolute for the question of how much mercury is released from amalgams.

"Instead of doing this simple, straightforward project to answer the question of how much mercury is released from amalgams, the NIDCR and FDA orchestrated a costly (they won't admit how much it cost) panel review of the existing literature organized by a group of questionable expertise selected by dental administrators. Why would they do this? In my opinion, hard scientific data produced by 10 different universities would be hard to question or manipulate. It is apparent to me that panels formed to look at certain issues can be hand selected and manipulated to give the answers wanted, just as epidemiology data can be massaged to give the answer wanted. These appear to be the two favorite approaches by the FDA, NIDCR and the CDC. I don't wonder why.

"While the rest of the civilized world is eliminating dental amalgams to reduce human mercury exposure, our FDA and NIDCR is now saying it's safe because research, done by dentists in areas where they have little or no expertise and big vested interest, says so. Now they have generated a panel of hand selected "experts" that agree with them. This panel evidently ignored the obvious science considered by the World Health Organization (WHO), many European countries, the Environmental Protection Agency (EPA) and the National Academy of Science Committee (NAS.)"

"Urine mercury is not a reliable measure of mercury exposure. The reason most mercury from fish and amalgams is not found in the urine is that about 90% of mercury is excreted in the fecal material. The half life of mercury vapor in the urine and blood is very short and such levels are not a good measure of exposure. Many acutely exposed individuals will have urine levels considered non-toxic, yet have high mercury levels in their organs years later when they die. Most studies on children indicate that the ones with the highest urine, blood or hair levels of mercury were the healthiest. That is because of those exposed to mercury; the ones with the highest urine, blood and hair levels are the ones effectively excreting the mercury. Three different research groups have shown that autistic children have much lower mercury in their hair, yet have higher body burdens of mercury. This implies that an inability to excrete mercury by a subset of the population represents those that will respond badly to a low chronic exposure to mercury.

"The only reliable measure of exposure and retention would require sacrificing the test subject so each organ could be analyzed for mercury retention. Mercury levels in body organs have been done on expired humans and the levels correlated to existing dental amalgams in the organs of the corpses. Results have also shown that the major amount of mercury found in the first hair cut of normal infants is accounted for by the number of dental amalgams in the birth mother. Therefore, again, there is no scientific controversy

about mercury in human bodies coming from dental amalgams. The controversy has been manufactured by pro-amalgam dental organizations to allay any blame for the massive neurological problems their procedures have generated in generations of Americans.

"Retention is the key issue, and inhaled mercury vapor is known to be 80% absorbed and retained by the body with each organ having a different time for the amount to decrease by 50%, with the brain having the longest retention time for mercury vapor, which is why this vapor form is more *neurotoxic* instead of *renal toxic*."

The next time you take your child to the dentist to have a cavity filled and they recommend silver amalgam, ask your dentist "what restoration material they use on their own children and why?" If they answer "ceramic or composite because they are white and match the color of the teeth unlike silver amalgam fillings", ask yourself "is it really just for cosmetic reasons or is it simply because your dentist doesn't want to place as much as 500 mg of mercury, the most toxic, nonradioactive metal known to man, 5 centimeters from their own child's brain?" Which reason do you really believe? More importantly, why is mercury amalgam good enough for your child but not for your dentist's own children?

Each year, more than 100 million amalgam fillings are placed in the U.S. alone. In this country, approximately 150,000,000 people have amalgam fillings. The average life of an amalgam filling is 5.5 to 11.5 years. Since amalgam has been used for more than 150 years, literally billions of amalgam fillings have been used to restore decayed teeth. Amalgam fillings contain approximately 50% mercury, 30% copper, 14% each of tin and silver, and 1% zinc. All five metals in amalgam fillings are toxic. These metals react with each other and form sixteen more corrosion products, all of which are toxic.
The continued use of mercury amalgam restorations has spawned whole industries whose livelihoods are dependent upon removal of this toxic metal from dental office waste streams where amalgam restorations are both placed and removed.
The U.S. Environmental Protection Agency safety limits for mercury vapor exposure are 10 µg per day. Numerous studies have shown that mercury amalgam fillings release anywhere from 1 to 29 µg/day, 3 times the limit. The rate of mercury release from dental amalgam is dependent upon several factors including the number of amalgam restorations, the composition of the amalgam (high vs. low copper amalgam), the location (*occlusal* vs. *nonocclusal* teeth), and the amalgam surface area.
After implantation in your teeth, and for an indefinite period of time, silver mercury fillings outgas detectable amounts of mercury vapor, in the range of 1 to 50 micrograms of mercury per cubic meter of air.

An adult breathes about 1/2 liter of air per breath, breathing over up to 20,000 times each day. As long as you have mercury dental fillings, you inhale mercury vapor 24 hours a day, 365 days a year. The body's tissues, especially brain, kidneys, jaw, lungs, gastrointestinal tract, and liver, absorb and store mercury. Mercury toxicity has destructive effects on kidney function and contributes to cardiovascular disease, neuropsychological dysfunction, reproductive disorders, birth defects, and more. Like other heavy metals, and x-rays, mercury causes damage to the lining of arteries.
How can mercury amalgam be considered a safe and effective dental restorative when, according to Dr. Gary Schumacher, a dentist and chief of clinical research at the American Dental Association Health Foundation's Paffenbarger Research Center, secondary cavities that form under or adjacent to conventional (*amalgam*) fillings are "probably the biggest problem facing most dentists today"? Dr. Schumacher estimates more than half of the fillings done by dentists are necessitated by secondary tooth decay.

A recent study completed in 2003, states patients with certain autoimmune diseases such as lupus, multiple sclerosis, autoimmune thyroiditis and allergic disease "often show increased lymphocyte stimulation by low doses of inorganic mercury in vitro." In their study, they removed amalgams from a group of 35 patients with autoimmune diseases and replaced them with composites. When examined six months later, 71 percent had shown an improvement in health, with the greatest improvement in those with multiple sclerosis. Their conclusion: "Mercury-containing amalgam may be an important risk factor for patients with autoimmune diseases."

Pendergrass and Haley in a 1997 performed a study published in the journal *Neurotoxicology*. In their study, they showed concentrations of mercury vapor, known to be released by dental amalgams in people, increased mercury concentrations in rat brains from 11- to 47-fold higher than controls. At this level, the mercury produced the identical lesions seen in Alzheimer's disease (*neurofibrillary tangles*) by interfering with normal tubulin maintenance.

A second mechanism of producing neurodegenerative diseases is even more impressive, called *excitotoxicity*. Excitotoxicity, a mechanism by which excess glutamate accumulates outside the neuron, thereby leading to death of the cell by an excitation process, has been linked to mercury neurotoxicity as early as 1993. More recent studies have confirmed this mechanism and clearly demonstrate, even in concentrations below that known to cause cell injury; mercury can paralyze the glutamate removal mechanism, leading to significant damage to synapses, dendrites and neurons themselves.

This glutamate removal mechanism is critical to brain protection. Additionally, mercury in very low concentrations increases glutamate release, primarily by stimulating the brain's immune cell, the *microglia*. Chronic microglial activation, as seen with mercury exposure, has been solidly linked to all of the neurodegenerative diseases.

At least two studies have shown that mercury increases the toxicity of glutamate. Interestingly, excess glutamate can also produce the same neurofibrillary tangles seen with mercury exposure. In essence, we have the mechanism by which these diseases are produced by mercury vapor and know that it can occur in concentrations commonly found in people having dental amalgam fillings.

Only one microgram of mercury is enough to destroy any type of cell in the body, especially nerve tissue. Mercury releases from 20 to 150 micrograms per day depending on the conditions and the type of amalgam. The state-of-the-art high-copper amalgams release 50 times more mercury in a given time than the older conventional amalgams. If one microgram is absorbed, it will take 70 days to several months to eliminate half of it. Meanwhile, the next day you absorb another microgram, and 69-and-a-half 70ths of the original one microgram will still be there. On day three you absorb another microgram, and you still have 69/70ths from the first day, and 69 and-a-half 70ths from the second day, so you can see that even with the fastest elimination, excretion is negligible compared to intake if you have amalgam in your mouth. You will still increase your total body burden of mercury daily.
Not all of the mercury escaping from a filling stays in the vapor form, especially if it is on the surface of a filling registering a negative electrical charge. In the electrical environment on the surface of a filling, mercury vapor is rapidly converted into the highly toxic *methylmercury*. The chemical product formed by the setting of the five metals is chemically reactive. A mercury vapor meter placed over a filling can detect toxic amounts of mercury vapor within ten seconds. Fillings release mercury just sitting undisturbed in the mouth, but there are several ways that we can cause our fillings to release increased amounts of mercury.
The action of chewing foods increases the vapor release due to abrasion as well as compression of the filling for up to an hour and a half after we stop chewing it. Heat from coffee or other hot beverages increases the vapor release from the fillings. When there are dissimilar metals in the mouth, and the mouth contains saliva, an electrolyte solution, you have a battery working twenty-four hours a day in your mouth, and metals and metal oxides, sulfides, and sulfates draining out of the fillings into your mouth; you can experience it as an unpleasant metallic taste. During detoxification,

after removal of fillings, the body is dumping metals in the saliva, and the taste can persist for several weeks.
The total of the toxins is far greater than the sum of the toxins. With lead and mercury, for instance, a toxicity rating of 1 for each mercury and lead equals not 2, but 60 when the two are combined. With nickel, copper, beryllium, mercury, tin, silver, zinc, cobalt, chromium, and root canal toxins in the mouth, with just one crowned root canal and one amalgam filling--you can have a witches' brew of complex toxic reactions, made even more complex if you include the cements.


## The Controversy

On the other side of the problem we have the proponents who advocate continued use of amalgam fillings. The combined credentials and strength of this group is awesome. It includes the National Institute of Dental Research, National Bureau of Standards, The American Dental Association (ADA), The Academy of General Dentistry (AGD), most of the state dental societies, all of the teaching college and university dental schools and most of the medical doctors. Of the 100,000 plus practicing dentists in the U.S., there is only a small minority at this time (somewhere in the order of 2,000) that do not accept the ADA position on the use of amalgam in dentistry.
The type of material used to fill teeth has always presented problems of one kind or another to the dental profession. Manipulation of it to "fill" a small area in a tooth always presents difficulty to the dentist. Over the years, it was a constant challenge to the ingenuity and inventiveness of the dental practitioner to eliminate the difficulties of working with single metals to make them more pliable and capable of being molded (plastic) so that they would then harden and have some permanence.
There are literally hundreds of scientific papers that show mercury can effect and cause some detectable damage to almost every component of the human body or comparable component of an animal body. However, there does not seem to be any way of proving or demonstrating in a human body that mercury is the sole cause of the detectable damage. To prove this in humans, we would have to be maintained in a totally sterile environment and not subjected to thousands of chemicals and pollutants in the course of our lifetime simply from the routine acts of eating and breathing.

There is a substantial flow of anecdotal evidence being reported by dentists and physicians who believe that the research to date has indicated with sufficient clarity that amalgams in teeth may be injurious to our health. These health practitioners have recommended removal of amalgam fillings and replacement with new composite materials that are basically non-toxic. Where the patient has agreed to this type of reconstruction and the work was performed, there has usually been an abatement, amelioration or complete clearing of symptoms.

*"How is it that mercury is not safe for food additives and Over the Counter drug products, but it is safe in our vaccines and dental amalgams?"--Represenative Dan Burton (R-IN)*

*"The evidence tells me very succinctly that there is a chronic low-dose exposure to a toxic heavy metal that 80-85 per cent of the industrialised world have implanted in their teeth, and it's a situation of timed-release poisoning."--Dr Murray Vimy, research scientist and former World Health Organization consultant"*

*..there is no safe level of mercury, and no one has actually shown that there is a safe level. I would say mercury is a very toxic substance...--Dr Lars Friberg, Former Chief Adviser to the World Health Organization on Mercury safety.*

*...if they have as few as 4 amalgam fillings present in their mouth, the average person's saliva is so high in mercury they cannot legally spit into the toilet. Their saliva exceeds the EPA maximum legal municipal discharge standard for mercury..--David Kennedy D.D.S.*

Mercury is one of the most toxic elements on the planet, probably second only to plutonium, yet worldwide people have it in all tissues of their bodies, and it continues to be dumped into our waterways and soil, placed into our teeth, and injected into our bodies. If a single large amalgam filling contained 1 gram of mercury (1 million micrograms) and lost a significantly toxic 10 micrograms per day there would be enough mercury for 100,000 days or about 274 years of exposure. A small tenth of a gram mercury filling would last 27 years. So enough mercury is within amalgam fillings to provide a consistent chronic toxic exposure for the life of most fillings. A 1997 report by the U.S. Environmental Protection Agency, say nothing deposits more inorganic mercury into the body than fillings. The ADA notes that mercury has been used for 160 years--since blacksmiths and barbers won out over medical professionals, who preferred to pull teeth or fill them with gold.

Dr. Boyd Haley believes that the CDC and the FDA are strongly influenced by the pharmaceutical and vaccine industries and that they have been derelict in their duty to safeguard the health of the American People. As a result of their delinquency, we have been systematically poisoned by mercury derived from silver amalgam fillings in our teeth and our children, especially boys, have been severely damaged by vaccines containing *thimerosal*.

Autism and the autism spectrum diseases, in which four boys are affected for each girl, varying degrees of madness due to mercurial toxicity, have had a devastating effect on an entire generation of young men. The cost of special education for learning disabled children is over $3 billion annually and increasing. A great number of them are autistic. Since such children are plagued with autoimmune and digestive diseases as well, their medical care is expensive.

Mercury is present in the brains of Alzheimer's disease patients and only it is capable of inactivating the enzymes that protect neurons from destruction and producing the tangles and plaque deposits characteristic of the disease. The costs of care for patients with this disease exceed $100 billion a year and are increasing.

In effect, we have a health care disaster, worsening daily, caused by the unwise use of a dangerously neurotoxic material by dentists and physicians with the support and approval of their professional associations and health authorities at the highest levels of the Federal Government. The damage done to the World Trade Center by a small band of terrorists, pales in comparison to the damage that has been caused by mercury in our dental fillings and in vaccines injected into our children and us.

Mercury, considered to be both the most toxic non-radioactive element and the most volatile heavy metal, is being removed from all health care uses--save one. The disinfectant *Mercurochrome* is banned; *mercury thermometers* have been outlawed in over a dozen states (including California ); and the Center for Disease Control has ordered manufacturers to cease putting mercury preservatives in vaccines. The exception--*mercury in dental amalgam fillings*--sadly trumps all other uses both in magnitude of mass product and unrelenting harm to the human body.

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prohibits dentists from initiating discussion critical of amalgam's health effects.

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Toxicity caused by excessive mercury exposure is now becoming recognized as a widespread environmental problem and is continuing to attract a great deal of public attention. A National Academy of Sciences study published in July, 2001 estimates that up to 60, 000 children born in the USA each year may be affected by mercury toxicity, and in March of 2002 an environmental group had charged the FDA of failing to warn the public of the dangers of mercury contamination from eating tuna, which contain high levels of mercury.

World Health Organization reports that the amount of mercury-absorbed daily by the average human body is 0.3 micrograms (mcg) from water and air, 2.61 mcg from fish, and 17 mcg from dental amalgams (silver fillings). Uptake of up to 100 µg daily has been observed in extreme cases. Research points out that mercury vapor is 80% absorbed into the blood, and that in animal studies, mercury vapor goes directly from the nose to the brain, following nasal nerve pathways. Amalgam fillings release mercury for as long as 70 years. Someone with 8 amalgams could release 120 mcg into the saliva per day.
The maximum allowable by the EPA is less than 0.1 mcg per kilogram of body weight per day, to be absorbed into the human body.

Dentists have 4 times as much of a body burden of mercury as an average non-dentist. Dental workers show 50-300% more mercury in hair and fingernails than the average population.
Mercury is the only metal that is liquid at room temperature. Its elemental symbol is Hg, which is derived from the Greek word *hydrargyrias*, meaning "water silver." Mercury is found in *organic* and *inorganic* forms. The inorganic form can be further divided into *elemental mercury* and *mercuric salts*. Organic mercury can be found in long and short *alkyl* and *aryl* compounds. Mercury in any form is toxic. The difference lies in how it is absorbed, the clinical signs and symptoms, and the response to treatment modalities. Mercury

poisoning can result from vapor inhalation, ingestion, injection, or absorption through the skin.

The use of mercury in medicine predates its use in dentistry by centuries. Mercury has been found in Egyptian tombs, indicating it was used as early as 1500 BC. As early as 500 B.C. there is evidence that India was using mercury as a drug. However, Arabian physicians first studied mercury as a drug and introduced the use of a mercurial ointment in the 10th century. It was towards the end of the 18th century that mercury found its way into medical practice in the U.S. as a prescription item. In the late 18th century, antisyphlitic agents contained mercury. For centuries, mercury was an essential part of many different medicines, such as diuretics, antibacterial agents, antiseptics, and laxatives.

Mercury poisoning usually is misdiagnosed because of the insidious onset, nonspecific signs and symptoms, and lack of knowledge within the medical profession. In medicine, mercury is used in dental amalgams and various antiseptic agents. Mercury is found in many industries such as battery, thermometer, and barometer manufacturing. Mercury can be found in fungicides used in the agricultural industry. Before 1990, paints contained mercury as an antimildew agent. On July 7, 1999, a joint statement by the American Academy of Pediatrics and the US Public Health Service was issued alerting clinicians and the public of thimerosal, an ethylmercury-containing preservative used in vaccines.

Elemental mercury is found in liquid form, which easily vaporizes at room temperature and is well absorbed through inhalation. Its lipid (fat)-soluble property allows for easy passage through the alveoli into the bloodstream and red blood cells. Once inhaled, elemental mercury is mostly converted to an inorganic *divalent* or *mercuric* form by *catalase* in the red blood cells. This inorganic form has similar properties to organic mercury. Small amounts of non-oxidized elemental mercury continue to persist and account for CNS toxicity. Elemental mercury, as a vapor, which escapes from fillings, penetrates the blood-brain-barrier and enters the CNS, where it's ionized and trapped, attributing to its significant toxic effects. It is not well absorbed by the GI tract and, when ingested, is only mildly toxic. Inorganic mercury is highly toxic and corrosive and is the most destructive form, but its destruction is limited to where it's located. It doesn't have the ability to move through tissues like other forms. It gains access orally or dermally and is absorbed at a rate of 10% of that ingested. It has a nonuniform mode of distribution, secondary to poor fat solubility, and accumulates mostly in the kidney, causing renal damage.

Although poor lipid solubility characteristics limit CNS penetration, slow elimination and chronic exposure allow for significant CNS accumulation of mercuric ions and subsequent toxicity. Chronic dermal exposure to inorganic mercury also may lead to toxicity. Excretion of inorganic mercury, as with organic mercury, is mostly

through feces. Renal excretion of mercury is considered insufficient and attributes to its chronic exposure and accumulation within the brain, causing CNS effects. Organic mercury can be found in 3 forms, *aryl* and short and long chain *alkyl* compounds. This is 100 times more toxic than the ionic or vapor forms. Bacteria in the mouth, stomach and intestines, or in the blood, through a process called *methylation*, converts mercury vapor and ionic mercury into deadly *methylmercury*.

Organic mercurial's are absorbed more completely from the GI tract than inorganic salts are; this is because of intrinsic properties, such as lipid solubility and mild corrosiveness (although much less corrosive than inorganic mercury). Once absorbed, the *aryl* and long chain *alkyl* compounds are converted to their inorganic forms and possess similar toxic properties to inorganic mercury. The short chain *alkyl* mercurial's are readily absorbed in the GI tract (90-95%) and remain stable in their initial forms. Alkyl organic mercury has high lipid solubility and is distributed uniformly through the body, accumulating in the brain, kidney, liver, hair, and skin. Organic mercurial's also cross the *blood brain barrier* and placenta and penetrate red blood cells, attributing to neurological symptoms, *teratogenic* effects, and high blood-to-plasma ratios.

Today, members of the American Dental Association (a trade association and political lobbying arm of dentistry) who even talk against mercury, run not just the possibility of expulsion, but of having the ADA pressure state regulatory agencies to remove the license of any dentist who mentions that mercury might be toxic. The ADA even calls it "unethical and unprofessional conduct" to inform patients of the potential dangers of the most hazardous metal known to mankind. For decades the ADA has claimed that mercury is tightly bound within amalgam and cannot possible get out. Chemists and toxicologists, on the other hand, point out that not only does mercury escape, but it's release is greatly enhanced by chewing and heat. The World Health Organization has published research which shows that between 3-17 micrograms of mercury is released into the body every day simply by chewing pressure on dental mercury fillings.

Of this amount, between 74% and 90% is absorbed and combines with body tissues. Scientists point out that industrial meters held over a filling for 10 seconds after chewing can register levels higher that the EPA allows us to be exposed to for a few hours a day. Fillings, of course, emit mercury vapor 24-hours a day. Fish and other environmental pollutants provide only 0.5-2 micrograms of mercury. There is no known safe limit of mercury ingestion. Mercury accumulates within your body, as humans do not have a good mechanism for eliminating it. Yielding to scientific pressures, the ADA now admits that mercury is indeed released from amalgam fillings even after placement, but state that it is perfectly safe and still support the use of amalgam fillings. They claim their use is safe,

based on over 150 years of use, and that no scientific evidence shows mercury exposure from dental fillings causes any known disease.
Scientific evidence of the toxicity of mercury is abundantly supplied in any scientific fields related to biology. This includes immunology, pharmacology, toxicology, endocrinology, genetics, and birth defects, etc. It does not include dentistry. There is no scientific evidence showing amalgam's safety and mixed dental amalgam has never had FDA research or approval. If it were to be classified as a *class II* medical device and made to undergo the rigorous testing needed to prove safety, it would never pass. The ADA does admit there is a potential hazard for dental office personnel with the handling of dental amalgam and recommend that dentists use a "no-touch" technique, because dentists and their staff might become contaminated. They admit that the "scrap" amalgam, the excess amalgam left over after filling a tooth, also constitutes a hazardous threat because of continuous vapor release.
Mercury is associated with 258 different symptoms, and copper, also found in amalgam, with over 100. The severe toxicity of methyl mercury is attributed to its ability to pierce any cell membrane in the body and cross all barriers, even the placental and blood-brain barriers. After crossing these barriers, methyl mercury is converted back into the highly destructive ionic form and destroys all cell components in its path. The transportation mechanism into cells is its primary damaging component. Its conversion to ionic form then deposits the "killer" form of mercury in areas it could never penetrate in the ionic form. By this mechanism, methyl mercury is credited with initiating degeneration and atrophy of the sensory cerebral cortex, paresthesia, (numbness and tingling), autism, behavioral and emotional aberrations, as well as hearing and visual impairment.
In crossing the placenta, it can inhibit fetal brain development and bring on cerebral palsy or psychomotor retardation in the latter stages of development. Other symptoms of mercury toxicity include: anorexia, depression, fatigue, insomnia, arthritis, multiple sclerosis, moodiness, irritability, memory loss, nausea, diarrhea, gum disease, swollen glands, headaches, and many others. Mercury amalgams have set us up for most of the health problems we see today. Toxic metals interfere with the normal energy patterns in acupuncture channels, setting up interference patterns in the meridians. The body, in trying to protect itself against mercury, creates a problem of yeast infection.
One of the natural absorbers of heavy metals is *Candida albicans*. The body attracts yeast into the intestines to act as a natural sponge for the mercury. Heavy metals such as mercury act as free radicals, which are highly reactive, charged particles that damage body tissues. Free radicals prevent nutrients from entering the cells and wastes from leaving and block enzymes necessary for the body's detoxification processes. Mercury can bind to the DNA of cells, as well as to the cell membranes, distorting them and interfering with normal

cell functions. The immune system no longer recognizes the target as part of the body and will attack it. Once mercury reaches its destination tissue, it has many ways in which it may express its toxicity in many ways.

1. Altered cell membrane permeability
2. Alteration of tertiary structure
3. Alteration of enzyme function
4. Interference in nerve impulses
5. Alteration of the genetic code
6. Inhibition of DNA repair
7. Interference with endocrine function
8. Contribution to autoimmune disease
9. Digestion and absorption alteration
10. Contribution to the development of antibiotic resistance

Millions of U.S. citizens are being exposed to mercury levels that exceed established health standards. Occupational exposure to mercury is a hazard for dental personnel. The only defense for its use comes from the total support of organized dentistry. Science, in over 12,000 scientific studies, has not been able to determine one constructive purpose served by the presence of this toxic metal in the human body. No amount of exposure to mercury vapor can be considered harmless. Once it has leached from the dental fillings and infiltrated the body, mercury becomes a neurotoxin. Mercury is more neurotoxic than arsenic and far more neurotoxic than lead. Mercury has been used quite extensively by the medical profession in anti-fungal preparations, diuretics, antiseptics, brain scans (radioactive mercury), etc. Merthiolate and Mercurochrome, which were very common "first-aid" items in most households and are still used extensively in hospitals, contain mercury.

Nerve endings in the peripheral nervous system constantly scan their environment, engulfing foreign particles and bringing them across the cell membrane for inspection. These substances may then travel all the way up from the foot to the spinal cord to be presented to the nerve cells there. As it travels up the axon, mercury destroys a substance called *tubulin*, used as insulation for *neurofibrils* in the *microtubules*, effectively destroying the nerves. Within 24 hours of injecting a minute dose of mercury into a muscle anywhere in the body of test animals, it is detectable in the spinal cord and brain. The mercury is also found in the kidneys, lungs, bloodstream, connective tissue, adrenals and other endocrine glands. In the brain, it tends to congregate in the *hypothalamus*, which regulates the autonomic nervous system, and in the *limbic system*, believed to be the seat of emotions.

The most devastating effect of mercury in the nervous system is that it interferes with energy production inside each cell. Nerve cells are impaired in their ability to detoxify and nurture themselves. The cell becomes toxic and dies, or lives in a state of chronic malnutrition. It is common for heavy metals to migrate to and accumulate in nerve

*ganglia* (nerve relay stations). As a heavy metal (which means heavier than water), mercury tends to accumulate in the lowest parts of the body, such as the floor of the mouth, the pelvic floor, and the feet. Pelvic symptoms, in both men and women, are very commonly caused by metal toxicity of the *Frankenhauser's ganglion*. This can account for premature ejaculation and an enlarged prostate in men, and endometriosis, pelvic pain, and hormonal dysfunction in women. Neural therapy cleans up this area through the painless injection of the Frankenhauser's ganglion (just above the pubic bone) with a local anesthetic. This opens up most of the ionic channels in the cell wall; the cell is then able to excrete much of its toxic components. This spurs the body to dump large amounts of mercury into the urine.

Mercury is in many of the foods we eat and it is also contained in a great many over-the-counter drugs and cosmetics; e.g. mascara, contact lens solution, hemorrhoid preparations, etc. The mercury ingredients used are *thimerosal, phenylmercuric acetate, phenylmercuric nitrate, mercuric acetate, mercuric nitrate, MB for merbromin,* and *mercuric oxide yellow*. Thus, sensitization to mercury can come from a number of sources. The escape of mercury vapor from amalgam is the primary source through which mercury gains access to the body. Mercury vapor is absorbed through the mucous membranes of the mouth and by direct inhalation into the lungs. The stomach and intestinal tract also absorb swallowed mercury, freshly formed from the highly reactive vapor in the mouth. All of these portals of entry allow mercury relatively direct access to the bloodstream, where binding to hemoglobin can take place. The majority of the mercury in the blood is contained within the red blood cells. Many of those dentists who have inquired into mercury toxicity have lost their licenses or been put on probation for challenging the safety of mercury. The dental industry is scared of legal responsibility for continuing to say that mercury is safe, when all the scientific evidence says otherwise. It is only logical that they would do everything they can to protect the financial interests of the dentists, the manufacturers, and the insurance industry.

Mercury is implicated in metal-induced autoimmunity with the emphasis on *multiple sclerosi*s (MS), *rheumatoid arthritis* (RA) and *amyotrophic lateral sclerosis* (ALS)..If everyone who had come down with MS, lupus, arthritis, epilepsy, leukemia, ALS, diabetes, etc., could relate their disease to dental procedures, the ensuing legal battle would be for more money than exists. A dentist can't legally throw amalgam material or extracted amalgam filled teeth in the trash, bury them in the ground, or put them in a landfill, but the ADA and the EPA say it's okay to put it in people's mouths. In 1976, the U.S. Congress requested that the FDA "classify" dental amalgam fillings. The Federal Register recorded another such request in 1980. Multiple requests have been made over the years, yet there is still no classification of dental amalgam. The FDA has steadily refused to classify amalgam. The government agencies have been defending the

use of mercury. Consider for a moment the national consequences if mercury in fillings were reported to be dangerous. The offending parties (dentists, the ADA, dental manufacturers and distributors), if found guilty, would be liable.
Exposure to mercury vapor causes accumulation of mercury in the brain and spinal cord. Mercury is often concentrated in neurons, especially motor neurons and astroglia cells. It has been suggested that mercury in low concentrations may affect *phosphorylation* and thereby intercellular signalling. Mercury inhibits the development of, and breaks down, cytoskeleton structures in nerve cells. At approximately 0.35 µg/g mercury in brain tissue, bonding of GTP to tubulin was inhibited. This process is necessary for polymerization of *tubulin*, which in turn is a key component of the cytoskeleton. Concentrations of $HgCl_2$ below and close to 0.1 µM inhibit the growth of nerve germs and also cause retrograde degradation of the cytoskeleton in nerve cells.

A recent study completed in 2003, states patients with certain autoimmune diseases such as lupus, multiple sclerosis, autoimmune thyroiditis and allergic disease "often show increased lymphocyte stimulation by low doses of inorganic mercury in vitro." In their study, they removed amalgams from a group of 35 patients with autoimmune diseases and replaced them with composites. When examined six months later, 71 percent had shown an improvement in health, with the greatest improvement in those with multiple sclerosis. Their conclusion: "Mercury-containing amalgam may be an important risk factor for patients with autoimmune diseases."

Pendergrass and Haley in a 1997 performed a study published in the journal *Neurotoxicology*. In their study, they showed concentrations of mercury vapor, known to be released by dental amalgams in people, increased mercury concentrations in rat brains from 11- to 47-fold higher than controls. At this level, the mercury produced the identical lesions seen in Alzheimer's disease (*neurofibrillary tangles*) by interfering with normal tubulin maintenance.

A second mechanism of producing neurodegenerative diseases is even more impressive, called *excitotoxicity*. Excitotoxicity, a mechanism by which excess glutamate accumulates outside the neuron, thereby leading to death of the cell by an excitation process, has been linked to mercury neurotoxicity as early as 1993. More recent studies have confirmed this mechanism and clearly demonstrate, even in concentrations below that known to cause cell injury; mercury can paralyze the glutamate removal mechanism, leading to significant damage to synapses, dendrites and neurons themselves.

This glutamate removal mechanism is critical to brain protection. Additionally, mercury in very low concentrations increases glutamate release, primarily by stimulating the brain's immune cell, the *microglia*. Chronic microglial activation, as seen with mercury exposure, has been solidly linked to all of the neurodegenerative diseases.

At least two studies have shown that mercury increases the toxicity of glutamate. Interestingly, excess glutamate can also produce the same neurofibrillary tangles seen with mercury exposure. In essence, we have the mechanism by which these diseases are produced by mercury vapor and know that it can occur in concentrations commonly found in people having dental amalgam fillings.

*"If you have something that's been put in your mouth that you can't dispose of in a waste basket without breaking environmental protection laws, there's no point in keeping it around, there's no point in taking that type of risk - there's no point in exposing people to any level of mercury toxicity if you don't have to..... .....there is no doubt in my mind that low levels of mercury present in the brain could cause normal cell death, and this could lead to dementia which would be similar to Alzheimer's disease.... We can't go inside a living human being and look at their brain, so we have to work outside, and do scientific experiments such as we've done. And to the best that we can determine with these experiments, mercury is a time-bomb in the brain, waiting to have an effect. If it's not bothering someone when they're young, especially when they age it can turn into something quite disastrous."--Dr Boyd Haley, Professor of Medicinal Biochemistry, University of Kentucky.*

## Mercury and the Eyes

The retina of the eye accumulates mercury when there is exposure to mercury vapor. 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. Pregnant squirrel monkeys were exposed to mercury vapor during approximately 2/3 of a pregnancy, at a concentration of 0.5 or 1 mg $Hg/m^3$ air for 4 or 7 hours a day, 5 days a week. The offspring were sacrificed at different ages (gestational week 16 to 5 years). The eyes were enucleated and horizontal sections of the retina, comprising the optic disc and the fovea, were processed for *autometallographic* (AMG) silver enhancement. The AMG mercury distribution was mapped using light and epipolarization microscopy. In young offspring (16-week-old fetus to 3 days old), mercury was detected mainly in the optic nerve, retinal pigment epithelium, inner plexiform layer, vessel walls, and ganglion cells. Three and a half

months later, the amount of visualized mercury had decreased in all areas except for the retinal pigment epithelium.
Fish were either exposed to waterborne Hg for 7 and 21 days or they received an intravenous injection of the metal and were sacrificed 1 and 21 days later. Mercury did not accumulate in the brain after intravenous injection, indicating that the blood-brain barrier is impervious to Hg in plasma. In contrast, Hg was accumulated in specific areas of the brain (olfactory system, eminentia granulares and medulla of cerebellum, optic nerve and tectum, and rhombencephalon) and spinal cord (ventral horn ganglia) following water exposure. The specificity of the accumulation sites strongly suggests that waterborne Hg was taken up by water-exposed receptor cells of sensory nerves and subsequently transferred toward the brain by axonal transport, a normal physiological process for the transport of organelles and dissolved neuronal constituents along nerve axons. Accumulation of Hg in ventral horn ganglia is probably the result of leaching of metal from blood into muscle followed by uptake in motor plates. Axonal transport allows waterborne inorganic Hg, and possibly other xenobiotics, to circumvent the blood-brain barrier.

Methylmercury in seafood may cause lens clouding, contributing to cataract development. Optometrist Ben Lane noted that his cataract patients liked seafood, while those who didn't like fish were clear-eyed. A study of 17 patients revealed that the cataract patients had eaten salt water fish or shellfish at least once a week on the average, but those cataract-free reported using these foods an average of once every five weeks. The cataract patients showed far higher concentrations of mercury in their hair. Dr. Lane's study showed that the presence of 2.3 ppm or more of mercury in hair samples was related to a 23-fold increase in the risk of cataracts.

### Neuropsychiatric symptoms associated with mercury toxicity include:

1. Insomnia
2. Nervousness
3. Hallucinations
4. Memory loss
5. Headache
6. Dizziness
7. Anxiety
8. Irritability
9. Drowsiness
10. Emotional instability
11. Depression
12. Poor cognitive function

## Mercury Vapor

Silver mercury fillings are not stable. These fillings emit mercury vapor at a rate of 2.8 micrograms per cubic meter of air breathed in the resting state, and their emission rate accelerates dramatically (as high as 49 mgs) after minimal mechanical, chemical, and temperature stimulations. It is also very volatile. This means that "metallic" mercury gives off mercury vapor when agitated, compressed or exposed to increases in temperature. Mercury vapor--which is colorless, tasteless and odorless--if inhaled into the lungs, passes into your bloodstream for distribution to all body tissues. It is at this point that biotransformation begins. Some of the mercury vapor remains unchanged, and some of it is oxidized. (This means to remove a pair of hydrogen atoms and to combine with oxygen. Chemically it means the increase of a positive electrical charge and the decrease of the negative charge, which in effect ionizes the vapor). The unchanged portion exists dissolved in the blood lipids (fats). The toxic effects are produced by that portion that is oxidized into mercuric ions which occurs partly in the blood, partly in the tissues but mainly in the red blood cells.

Hg vaporizes and corrodes in the presence of more noble metals, gold, through all surfaces of the fillings. Most enters the blood stream of the jawbone directly. All kinds of stimulation release it: Chewing, chewing gum, tooth brushing, -cleaning, -polishing and bruxism. Five years old fillings have lost 25%, after 10-15 years half the Hg has left them.

It easily passes the intestinal wall, helped by emulsified fat, oxidizes quickly in body fluids is by far the main source of free radicals splitting any compound hit. It creates oxidative stress.

It attacks sulphur containing proteins, enzymes, some hormones and DNA and sets them out of action. Selenium similarly, e.g. in the enzyme that generates our most important antioxidant glutathione.

It forms cytotoxic organic Hg. Our streptococci in the plaque directly on the fillings, in the throat and alimentary canal do it. It penetrates protecting barriers, cell membranes, blood/brain and blood/retina, the placenta and the mammary glands. It accumulates in the brain of the fetus/baby.

The final compounds are deposited anywhere in the body. They are extremely water insoluble.

Several researchers, beginning with Jernelov in 1969, have demonstrated the microbial conversion or *methylation* of mercury by various microorganisms. This was demonstrated in the laboratory as well as inside the bodies of animals. In 1975, Edwards and McBride demonstrated the methylation of mercuric chloride in human feces. It was also in 1975 that Rowland, Grasso and Davies determined that most strains of *staphylococci, streptococci*, yeasts and *escherichia coli* found in the human intestine (these are bacteria and yeasts of different forms and shapes that are normally present in the human

gut) were capable of methylating mercury. It was in 1983 that Heintze and his associates made the startling discovery that saliva can also methylate mercury being released from the amalgam fillings.
Confirmation of the escape of mercury vapor and ions from amalgam dental fillings is provided by The World Health Organization (WHO) Environmental Health Criteria 118 document (EHC 118) on inorganic mercury. It clearly states that the largest estimated average daily intake and retention of mercury and mercury compounds in the general population, is from dental amalgams, not from food or air. Mercury vapor inhaled into the lungs is absorbed almost 100 percent and immediately passes into the bloodstream. It takes approximately four minutes before mercury is converted or oxidized into an ionic state from its elemental vapor state. While in its elemental form, mercury vapor is lipid (fat) soluble and readily passes through the blood-brain barrier or the placental membrane.
It can also accumulate in other organs and tissues of the body. The estimated average daily intake of mercury from dental amalgams is 3.8 - 21 micrograms per day. Two-thirds of the body burden of mercury is derived from the mercury vapor released from amalgams. The static, unstimulated release of mercury vapor from amalgam fillings, which goes on 24 hours a day, 365 days a year, is a major contributor to total mercury body burden. Large amounts of mercury vapor are released during chewing. After only ten minutes of gum chewing, there is an average increase in mercury release of 15.6 times more than during the resting state in test subjects. That converts to a 1,560% increase in mercury release.
*"The World Health Organization has calculated that the average human daily dose of mercury from various sources are: Dental amalgam = 3.0-17.0 mg/day (Hg vapor) Fish and Seafood = 2.3 mg/day (methylmercury) Other food = 0.3 mg/day(inorganic Hg) Air & Water = Negligible traces (NOTE mg = Micrograms)" (World Health Organization Figures, from Environmental Health Criteria 118: Inorganic Mercury, Geneva, 1991. These figures confirm Amalgam as #1 average source for Environmental Mercury exposure.)*
*"You wouldn't take a leaky thermometer, put it in your mouth, and leave it there 24 hours a day, 365 days a year. Yet that's exactly what happens when an amalgam filling is installed in your mouth."-- Dr Michael Ziff.*
Mercury Vapor Analyzer
The *Jerome 431-X* Mercury Vapor Analyzer uses a patented gold film sensor for the detection and measurement of toxic mercury vapor in the air, including the air in your mouth. It is a portable hand-held unit, weighing only seven pounds that can easily be carried to locations where there is a concern about mercury. It is the same unit used for chemical toxicology testing by OSHA and the EPA to monitor industrial hygiene, mercury spill cleanups and mercury exclusion testing. It is also suitable for monitoring mercury concentrations in a dental office during a daily routine.

The simple push-button operation allows users to measure mercury levels in just seconds. The detection range is from 0.000 to 0.999 $mg/m^3$ Hg. The gold film sensor is inherently stable and selective to mercury, eliminating interference common to ultraviolet analyzers, such as water vapor and hydrocarbons. When the sample cycle is activated, the internal pump in the 431-X draws a precise volume of air over the sensor. Mercury in the sample is adsorbed and integrated by the sensor, registering it as proportional change in electrical resistance. The instrument computes the concentration of mercury in milligrams or nanograms per cubic meter, and displays the final result in the LCD readout.

The 431-X includes features not available in older Jerome models. When attached to either a data logger or computer, the analyzer automatically regenerates the sensor when it becomes saturated and then resumes sampling. An improved film regeneration circuit makes the sensor last even longer. It can operate up to six hours on a fully charged nickel-cadmium battery.

This analyzer can easily be used to measure mercury vapor concentration on a patient before and after chewing a piece of gum for 5 minutes. Chewing, or tooth grinding, increases the heat between teeth and, thus, enhances the release of mercury from amalgams.

This is an insightful eye-opener for those skeptical dentists who still refute the possibility of mercury leaking out of dental amalgams and their own health and their patients' health being in jeopardy by their refusal to acknowledge something that is clearly visible with this machine.

Some reported measurements of dental patients' oral mercury vapor have been twice the OSHA standard of 50 µg/cubic meters which would place them in violation of the OSHA standard based on an employee's 8-hour work exposure for a 40-hour work period seven days a week. Once measurements are taken, you will realize that the most toxic spaces may not be at one of the EPA's superfund sites, but simply right under your nose.

## Mercury Ingestion

Mercury readily mixes with food and is swallowed with it. The body uptake from inorganic mercury, swallowed with saliva, can be as much as hundreds of micrograms per day for individuals with a large number of amalgam fillings. Urinary excretion is a common indicator of mercury toxicity, even though fecal excretion of mercury is twenty times greater than the corresponding urinary excretion. There is a statistical correlation between the mercury concentration in saliva and the number of amalgam fillings. The United States government has determined and ruled that the continual exposure to mercury from amalgam fillings is not without risk to patients. We are concerned over *picograms* and *micrograms* of mercury in apples and are looking the other way when *milligrams*, one million times more,

are being implanted directly into a child's mouth. There is a phenomenon that occurs in the mouth that can contribute to the release of mercury, and is called corrosion. Corrosion is similar to "rust" and means that surface particles of the filling material are being chemically broken down and released into the oral cavity.
Mercury vapor is released when you chew or grind. Additionally, minute rusted particles of the amalgam are being abraded and taken up by your food or saliva and swallowed. Intestinal enzymes and bacteria both produce *methylmercury*, an even more toxic form than elemental mercury, may act upon these minute particles of mercury filling. Although several sources contributing to the domestic mercury concentrations have been identified, human wastes (feces and urine) from individuals with dental amalgam fillings are believed to be the most significant source--greater than 80 percent. Conventional amalgam was routinely placed until 1976, when the new state-of-the-art amalgams (50% mercury and 30% copper) were introduced. They emit up to 50 times more mercury than the earlier, conventional amalgam fillings. That means that every new high-copper amalgam filling placed today has the effective toxic equivalent of fifty of the older amalgam fillings. If other fillings are in the mouth, such as gold crowns, nickel crowns, and removable bridges or braces, the mercury emission further increases from the amalgam. This is due to the electrical current generated by the presence of dissimilar metals in an electrolyte such as saliva. Heat will reliably increase the rate of escape of mercury vapor from amalgam fillings. Vapor detectors, held above amalgams, revealed an increase from 3 micrograms to over 500 micrograms ten seconds after a hot drink was swallowed.
*"Worldwide there are over 4000 research papers indicating mercury is a highly toxic substance. How can dentists be so thoughtless as to place one of the deadliest toxins in existence *two* inches from our brain?"--Tom Warren*
*"The mercury uptake from amalgam is the dominating source for inorganic mercury in the central nervous system and is the major source of total mercury uptake in the population."--Maths Berlin, a leading Swedish toxicologist*

## Blood-Brain Barrier

The blood-brain barrier is a normal mechanism that is supposed to restrict the entry of substances into the brain. The transfer of substances such as nutrients, waste products, oxygen and carbon dioxide, hormones, and poisons in and out of the cells of the body is accomplished through the smallest of blood vessels, the capillaries. The capillaries of the brain have a special structural design to provide extra protection for the critical brain cells. Unlike capillaries elsewhere in the body, the cells lining the brain capillaries are overlapped and less porous. This special structure prevents many substances from passing into or out of the brain that would easily pass to and from other body cells.

Substances that can dissolve in fats readily penetrate the membranes of cells, as these membranes have large amounts of fat-containing molecules. Elemental mercury vapor and methylmercury are fat-soluble and therefore easily penetrate cell membranes, including those of the placenta and the blood-brain barrier. This barrier does, however, selectively allow passage of certain smaller water-soluble substances necessary to the brain, such as glucose and essential amino acids. Mercury vapor has no electrical charge (non-ionic) and is fat-soluble, which accounts for its extremely potent toxicity in the elemental vapor form. The oxidation of mercury vapor occurs in the blood and in the body cells. Ionic mercury is the harmful form of mercury because it is chemically active and can readily combine with tissues, exerting its toxic influence in that manner.

Elemental mercury vapor, after entering the bloodstream, is oxidized through the *mercurous* into the *mercuric* ion. These reactions requires several minutes for completion; because of this delay, elemental mercury stays in the blood long enough to reach all tissues and organs. In its elemental form, mercury easily penetrates the blood-brain barrier and infiltrates nerve cells, where final oxidation proceeds. By easily overcoming the blood-brain and placental barriers, elemental mercury is particularly dangerous during long-term or chronic exposures, representing a potentially serious hazard in many occupations. Once mercury has penetrated the blood-brain barrier, its oxidation to the ionic form is completed. This ionic mercury now has an electrical charge and is no longer fat-soluble. Ionic mercury is very active chemically and readily combines with body substances, thereby exerting its toxic effect.

This ionic mercury can no longer easily penetrate the blood-brain barrier and is very resistant to removal from the brain. Mercury is retained in brain tissue for extremely long periods of time. Autopsy studies have demonstrated a definite correlation between levels of mercury found in the brain and the number and surfaces of dental amalgam fillings present. When mercury ions are absorbed into the bloodstream, even in minute amounts (less than 1.0 parts per million), they are capable of impairing the blood-brain system within 4-6 hours, allowing passage of normally barred plasma solutes into the brain from the blood, that otherwise would be denied entry. Mercury will not only damage the brain but it will also increase exposure of the brain to other harmful substances in the blood. The blood-brain barrier is also an active site for the regulation of the uptake of metabolites from the blood to the nervous system.

The impairment of the blood-brain barrier, together with the possible inhibition of certain associated enzymes by the mercury, is probably responsible for the great reduction of the uptake of amino acids and other metabolites by the nervous system after mercury administration. Amino acids are the building blocks of proteins which are the structural materials used to construct the cells of the body, along with physiological materials such as enzymes and hormones.

There is no scientific evidence that brain cells can be regenerated. This is why mercury damage to the brain is permanent and irreversible. Since mercury vapor readily traverses the placental membrane, the oxidation of mercury vapor in the fetal blood or at the fetal blood-brain barrier itself no doubt results in damage to the fetal blood-brain barrier. But the damage to the fetal blood-brain barrier may be even more important, preventing the uptake of vital amino acids for the construction of the irreplaceable brain cells.
There is absolutely no doubt that exposure to methylmercury in pregnant women presents a serious threat to the fetus. A number of studies have described the effects on infants of prenatal exposure to methylmercury, while the exposed pregnant mothers exhibited little or no observable signs or symptoms from exposure. The neurological effects on these infants were as severe as cerebral palsy and even death, but less easily recognizable symptoms were more common, such as delayed mental development, delayed speech development, delayed motor development, and learning deficits. The major influence of mercury vapor on the fetus is not the promotion of birth defects; but rather the toxic effect on the body cells, particularly those of the brain. In spite of the wealth of information strongly demonstrating the potential risk of elemental mercury vapor to the unborn child, the scientific community has not yet seen fit to responsibly investigate this awesome question.
*"It is sobering to realize that the original "quacks" were dentists who advocated the use of mercury amalgam and that most dentists are still advocating it today."---"The maximum amount of mercury that the Environment Protection Agency allows people to be exposed to is 5,000 times smaller than the permissible amount of lead exposure; in other words the EPA apparently considers mercury to be 5,000 times more toxic than lead."--Marcia Basciano DDS*

## Fertility

Mercury has been shown to pass the placental membrane in pregnant women and cause permanent damage to the brain of a developing baby. A special relationship regarding mercury distribution exists between the mother and the fetus. Much higher levels of methylmercury have been reported in cord blood versus that contained in maternal blood. In animal experiments it has also been shown that there is a much higher accumulation of mercury in the fetal brain tissue than in the maternal brain tissue. Mercury exposure leads to hormone and immune disturbances that can reduce fertility. Reduced fertility among dental assistants with occupational exposure to mercury is a common problem. Many of the female fertility cycle events are related to posterior pituitary activity, so amalgam is another factor that can disturb fertility as well as functions unrelated to pregnancy. Estrogen function can also be influenced by amalgam. Blood serum phosphorus is a guideline to endocrine balance. If the phosphorus is below 3.5 mg%, there is an endocrine disturbance,

somewhat related to the degree of drop below 3.5. The most effective hormones in balancing the phosphorus level are the sex hormones. All males and all females produce both estrogen and testosterone. The males produce more testosterone and the females more estrogen, but there is a balance between the two in both sexes. Small doses of both hormones are used in both sexes to balance the serum phosphorus.

The menstrual and reproductive cycles are controlled by a very complex feedback mechanism between the ovaries, hypothalamus, and the pituitary. In the case of *follicle stimulating hormone* (FSH), there is a negative feedback relationship with estradiol at all times. When estrogen levels are low, the release of *leutinizing hormone* (LH) is increased, and when estrogen levels are high, LH is decreased. This ebb and flow controls the hormonal function leading to ovulation and the mid-cycle surge of both LH and FSH and the reduction of LH and FSH at the luteal phase relate to a feedback relationship with progesterone. Progesterone is not secreted by the ovary until just before ovulation. This, in turn, provokes ovulation--progesterone secretion, which undergoes a tremendous increase. The high levels of progesterone and estrogen associated with the *luteal phase* combine to suppress FSH and LH during the *corpus luteum* phase. Mercury inhibits release of FSH from the pituitary by damaging membranes of cells in the anterior pituitary.

Chronic inhalation of mercury vapor from amalgam fillings for twenty years or more can result in accumulation of pathologic quantities of mercury in the brain and other critical organs and tissues. Human autopsy studies of accident victims have shown a positive correlation between the numbers of mercury amalgam dental fillings and the concentration of mercury in the brain. The onset of clinically observable signs or symptoms of mercury toxicity may take as long as 20-30 years to appear, depending on a person's biochemical individuality. Lubricated condoms and birth control creams or gels have mercury as the primary spermicide. It is not required that the word mercury appear on the label, as it is assumed that everyone knows mercury is in there. The uterus is a collection center for mercury. Hal Huggins reported that more than 90% of the imbalances, created by sex hormone disturbances were corrected within a few weeks of amalgam removal. His patients noted differences in fertility, less pain during periods, relief from endometriosis, and a trend toward optimization of the days of menstrual flow. PMS is one of the most common symptoms to change after amalgam removal. Amenorrhea, or the complete absence of a menstrual flow, responds to amalgam removal. This is usually in women in their twenties or thirties. Even in women who have gone through a sort of premature menopause in their early forties, the periods may start up again for a couple of years. This has resulted in surprise pregnancies. Women should avoid pregnancy for at least six months after amalgam removal.

## The Placenta

The circulatory systems of the mother and fetus are separated by a very thin membrane in the placenta. The purpose of this membrane is to ensure that there is no actual mixing of maternal blood with the fetal blood. This placental membrane was formerly called the placental barrier. Its function was assumed to be one of protecting the fetus from possible damage from any of the potentially toxic drugs or substances that might be present in the mother's blood. The *Thalidomide* disaster in 1961 demonstrated that the passage of toxic substances from mother to fetus did occur and could result in tragic birth defects and deformities. Mercury reduces the blood's ability to carry oxygen and, although fetal blood flow might be normal, the reduced oxygen content of the blood would parallel the hypoxic condition. Mercury may affect the balance or status of most of the body's essential nutrients. No scientific study has ever addressed the relationship between chronic mercury exposure and placental weight/birth weight. From the time of fertilization until birth, the offspring is dependent upon maternal sources for all nutrition.

There are four major areas that are considered to be critical or determinants in the outcome of fetal development: (1) the mother's nutritional status, (2) the structural and functional quality of the placenta, (3) the genetic makeup of the offspring, and (4) the presence of physical, chemical, or mechanical insults to mother and child during pregnancy. Mercury can also affect the satisfactory outcome of fetal development in all four of these areas.

A possibly contributory factor in cadmium and mercury fetotoxicity may be an effect on the *transmembrane transport* of nutrients, such as amino acids, across the placenta to the fetus. An inhibition of nutrient transport may cause fetal death, congenital malformations, or growth retardation. The toxic effects of cadmium and mercury may be found in the placenta where presence of these metals prevent the passage of required nutrients to the embryo/fetus. The placental membrane will stop many substances. However, it is made of fat molecules, and mercury vapor and methylmercury, being fat-soluble, will penetrate the membrane. The lack of knowledge concerning the mechanisms of mercury toxicity as they relate to the human reproductive cycle is compounded by the scarcity of scientific studies investigating the effects of mercury vapor. The majority of scientific studies on mercury have dealt with methylmercury or inorganic mercury. Very little attention has been paid to the threat posed by low-level chronic exposures to toxic metals.

A great deal of the available scientific data was derived from observation of acute exposures where a large single injection of the toxic metal being investigated was administered and the results examined. While there is no barrier preventing the transfer of mercury, there is a slight barrier to the transfer of lead, and the greatest barrier is to the transfer of cadmium. Mercury vapor enters

the body and its cells far more readily than most other forms of mercury. Researchers have found that the placental transfer of mercury varies with the chemical form of mercury; that is, methylmercury is more readily transferable than mercuric nitrate.
The mercury concentrations in the placenta and the infant's hair are directly related to the infant's body burden of mercury. Total mercury and methylmercury, cadmium, and iron were higher in cord blood than in maternal blood, whereas copper and zinc were lower. Significant positive correlations were observed between maternal and cord blood with regard to total mercury and methylmercury, lead, cadmium, and manganese content. Significant correlations were also observed between many pairs of metals, particularly in the umbilical cord and its blood. These results suggest a more serious and complicated influence of heavy metals on infants than on their mothers. The presence of selenium in the placenta can modify and greatly reduce the transplacental passage of mercury to the embryo/fetus.
Environmental chemicals taken into the body may considerably increase the fetal body burden of mercury and its concentration in certain tissues, like the liver or thyroid, after mercury vapor inhalation. Most scientists and researchers are ignoring elemental mercury vapor in their research and in their recommendations for critical future research areas. These researchers either do not know or have forgotten that, once in the blood, elemental mercury vapor remains in its elemental form for minutes, during which time it can penetrate most tissues easily. It is this capability that permits it to also readily move through the placenta to the embryo or fetus, as does organic mercury. Most of the published research has assumed that the only exposure to elemental mercury vapor is from a minute amount contained in the atmosphere. Most research therefore has only focused on probable exposure from dietary mercury, which is usually in the form of organic methylmercury. A glaring omission has been made by not considering the exposure to elemental mercury vapor from mercury amalgam dental fillings.

## Chronic Fatigue

The formation of hemoglobin can be impaired by the presence of mercury, which shows up as increased amounts of porphyrin, a building block of hemoglobin, in the urine. Porphyrin is a layered molecule with the first layer consisting of eight carboxyl groups. When enzymes cut off the carboxyl fragments, what is left is a core molecule known as heme. Heme has two energy functions involving its attachment to globin to form hemoglobin, used by the body to transport oxygen, and it can also undergo a transformation down a chemical cascade of enzymes called the cytochrome oxidase system in which the molecules of *adenosine triphosphate* (ATP) are formed in the Kreb's cycle within the mitochondria of the cells. Mercury appears to create interference in porphyrin metabolism; the result being an

identifiable increase in the urine of porphyrin breakdown products in lieu of energy forms. In serious chronic fatigue conditions, the excretion is as high as 2100 micrograms.
The levels of hemoglobin in chronic fatigue patients can run below normal. Readings below 12 grams clearly indicate inadequate blood levels of hemoglobin. But, many with chronic fatigue have normal or even high levels of hemoglobin. Often these people are referred to psychiatrists under the assumption that they are suffering from mental/emotional stress disorders. The oxygen binding sites in hemoglobin are a favorite of mercury. When enough mercury combines with the hemoglobin, the body experiences chronic fatigue due to lack of oxygen transport, and may create more red blood cells in compensation. This would show up as normal or high hemoglobin readings. Since the body cannot block the daily mercury doses released from amalgams, it will typically make more red blood cells to compensate for this daily contamination. Physicians can easily make the mistake of thinking that they couldn't possibly be hypoxic or anemic with normal hemoglobin. Once mercury is bound to hemoglobin, it will typically stay there for the lifetime of the red blood cell, which is approximately 120 days. Since one molecule of hemoglobin has four oxygen-binding sites, then one atom of mercury will drop the oxygen-carrying capacity of that hemoglobin molecule by 25% after binding. If two atoms of mercury attach, that hemoglobin molecule will have a 50% reduction of its oxygen-carrying capacity, etc. After amalgam removal, the oxygen saturation in venous blood rises dramatically.

## Digestion

Through a process called *pleomorphism*, similar to *metamorphosis* in which a worm becomes a butterfly, many bacteria alter themselves in response to their immediate environment and become different bacteria. These changes in body function lead to differences in their personal biological wastes, which is the cause of many problems. As the stomach environment changes with the addition of new and different foods, some bacteria can undergo a pleomorphic change to accommodate the digestive needs of the new food. By the time a child is two years old, and their teeth have erupted, there may be as many as 400 variations of bacteria in the gastrointestinal tract, and the child is ready for the basic challenges of digestion. When mercury enters the digestive tract, it has an effect on the bacteria that reside there. Mercury readily mixes with the foods and is swallowed with it, then contacting the friendly bacteria.

## Bacteria and Yeast

When people have mercury amalgams or just has elevated mercury in their body, the friendly bacteria (probiotics) will convert the mercury into *methyl mercury*, which is at least 100 times more toxic than ordinary mercury. Research shows that oral bacteria, yeast and

probiotics all methylate mercury, so you should minimize any contact between the bacteria and your mercury. The methylation of mercury could explain some of the adverse reactions reported by parents and patients who have begun detox with massive doses of probiotics to correct dysbiosis.

*Dysbiosis* is a pressing problem, but the production of large amounts of methyl mercury is much worse. Methyl mercury exacerbates damage to the nervous system and even further promotes dysbiosis by further compromising the intestinal immune system. One theory holds that the body deliberately builds up the population of candia as a coping strategy to deal with the heavy metal poisoning. The body actually fosters the presence of candida in a heavy metal toxic patient because the cell walls of the candida binds up the mercury and other toxic metals, providing a measure of relief. If the candida cell walls are destroyed, the cell walls release their toxic metals back into the system, causing symptoms. This release of heavy metals is possibly one explantion of *Herxheimer's reaction*, in which the patient feels more ill, and even more toxic, after the candida is attacked and killed. By using NDF (*Nanocolloidal Detox Factors*), an oral detox supplement, containing cell wall broken probiotics, the bacteriocins from the probiotics drive pathogenic bacteria and yeast away from their territory without breaking their cell walls. This competitive exclusion effect is safer than breaking the cells of the candida.

Mercury may kill the bacteria, but the ones that are stronger undergo pleomorphic change and become more resistant to mercury. These altered intestinal bacteria almost digest your food properly, but not quite. The resultant almost digested proteins are absorbed into the bloodstream. But, while almost the right shape and form, they do not fool the immune system. The immune system sees these undigested proteins as foreign protein and immediately sets up an antigen/antibody reaction, creating an allergic reaction. This is often how food allergies are created. Mercury can turn every meal into an immune challenge instead of the nutritional boost it is supposed to be. Altered bacteria also encourage the rotting of proteins (called putrefaction). Putrefaction of proteins results in the production of more toxins interfering with the actual absorptive mechanism from the intestinal lining.

As a result of these injuries, the selective absorption of the intestinal tract is impaired, allowing seepage of partially processed foods through the lining into the body itself. The lymphatic drainage system picks these up and places them in the blood. Leaky gut syndrome is one of the labels applied to this situation. There is another connection with root canal filled teeth and digestive problems. The common denominator appears to be toxic immune damage from toxins found in the periodontal ligament surrounding the root canal tooth. These toxins are formed within the root structure of the tooth itself, regardless of what is used to fill the root canal. Once formed, they migrate to the outside of the root, to the interphase between bone

and teeth. When one bites down, as during chewing, a few molecules of the toxins are forced up the root surface into the mouth. From the mouth, toxins are mixed with saliva and foods and swallowed into the stomach and intestinal tract. These toxins are unaffected by acids and enzymes in the stomach. There is nothing known in biochemistry or toxicology that is as toxic per volume as root canal generated toxins. It only takes microminute amounts of these acute dentally associated toxins only a minute or two to inactivate many of the body's most critical enzymes. The first layer of cells in the intestine in contact with the food is called the epithelium. These epithelial cells contain glycolytic enzymes that are critical in the production of trypsin, chymotrypsin, and pepsin--digestive enzymes.

As toxins from root canal teeth are released into the saliva, they mix with other components of the saliva, one of which will be mercury if there are any silver mercury amalgam filings in the teeth. In addition to root canal toxins, several other toxic chemicals are produced simultaneously in the *periodontal ligament* space. Among these are *hydrogen sulfide* and *methyl mercaptan*. As this team of chemicals is exposed to mercury, an immediate reaction occurs between them and a new "dual" toxin is formed that can easily enter the epithelial cells of the intestinal tract, inhibiting the production of *trypsin*, *chymotrypsin*, and *pepsin* that are necessary for complete digestion. This leads to chronic constipation, etc. The most significant factor to good digestion is thorough chewing of food, but chewing can trigger the release of these vicious toxins--and if you don't chew your food well, it will ferment and putrefy.

## Diarrhea

Another reaction of mercury in the gut can be diarrhea. Diarrhea is an effective response by the body to rid the G.I. tract of harmful or toxic substances that may have been ingested. After an average of eight years from the time the body begins to fight the presence of mercury seriously, there is the onset of an alternating pattern of diarrhea and constipation, eventually settling into chronic constipation. This condition of chronic constipation leads to parasitic infestation, causing the patient to become even sicker. Parasites not only rob these patients of essential nutrients, but they supply their own toxic by-products as well, which takes energy from the immune cells, liver and kidneys.

## Leukemia

There is a significant cause and effect relationship between mercury amalgam fillings and the white blood cell count. A normal unchallenged, white cell count will run between five and ten thousand cells per cubic milliliter. Amalgam removal is often followed by drops in the high levels of white blood cells seen in leukemia-diagnosed persons. Even the presence of one or two amalgams would increase the white cell level to 7,000 or 8,000. Some researchers, like Hal

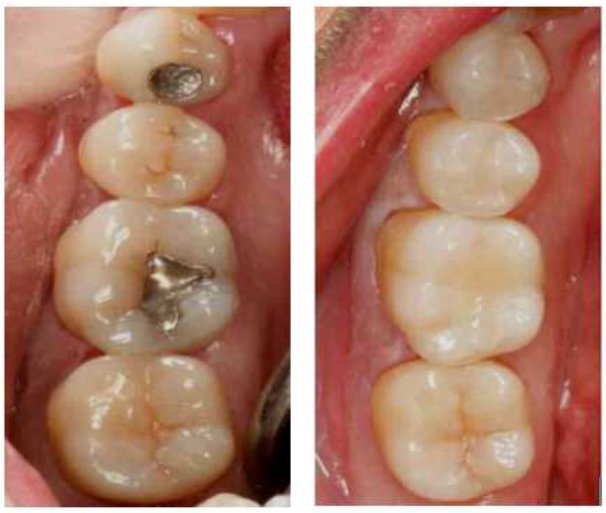
Huggins, believe that leukemia might be the result of a valiant attempt on the part of a super-healthy immune system to rid the body of a challenge that the system considers extremely bad. Sometimes, the day after having fillings removed, the white count will drop over 10,000 to a more healthy level.

## Diabetes

Mercury bonds to the insulin molecule. Insulin, the molecule of question in diabetes, has three sulfur-binding sites. Should mercury attach to one of these, there will be an interference with normal biological function. In diabetics, the daily requirements for insulin usually drop to less than half of what they had been before dental revision. It's important to monitor blood sugar changes after revision, as insulin overdose can occur.

## Alzheimer's Disease

There is conclusive scientific research showing a direct correlation between the numbers and surfaces of amalgam fillings and the mercury content of brain tissue. Autopsy studies show high levels of mercury in the brain tissue of Alzheimer's victims. Chronic inhalation of low-level mercury vapor can inhibit polymerization of brain tubulin essential for formation of microtubules.



BEFORE AFTER

## Hormones

The affinity of mercury for the pituitary gland was first identified by Stock in 1940. Autopsy studies in 1975 revealed that, contrary to accepted belief that the kidney was the prime accumulator of inorganic mercury, the thyroid and pituitary retain and accumulate more inorganic mercury than the kidneys. It has been well documented that mercury is an endocrine system disrupting chemical in animals and people, disrupting function of the pituitary gland, thyroid gland, enzyme production processes, and many hormonal functions at low levels of exposure.

People with high mercury levels in their bodies have more hormonal disturbances, immune disturbances, recurring fungal infections, hair loss and allergies. Very few periodontists or dentists recognize amalgam mercury as an etiological (causing) factor in the development of periodontal disease. Hormones that are most often affected by mercury are thyroid, insulin, estrogen, testosterone, both anterior and posterior pituitary, and adrenaline. Almost all hormones have binding sights capable of connecting to metabolic cofactors, but mercury can bind here, too. Mercury frequently has a stronger affinity for these binding sites than the normal activators; even though the hormone is present in the bloodstream, it may not be able to act as it is supposed to act.

Mercury (especially mercury vapor or organic mercury) rapidly crosses the blood-brain barrier and is stored preferentially in the pituitary gland, thyroid gland, hypothalamus, and occipital cortex in direct proportion to the number and extent of dental amalgam surfaces. Mercury, through its affects on the endocrine system, is documented to cause other reproductive problems including infertility, low sperm counts, abnormal sperm, endometritis, PMS, adverse effects on reproductive organs, etc. In general, immune activation from toxins such as heavy metals, resulting in cytokine release and abnormalities of the hypothalamus-pituitary-adrenal axis, can cause changes in the brain, fatigue, and severe psychological symptoms such as depression, profound fatigue, muscular-skeletal pain, sleep disturbances, gastrointestinal and neurological problems as are seen in CFS, fibromyalgia, and autoimmune thyroiditis. Symptoms usually improve significantly after amalgam removal. A direct mechanism involving mercury's inhibition of hormones and cellular enzymatic processes by binding with the *hydroxyl radical* (SH) in amino acids, appears to be a major part of the connection to allergic/immune reactive/autoimmune conditions such as autism/ADHD, schizophrenia, lupus, scleroderma, eczema, psoriasis and allergies.

Mercury inhibits the activity of *dipeptyl peptidase* (DPP IV) which is required in the digestion of the milk protein *casein* as well as *xanthine oxidase*. Studies involving a large sample of autistic and

schizophren*ic patients found that over 90% of those tested had high levels of the neurotoxic milk protein* beta-casomorphine-7 in their blood and urine and defective enzymatic processes for digesting milk protein. Elimination of milk products from the diet improves the condition. ADHD populations have high levels of mercury and recover after mercury detoxification. As mercury levels are reduced, the protein binding is reduced and improvement in the enzymatic process occurs. Additional cellular level enzymatic effects of mercury binding with proteins include blockage of sulfur oxidation processes, enzymatic processes involving vitamins $B_6$ and $B_{12}$, effects on cytochrome-C energy processes, along with mercury's adverse effects on mineral levels of calcium, magnesium, zinc, and lithium.

## Thyroid

Organic mercury causes severe damage to both the endocrine and neural systems. Studies have documented that mercury causes hypothyroidism, damage of thyroid RNA, autoimmune thyroiditis (inflammation of the thyroid), and impairment of conversion of thyroid T4 hormone to the active T3 form. Large percentages of women have elevated levels of antithyroglobulin (anti-TG) or antithyroid peroxidase antibody (anti-TP). Slight imbalances of thyroid hormones in expectant mothers can cause permanent neuropsychiatric damage in the developing fetus. Hypothyroidism is a well-documented cause of mental retardation. Maternal hypothyroidism appears to play a role in at least 15% of children whose IQs are more than 1 standard deviation below the mean, millions of children. Studies have also established a clear association between the presence of thyroid antibodies and spontaneous abortions. Hypothyroidism is a risk factor in spontaneous abortions and infertility.

In pregnant women who suffer from hypothyroidism, there is a four-times greater risk for miscarriage during the second trimester than in those who don't. Women with untreated thyroid deficiency are four-times more likely to have a child with a developmental disability and lower I.Q. Mercury blocks thyroid hormone production by occupying iodine-binding sites and inhibiting hormone action even when the measured thyroid levels appears to be in the proper range. There are several aspects of iodine deficiency and hypothyroidism-related effects on fetal and perinatal brain development that can be aggravated or otherwise affected by the presence of mercury. Mercury has the ability to reduce cerebellar brain weight through significant reductions in total cell populaton of the cerebellum. Reductions of total body weight at birth are related to maternal exposure to mercury. Lead and mercury also have a direct effect on neuronal development leading to learning deficits. These are the same type of birth defects produced by maternal iodine deficiency and hypothyroidism.

Mercury can have a negative effect on both iodine and thyroid status. A pregnant woman with a mouthful of mercury amalgam fillings has a much greater chance of experiencing some degree of hypothyroidism and/or iodine deficiency during pregnancy than one without amalgam fillings. Both the pituitary and the thyroid display an affinity for accumulating mercury. The enzymatic effects of mercury intoxication can be overcome by the administration of the thyroid hormone *thyroxine*. Through a feedback loop, the pituitary releases *thyrotropin-releasing hormone* (TRH), which in effect tells the thyroid how much thyroxine hormone to release into the blood. Mercury first stimulates and then suppresses the thyroid function. Chronic intake of mercury for more than ninety days results in signs of mercury poisoning, together with decreased uptake of iodine and depression of thyroid hormonal secretion.

The thyroid and hypothalamus regulate body temperature and many metabolic processes including enzymatic processes that, when inhibited, result in higher dental decay. Mercury damage thus commonly results in poor body temperature control, in addition to many problems caused by hormonal imbalances such as depression. Such hormonal secretions are affected at levels of mercury exposure much lower than the acute toxicity effects normally tested. Mercury also damages the blood brain barrier and facilitates penetration of the brain by other toxic metals and substances. Hypothyroidism is also a major factor in cardiovascular disease. The thyroid gland has four binding sites for iodine. When mercury attaches to one of these sites, the hormone activity is altered. There is a relationship between thyroid function and the nutritional status of folate, vitamin $B_{12}$, and methionine. There is also a strong association between lowered zinc intake, lowered basal metabolic rate, lowered thyroid hormones and lowered protein utilization.

Mercury affects the nutritional status of folate, vitamin $B_{12}$, methionine, and zinc, as well as protein. The thyroid is one of the important glands influencing dental decay. There is a fluid flow from the pulp chamber, through the dentin, through the enamel and into the mouth in people who have no dental decay. Thyroid is part of the endocrine function that controls the direction of this fluid flow. Low thyroid hormone production allows this fluid flow to run in the opposite direction--from the mouth, into the enamel, dentin, and pulp chamber. This fluid brings bacteria and debris from the mouth with it, leading to dental decay. When the teeth are susceptible to decay, the whole body is susceptible to degenerative disease. The thyroid is involved with maintenance of proper body temperature. Most mercury toxic patients have lower than optimum body temperatures.

The most toxic persons may have temperatures as low as 96.2. When the amalgam fillings are removed, there is a trend for the temperature to approach 98.6, sometimes within 24 hours of removing all of the amalgams. The thyroid gland is controlled by the pituitary gland. When the thyroid is influenced by mercury, there is a

high incidence of unexplained depression and anxiety. A person may have adequate levels of T3 and T4 hormones, but if the hormones are contaminated, the person is functionally thyroid deficient. Thyroid imbalances cause chronic conditions such as clogged arteries and chronic heart failure. People who test hypothyroid usually have significantly higher homocysteine and cholesterol, which are documented risk factors in heart disease.

Fifty percent of those also had high levels of homocysteine, and 90% were either *hyperhomocystemic* or *hypercholesterolemic*. The major regulator of adrenocortical growth and secretion activity is the pituitary hormone ACTH. ACTH attaches to receptors on the surface of the adrenal cortical cell and activates an enzymatic action that ultimately produces *cyclic adenosine monophosphate* (cAMP). cAMP, in turn, serves as a cofactor in activating key enzymes in the adrenal cortex. The adrenal cortex is able to synthesize cholesterol and to also take it up from circulation. All steroid hormones produced by the adrenal glands are derived from cholesterol through a series of enzymatic actions, which are all stimulated initially by ACTH.

Steroid biosynthesis involves the conversion of cholesterol to pregnenolone, which is then enzymatically transformed into the major biologically active corticosteroids. cAMP is produced from *adenosine triphosphate* (ATP) by the action of *adenylate cyclase*. Adenylate cyclase activity in the brain is inhibited by micro molar concentrations of lead, mercury, and cadmium. One of the key biochemical steps in the conversion of adrenal pregnenolone to cortisol and aldosterone involves an enzyme identified as *21-hydroxylase*.

Mercury causes a defect in adrenal steroid biosynthesis by inhibiting the activity of 21a-hydroxylase. The consequences of this inhibition include lowered plasma levels of corticosterone and elevated concentrations of progesterone and *dehydroepiandrosterone* (DHEA). DHEA is an adrenal male hormone. Because patients with 21-hydroxylase deficiencies are incapable of synthesizing cortisol with normal efficiency, there's a compensatory rise in ACTH leading to adrenal hyperplasia and excessive excretion of *17a-hydroxyprogesterone*, which, without the enzyme *21-hydroxylase*, cannot be converted to *cortisol*.

The inhibition of the 21-hydroxylase system may be the mechanism behind the mercury-induced *adrenal hyperplasia*. Adrenal hyperplasia can stress the adrenal glands by their accelerated activity to produce steroids to the point that production begins to diminish and the glands will atrophy. The result is a subnormal production of corticosteroids. Both lead and mercury can precipitate pathophysiological changes along the *hypothalamus-pituitary-adrenal and gonadal axis* that may seriously affect reproductive function, organs, and tissues. Leukocyte production, distribution, and function are markedly altered by *glucocorticosteroid* administration. In Addison's disease (hypofunction of adrenal glands), neutrophilia

occurs 4-6 hours after administration of a single dose of hydrocortisone, prednisone, or dexamethasone. Neutrophilia is an increase in the number of neutrophils in the blood. Neutrophils are also called *polymorphonuclear leukocytes* (PMNs). Mercury not only causes a suppression of adrenocorticosteroids that would normally have stimulated an increase of PMNs, but at the same time also affect the ability of existing PMNs to perform immune function by inhibiting a metabolic reaction that destroys foreign substances.

## Posterior Pituitary Gland

The pituitary gland controls many of the body's endocrine system functions and secretes hormones that control most bodily processes, including the immune system and reproductive systems. One study found mercury levels in the pituitary gland ranged from 6.3 to 77 ppb, while another found the mean levels to be 30 ppb, levels found to be *neurotoxic* (toxic to nerves) and *cytotoxic* (kills cells). Amalgam fillings, nickel and gold crowns are major factors in reducing pituitary function. The posterior pituitary hormone joins forces with the thyroid in influencing emotions. Posterior pituitary hormone is really two hormones, *oxytocin* and *vasopressin*. High blood pressure is related to the function of the posterior pituitary hormone vasopressin. It is a short trip for mercury vapor to leave a filling, and travel into the sinus, and then travel an inch through very porous, spongy tissues to the pituitary gland. Mercury is detected in less than a minute after placing amalgam in teeth of test animals.

## Suicide

Part of the reason for depression is related to mercury's effect of reducing the development of posterior pituitary hormone (oxytocin). Low levels of pituitary function are associated with depression and suicidal thoughts, and appear to be a major factor in suicide of teenagers and other vulnerable groups. As a profession, dentists rank highest in suicide. Autopsy studies in Sweden showed that the pituitary glands of dentists hold 800 times more mercury than people who were not in dentistry. Suicidal thoughts are not limited to dental personnel though. Suicide is close to the number-one cause of death in teenagers. Braces increase the electrical and toxic load people are carrying if they have amalgam in their mouths. Amalgam can create suicidal tendencies by itself, but the addition of braces, nickel crowns, or even gold crowns evidently increases the exit rate of mercury, and the glands react--or actually stop reacting. Suicidal tendencies tend to disappear within a few days of supplemental oxytocin extract, along with dental metal removal. Menstrual cycle problems, also normalize and fertility increases and endometriosis symptoms subside.

## Frequent Urination

The center that controls the need to get up several times each night to urinate is the posterior pituitary gland. There is a certain amount of solid material that must be disposed of daily in the urine. If the concentration of these solids is high (yield a specific gravity of 1.022 to 1.025) then the proper volume of urine will be excreted in a day. Should the concentration be half that, or yielding a specific gravity of 1.012 for instance, then it will take double the amount of urine to rid yourself of the same amount of solid. In other words, the solids remain the same. If the concentration of the urine is reduced, the total volume of urine is increased substantially. This ability of the kidney is controlled by the posterior pituitary.

## Adrenal Glands

Mercury accumulates in the adrenal glands and disrupts adrenal gland function. During stress, the adrenal glands increase in size as a normal reaction in order to produce more steroids (hormones). Both physical and physiological stress will stimulate the adrenal glands. The outer shell of the adrenal gland is called the *cortex*, and the inner core of the gland is called the *medulla*. The cortex produces three types of steroids called *glucocorticoids*. Cortisone is a corticoid essential to life and functions to maintain stress reactions. Mineral corticoids, such as *aldosterone*, regulate the balance of blood electrolytes and also cause the kidneys to retain sodium and excrete potassium and hydrogen. Mineral corticoids are also involved in *gluconeogenesis*, which is the process whereby your body converts glycogen to glucose (blood sugar).

Small amounts of corticoid sex hormones, both male and female, are also produced by the adrenal cortex. Two primary nutrients for the adrenal glands are pantothenic acid and vitamin C. A deficiency of pantothenic acid can lead to adrenal exhaustion (chronic fatigue) and ultimately to destruction of the adrenal glands. A deficiency of pantothenic acid also causes a progressive fall in the level of adrenal hormones produced. One of the largest tissue stores of vitamin C is the adrenals; it is exceeded only by the level of vitamin C in the pituitary. Physical and mental stress increase the excretion of *adrenocorticotropic hormone* (ACTH) from the pituitary, which is the hormone that tells the adrenals to increase their activity. The increased adrenal activity, in turn, depletes both vitamin C and pantothenic acid from the glands.

Humans cannot produce vitamin C. They therefor attempt to replenish the needs of the adrenals by taking the vitamin from other storage locations in the body. If your overall ascorbate status is low, there may be an insufficient amount available to satisfy the needs of the adrenals. Under this condition, normal adrenal hormone response may become inadequate, leading to an inadequate immune function. Mercury builds up in the pituitary gland and depletes the adrenals of both pantothenic acid and vitamin C. Stress and the presence of

mercury will have a very negative effect on the adrenal production of critical steroids. The ability of the adrenal gland to produce steroids is called *steroidogenesis* and is dependent upon reactions mediated by the enzyme *cytochrome P-450*. Cytochrome P-450 reacts with cholesterol to produce *pregnenolone*, which is then converted to *progesterone*. Cytochrome P-450 can then convert progesterone to *deoxycorticosterone* which is then converted to *corticosterone* or aldosterone by other enzymes in the adrenals. These adrenal functions are also affected by metal ions. Still today, the ADA and other governmental agencies tell us that the mercury in your mouth, or from vaccinations, is perfectly safe. Scientists say this is a ridiculous statement that is in violation of science and common sense.

## Diagnosis

The diagnosis of heavy metal toxicity must take into account the exposure history, clinical signs and symptoms, and laboratory tests. While the Centers for Disease Control has steadily dropped the "allowable level" of lead in the blood over the last fifteen years, there remains a problem with using blood levels in the first place. Blood levels may not accurately reflect the total body burden of toxic metals. High blood levels are usually only found in acute toxic metal exposure, or in people exposed to high levels of toxins over a long period of time. In chronic low level exposure, however, the blood levels may actually be low due to redistribution of the toxins throughout the body, while bone and other tissue levels remain high.

Hair analysis is another method of determining toxin exposure that is popular with many clinicians. The amount of mercury in the hair is determined by flow injection analysis-cold vapor atomic absorption spectrometry and amalgamation, one of several tests available to determine mercury content. Hair can be a good indicator of exposure because it grows slowly and incorporates toxic metals into its structure over a long period of time, and therefore may be a better measure of actual tissue levels. There are arguments over the accuracy of hair analysis due to the possibility of contamination from hair dyes, shampoo, and other factors. Nevertheless, hair analysis can be a valuable screening tool if the proper questions are asked and the proper steps are taken prior to its use.

A more accurate method for evaluating toxic metal burden is to do a urine challenge test with a "chelating" agent. Chelating agents bind to heavy metals throughout the body, and then are excreted in the urine, taking the heavy metals with them. In the urine challenge test, a chelating agent is administered and then urine is collected and analyzed to determine the amount and type of toxic metals that are excreted.

## A Time For Action

This is not a time for scientific studies and congressional hearings. It is a time for action! Common sense calls for termination of use of

amalgam fillings and the removal of thimerosal from vaccines now. The ponderous machinery of Washington has proven itself unequal to the task of protecting our health. The states need to follow the lead of Maine , which requires its dentists to warn patients of the dangers of amalgam fillings. But that limited action is not enough. Amalgam fillings, thimerosal and all other mercury containing substances should be illegal to use on or in people. Dr. Boyd Haley is currently acting as an expert witness in California to help ban thimerosal in that state.

People with autistic children and those with AD patients in their families need to be aware of the cause of these diseases and jointly call for the elimination of use of mercury by dentists and physicians. Perhaps state courts could be induced to grant injunctions against the use of these materials while state legislatures pursue the necessary lawmaking procedures.

*"The ADA owes no legal duty of care to protect the public from allegedly dangerous products used by dentists ..Dissemination of information relating to the practice of dentistry does not create a duty of care to protect the public from potential injury."--American Dental Association lawyers.*

*Through their efforts and thousands of others like them the dental profession has become one of the most respected professions. The ADA accredited dental schools of America do not teach the students the truth. If the Dean Hal Slavkin won't admit the truth when confronted with the pictures, there is not chance in the world that the students will ever even hear about it. None were present at the hearings that I saw. Through the nefarious activities of the ADA and their component societies the mercury cover-up will bring great shame to our noble profession. They lie they cheat they steal the health of vulnerable subsets of the population yet claim in court that they owe no duty of care to the public.*

*The American Cattle Raisers Association let greed get in the way of good sense. They allowed and lobbied for cattle raisers to continue feeding cows to cows. That action caused one cow in Washington to come down with Mad Cow's Disease and they lost 70 Billion dollars overnight in trade with 17 countries who will no longer buy American beef.*

*Just as the ADA has been trying to save a sinking ship for way too many years, they too, will someday have to pay the piper. When that day comes the manufacturer of dental amalgam will take the brunt of the blame. Guess who manufactures a mercury silver filling? Is it Johnson and Johnson? Nope. Is it 3M? Nope. They only sell ingredients. Like a cake. They didn't bake the cake and so they are not responsible for how it turns out.*

*Guess who the cook is in this example? The poor dumb dentist who sleep walks through life will someday wake up to find that their liability is hanging way out and there is no one there to give them any sympathy. They let their association do what should not have*

*been done. They did not protect the public. It is their 70 billion dollars of liability that will be lost in a blink. It is sad but true. The once proud profession of healers has degenerated to lobbyists and liars. Too bad and very sad for us few who remain truthful and ethical to be tarnished by the may who are not.*

The most controversial issue in dentistry today is whether mercury fillings should continue to be used. Mercury is no longer needed in oral health care; all modern dentists use alternative materials to fill any kind of cavity. But old-fashioned and factory-line dentists still place them in children and low-income Americans, because it is so easy – and profitable. Incredibly, FDA's Center on Devices has handed the issue, carte blanche, to its in-house dentists – persons (1) absolutely unqualified to determine the impact of poisonous mercury on the fetus, the child's brain, and the adult's kidneys, and (2) with a brazen conflict of interest. Both points were raised in a letter three years ago by Senator Lautenberg; his concerns were ignored. These FDA dentists defend amalgam on the pseudo-science that it is safe because it's been used for a long time (like cigarettes?); they handpick biased allies to do "literature reviews" to ratify their position.

We emphasize our belief that you two Assistant Commissioners have tried to turn the Center on Devices to a new direction regarding mercury amalgam. But the recalcitrant Center on Devices remains – as it has been called in the title of a House committee report and in a Supreme Court opinion – "FDA's Neglected Child."

A 2006 Zog by poll shows 76% of American voters cannot identify the main component of amalgam. FDA – in league with pro-mercury dentists – refuses to correct the deceptive promotion of this device as "silver fillings." FDA condemns mercury in virtually all other products – even banning mercury in all veterinary products. By blocking mercury products in animals but allowing it in children's mouths and in pregnant women, the Senate could well ask the Commissioner whether FDA puts a higher priority on protecting horses than protecting children and unborn babies.

The Center on Devices is violating several federal statutes:

It refuses to classify encapsulated mercury amalgam, thus violating the Food, Drug and Cosmetic Act;
To allow sales without classifying, the Center adopts a subterfuge system of deeming amalgam "substantially equivalent" to a non-mercury powder -- thus allowing sales of a device that is 50% mercury that no manufacturer has ever proved to be safe.

Ordered to do an independent review of the amalgam literature but determined not to allow the science to emerge, the Center violated the Federal Acquisition Regulation (FAR) statute by handpicking an unqualified meetings planner as strawperson contractor, then directing that a consultant for Big Tobacco actually write the report – for which the Center provided a blueprint in advance!

The Center violates the National Environmental Policy Act by repeatedly refusing to do an Environmental Impact Statement on amalgam – America's 3rd largest source of mercury.

Here is the latest: the Center is blocking a fair and balanced inquiry by the joint committee assigned to investigate amalgam's neurotoxicity. On April 3, you ordered that a joint committee, on September 6 and 7, 2006, "review and discuss peer-reviewed scientific literature on dental amalgam and potential mercury toxicity, specifically as it relates to neurotoxic effects." Those putting together the event – Chu Lin, Director of the Division of Anesthesiology, General Hospital, Infection Control, and Dental Devices; Mary Susan Runner, Director of the Dental Devices Branch; and Michael Adjodha, Executive Secretary, Dental Products Panel – are creating a one-sided presentation to promote their in-house position and to marginalize the independent scientists, the mercury-free dentists, and the consumers injured by mercury toxicity:
Ø They signed secret contracts with guest panelists whom they refuse to identify. Mr. Adjodha justifies this closed door because it is "FDA policy"; when questioned, he says the policy is not in writing and he refuses to say how he learned it. An oral policy? One that says FDA may sign secret contracts with unnamed persons to testify at a public meeting? Here is another example why you must stop the Center on Devices from controlling amalgam regulation.

Ø The program is intentionally one-sided – Lin, Runner, and Adjodha refuse to contract with any independent scientist who has researched mercury's toxicity. By using government funds to bring forward only the Center's position, they are biasing the panel by suggesting only their position is credible.
Ø All three key decision-makers – Dan Schultz, Director of the Center, Director Lin, and Director Runner – refuse to testify. Instead, they are delegating low-level staff (unidentified, of course) to give "background." It's time for accountability: those who uphold this policy disaster – Schultz, Lin, and Runner – must come before the panel and justify their actions.
Ø One invited speaker with government funds, Timothy DeRouen, calls into question FDA's new policy on conflicts of interest with panels. DeRouen headed the highly controversial mercury experiment on Portuguese orphans, now under investigation by the Office of Human Research Protection for implanting mercury without disclosures and fuzzy clearance procedures for orphans. Long before writing the report, DeRouen was an outspoken proponent of mercury amalgam; he testified at a public hearing in Seattle in 2002 that amalgam is safe. Such manifest evidence of bias should have been cause to yank his contract.
Mercury amalgam policy at the Center on Devices could well be called "FDA's Neglected Child's Neglected Child."
Sincerely,
Charles G. Brown
Consumers for Dental Choice
cc--at FDA: Daniel Schultz, Chu Lin, Michael Adjodha, Les Weinstein, Patricia Kuntze cc--Senator Mike Enzi, Chairman; Senator Ted Kennedy, Ranking Member; and Senator Members, H.E.L.P. Committee

Consumers for Dental Choice
1725 K St., N.W., Suite 511
Washington, DC 20006
Ph. 202.822-6307; fax 822-6309
www.toxicteeth.org
July 25, 2006

Mr. Michael E. Adjodha
Center for Devices and Radiological Health
Food and Drug Administration -- via e-mail:
Michael.Adjodha@fda.hhs.gov
Re: Requests, Hearings of September 6 and 7
Dear Mr. Adjodha:
In 2002, FDA's Center on Devices promised an independent review of the mercury amalgam literature. Instead, Dr. Mary Susan Runner, conspiring with Lawrence Tabak and Norman Braveman at NIDCR, engineered the handpicked appointment of an unqualified meetings planner (BETAH Associates) as strawperson contractor, and a consultant for Big Tobacco (LSRO) to do a report to mirror a blueprint given them in advance by NIDCR and FDA officials. Drs. Tabak, Braveman, and Runner insisted that no one with research experience be on the panel. Even then, LSRO had to reverse the research question (from evidence of harm to proof of harm) to get the cleansing document this cabal requested. Because this secret procedure so clearly violated the Federal Acquisition Regulation statute, NIH Director Zerhouni appointed a national CPA firm to do an independent investigation – in sharp contrast to FDA, who continues to cite this study as a basis for its pro-amalgam policies while covering up the fact of this investigation.

From the start, we have feared a repeat of the same intrigue to undo the order of April 3. The public record suggests a major institutionalize interest to protect the position you have wrongly staked out: Dr. Dan Schultz, by his abject failure to supervise; Dr. Chu Lin, by his approval of mercury amalgam without proof of safety and without even warnings to children and pregnant women; you, whose e-mail answer to consumer Pam Floener fails to disclose that encapsulated mercury amalgam has never been classified); and Dr. Runner, who disseminates false information denying Health Canada's warnings about pregnant women and children, and gives the ADA and California Dental Association a veto in your sham Consumer Updates on Amalgam. Answering solely to the pro-mercury faction of organized dentistry, the Center's policy is the opposite of the way FDA addresses other mercury products -- hiding the mercury from the American public, and even proposing a rule in 2002 that warns

about zinc in order not to warn about the mercury. Rather than being the Gold Standard, FDA's Center on Devices remains, as a Congressional report cited in a Supreme Court opinion notes, "FDA's Neglected Child."

I am now informed that, for the upcoming public hearings, you granted special status to the creator of the mercury experiment on Portuguese orphans, a move suggesting you are working to bias any scientific inquiry. Timothy DeRouen and his team, who pocketed a multi-million dollar federal contract for an unscientific and unethical experiment on institutionalized Portuguese children, are under federal investigation by the Office of Human Research Protection. (Have you informed the Panel of this federal investigation of the DeRouen-Martin team?) It is likely that, when the data are sifted through (if DeRouen allows his data to be examined), that this experiment will be as discredited as the LSRO/BETAH deal. But the human cost of DeRouen's personal aggrandizement is much worse: hundreds of Portuguese girls now have unnecessary mercury in their bodies, and some therefore will almost certainly have mercury-damaged babies. DeRouen, knowing that American children can sue after they reach adulthood, cleverly sought out the lowest rung of a semi-developed country – although someone should inform him that these girls/women, too, can go to U.S. courts after turning 18.

DeRouen also has conflicts of interest. (1) His partner in this taxpayer boondoggle is Michael Martin, who sits on the ADA Council of Scientific Affairs. (2) DeRouen went on record at a public hearing, way back in 2002, testifying that mercury fillings are safe, long before analyzing the data, a decision that was criticized even by his handpicked toxicologist, James Wood. Clearly, Martin and DeRouen were sought out by the pro-amalgam dentists inside the federal government because they were already known advocates of mercury fillings. Are you going to ignore this week's FDA pronouncements about conflicts of interest?

Have you assembled the panel we discussed this spring, one focused on mercury-free dentistry? Your proposed 2002 rule, with no evidence, concludes that the benefits of mercury fillings outweigh their risks. The truth is, No benefits exist for mercury fillings. Modern dentists won't use them. They cause mercury toxicity. They cause teeth to crack later – indeed, the fact they cause lifetime employment

for dentists is a major reason the ADA endorses their use. So let's put the benefits v. risks of amalgam out for public debate, instead of secretly making unsubstantiated assertions.
You stated in our one conversation that you want staff to make a presentation. We support this, only if staff will answer questions about its past and current decisions. Staff needs to answer why they assembled the notorious LSRO/BETAH deal, why they have false information about Sweden and Health Canada in Consumer Updates, why they provide deceptive information about amalgam research to Capitol Hill, why they refuse to give warnings, and why they refuse to classify mercury amalgam as a Class III. If your idea instead is to parade staff at the start to repeat the Center's rhetoric that this mercury being different, then refuse to answer questions about the continuing wrongdoings, it's clear the cover-up is continuing.

Consumers for Dental Choice has six requests.

(1) Remove DeRouen's "guest speaker" status, or give equal status to a rebuttal: With the controversy over this experiment, DeRouen does not merit this privileged status. But if you won't remove it (e.g., if you have already promised this favor to the ADA), then provide equal status (guest speaker) and equal time to Professor Boyd Haley to rebut an experiment in no way justifies the continued use of mercury fillings. If you won't even do that, it's clear where this entire hearing is proceeding. (If you are thinking of bringing in the ADA's favorite scientist, Thomas Clarkson, be forewarned that he is a paid consultant to the #1 manufacturer of mercury fillings, and would violate your rules about undisclosed conflicts.)

(2) Assemble a panel of dentists to discuss the issue of whether mercury fillings have any benefits. Yes, this is quite relevant, because the question for the Panel is weighing advantages vs. risks. Bring in your friends from the ADA as well as mercury-free dentists. In a public forum, no honest dentist will be able to say mercury fillings are needed. The sole advantage these days is dental convenience and dental profits.

(3) Invite qualified independent scientists – those who aren't

salivating after NIDCR/FDA million-dollar contracts. Many independent scientists have researched this field. You can invite Professor Vascken Aposhian of the University of Arizona, Professor James Adams of the University of Arizona, Dr. Murray Vimy of the University of Calgary, Professor Fritz Lorscheider (retired, now in South Carolina); or a plethora of scientists from other continents – e.g., Professor Chang of Taiwan or Dr. Maths Berlin of Sweden. These are people that FDA continues to pretend do not exist, doing studies that FDA facilely claims they are not aware of. Previous FOIA requests show that when this information is brought to the attention of Mary Susan Runner, she ignores it. Instead, FDA contracts only with known amalgam advocates, often those with de minimis credentials.

(4) Release the memoranda you are giving the panel. Since the Center is deceiving the public, we would be naïve to think you are not likewise trying to deceive the Panel. Show your good faith by releasing, now, the memoranda and correspondence to the two panels. Dr. Lin told me to file a FOIA, knowing that this request can be stonewalled until long after the hearing. For example, FDA's Center of Devices sat on records for three years, until the day before our meeting with Assistant Commissioner Lutter and Assistant Commissioner Brodsky (and even then withheld records, because we have subsequently found responsive documents via other channels).

(5) Allow me to speak. I will need 20 minutes to educate the panel about the misinformation the staff has been providing them and the public for the past two decades, to the fact that FDA is partner to the ADA in withholding from the American public that the fillings are mainly mercury, and that the Center on Devices takes a position on mercury devices at odds with FDA policies that ban even mercury in veterinary products.

(6) Bring Dr. Schultz, Dr. Lin, and Dr. Runner before the panel. Have them explain (a) why they won't classify amalgam, (b) why they won't warn the public about the mercury (instead proposing in 2002 to warn about zinc!), (c) why they won't require proof of safety like FDA does for other mercury products, (d) why they provide fewer protection to children and unborn children from mercury than FDA

does for animals, and (e) why they engineered or tolerated the BETAH/LSRO deal instead of an independent literature review.
Sincerely,

MONDAY, JULY 17, 2006

**Recent Amalgam Study on Portuguese School Children**

This is a recent study that has gotten some national and regional attention. It was sponsored in part at the University of Washington, which is why it is significant to the Seattle area. Basically the study was conducted in Portugal on school age children. The investigators provided amalgam fillings to children and than followed them with a battery of neurological tests and progress in school. They concluded that there was no impairment of IQ or school grades or neurological function after a period of years in the study subjects who received amalgam fillings in teeth, but they acknowledged an increase in mercury excretion in urine samples taken on study subjects. It is my opinion that this finding alone is cause for alarm and has many implications. Firstly, mercury is well known to accumulate in body tissues and not be observed in baseline unchallenged urine samples. The fact it was noted in these children implies that there is a much higher level of contamination in the body. It is further well documented that mercury at low levels in the body can and does cause damage to organ function and immune function among other things. It has a long list of neurological symptoms some of which were not tested for in this study. Furthermore it is well understood that children are far more sensitive as growing organisms to toxins like mercury, than adults and it is appalling to me to see that these children have been subjected to the a potent toxin like mercury. There is no guarantee that this exposure to mercury will in fact have **no** long term health implications in these children. The very nature of mercury being persistent and widespread throughout body tissues leaves a range of uncertain possible consequences.
Mercury in dental fillings said to be safe
Studies show amalgam fillings don't harm children as they age
By Kathleen Doheny HealthDay for Gannett News Service
Traditional amalgam dental fillings containing mercury are safe for school-age children, two new studies find.
The safety of such materials has long been debated, and the two studies are

significant because they are the first-ever randomized clinical trials to evaluate the fillings' safety in a head-to-head comparison with resin (tooth-colored) fillings, which do not contain mercury. They were to be presented at the International Association for Dental Research's annual meeting, which opened June 28 in Brisbane, Australia.

One study, first published earlier this year in the Journal of the American Medical Association, was conducted in the United States and the other in Europe. Both reached the same conclusion: Amalgam fillings, which contain mercury, are not associated with neurological or kidney problems as children age.

But the studies still leave unanswered the safety of dental fillings in children younger than age 6, because those studied were all 6 or older when the follow-up began, said the experts.

Still, the findings are as solid an answer as parents are likely to get for a while, said one researcher.

"I would say to include amalgam as one of the materials to consider for restoring large cavities in molars," said Tim DeRouen, director of the Comprehensive Center for Oral Health Research at the University of Washington in Seattle, and the lead author of the Portugal-based study. "Unless you have reason to believe that you have an unusual reaction to mercury, you should not have to worry about health risks from the small amount of mercury exposure from dental amalgam," he said.

The U.S.-based study was led by David Bellinger, a professor of neurology at Harvard Medical School in Boston. His team followed the health of 534 children, ages 6 to 10 years at the start of the study. Half of the children received an amalgam filling, and the other half received resin composite fillings. The researchers tracked five-year changes in full-scale IQ scores as the primary outcome of the study. The children had a mean of 15 tooth surfaces restored during the five-year follow-up.

In the Portugal study, conducted for seven years in Lisbon, the researchers tracked 507 children, ages 8 to 10 years old at the beginning of the trial. Again, the researchers assigned half to the amalgam and half to the resin composite filling group. They focused on tests of memory, concentration, coordination and attention. The children had a mean of 18.7 tooth surfaces restored in the amalgam group and 21.3 in the composite group.

In both studies, researchers found no significant differences between the amalgam and resin groups in terms of detectable loss of intelligence, memory, coordination or concentration. The U.S. trial also compared kidney

function between the two groups and found no differences.
DeRouen said the new data "represents the only evidence about the issue to come from randomized clinical trials, the highest-quality research design that can be used to address the issue. They are expensive and take years to complete, so it isn't like there will be more (of the same type of studies) in the foreseeable future."
DeRouen said that fillings that contain mercury could pose a problem for people allergic to mercury. However, according to the American Dental Association, fewer than 100 cases of such allergies have ever been reported.
Bellinger acknowledged that the two studies don't include children under 6 years of age. "As far as I am aware, there are not studies of the effects of dental amalgam in children younger than six," he said.
"These are both important, controlled trials," said Dr. James Crall, chairman of pediatric dentistry at the University of California at Los Angeles School of Dentistry. "The results are consistent across both studies. They both showed some slight elevation in mercury levels (in the urine of the amalgram groups) over the seven years of the study but no significant differences in outcome measurements that related to neuropsychological outcomes (such as memory, concentration and other skills)."
While he, too, is not aware of any published studies of amalgam fillings in children under age 6, in baby teeth, he said, the exposure is short-term by definition, as the baby teeth drop out by age 8 or 9. is preferred.

I would certainly like to see this matter investigated. The subject is hardly being mentioned in the UK though we have the same prevalence of autism as the US.

That'  a lot of suffering children. And families. Including mine.

# America's top mercury Scientist, Boyd

# Haley, P.h.D. on mercury amalgam fillings:

**"Arguing about the safety of mercury/silver amalgam with dentists is like arguing with the town drunk."**

**"I mean I'm testifying trying to get mercury out of certain states, and you'll hear these people make comments comparing a dental amalgam to table salt. Then you look at it and you say, this is what I mean by arguing with the town drunk. That is completely absurd logic and it shows that they don't know an iota of chemistry or they're desperately trying to find something to deceive the American people to make them think they're right."**

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## Dr. Boyd Haley refutes ADA in congressional testimony

## The following excerpts are taken from a rebuttal of the ADA's response in a letter they sent to Congress on May 11, 2001

**[The ADA says:] "There is no scientifically valid evidence linking either autism or Alzheimer's disease with dental amalgam". [Dr. Haley responds:] First, mercury is a well- known, potent neurotoxicant, and common sense would lead to the conclusion that severe neurotoxins would exacerbate all neurological disorders, including Parkin- son's, ALS, MS, autism and AD. Several research papers in refereed, high quality journals and scientific publications have shown that mercury inhibits the same**

**enzymes in normal brain tissues as are inhibited in AD brain samples.... AD is pathologically confirmed post-mortem by the appearance of neuro-fibillary tangles (NFTs) and amyloid plaques in brain tissue.**

**Published research, within the past year, has shown that exposure of neurons in culture to sub-lethal doses of mercury (much less than is observed in human brain tissue) causes the formation of NFTs...., the increased secretion of amyloid protein and the hyper-phosphor- ylation of a protein called Tau....**

**All three of these mercury-induced aberrances are regularly identified as the major diagnostic markers for AD. ....**

**NIH has spent hundreds of millions of dollars to find a causal factor for AD. Yet, no virus, yeast or bacteria has been identified so the cause remains unknown to general science. The rate of AD per 1,000 population is nearly the same in California, Michigan, Maine, North Carolina, Florida, Texas, etc. It is not significantly different for rural versus urban individuals, or factory workers versus those with outside jobs.**

**So the primary toxicant that may be involved is most likely not environmental.**

**Therefore, it must be a very personal toxicant, like what you put in your mouth. Since we place grams of a neurotoxic metal, mercury, in our mouths in the form of dental amalgam this makes it a good suspect for the exacerbation of AD -- not that all would be affected, just those that are genetically susceptible, or those who become ill enough to fall prey to the toxicity, or those that are also exposed to another synergistic toxin (see below).**

**The one fact that ties mercury into a major suspect for AD is the fact that most of the proteins/enzymes that are inhibited in AD brain are thiol-sensitive enzymes.**

**Mercury is one of the most potent chemical inhibitors of thiol-sensitive enzymes and mercury vapor easily pene- trates into the central nervous system.... Mercury is not the only toxicant to inhibit thiol-sensitive enzymes. Thimerosal and lead will do this also as well as reactive oxygen compounds created in oxidative stress and many other industrial compounds.**

**However, mercury has been reported to be significantly elevated**

**in AD brain.... Mercury is in many mouths being emitted from dental amalgam and absolutely would exacerbate the clinical condition identified as AD. Therefore, mercury should be considered as a causal contributor since mercury can produce the two path- ological hallmarks of the disease and inhibits the same thiol-sensitive enzymes that are dramatically inhibited in AD brain. ....**

**Grams of mercury are in the mouths of individuals with several amalgam fillings. Further, the level of blood and urine mercury positively correlates with the number of amalgam fillings. This was confirmed by a recently published NIH funded study.... Therefore, I fail to see the ADA's viewpoint that there is no scientifically valid evidence linking mercury from amalgams to exacerbating AD, especially since mercury produces the diagnostic hallmarks of AD....**

**The ADA hides behind the fact that there has not been an epidemiological study to attempt to correlate mercury exposure and AD. However, absence of proof is not proof of absence. This also begs the question why the ADA, the FDA and the National Institutes of Dental Craniofacial Research (NIDCR) have not pushed for such a study? These agencies know this would be immensely expensive and only the U.S. government could afford to support any reliable long-term study.**

**Yet, these same responsible agencies have failed to confirm as safe the placing into the mouth of Americans grams of the most toxic heavy metal Americans are exposed to.**

**The dental branch of the FDA has steadfastly refused to investigate the toxic potential of dental amalgam.**

**Look at the references in the ADA letter!**

**Even they must quote Scandinavian literature to support their contentions of safety, and even then they have to reference papers on fertility instead of neurotoxicity! Where is the ADA, FDA and NIDCR supported U.S. research in this area? Go to the NIH web-sites and look for research on the safety of mercury from amalgams, or try to find an NIH study concerning possible mercury involvement in any common neurological diseases.**

**NIH does support research on methyl-mercury, as we seem to like beating up on the fishing industry whilst leaving the dental**

**industry alone. However, according to the NIH study about 90% of the mercury in our bodies is elemental mercury, not methyl-mercury, showing the exposure is more likely from dental amalgams rather than fish. .... Support at NIH has been very sparse for investigating the relationship of elemental mercury exposure to neurological diseases.**

**[The ADA says:] "And there is no scientifically valid evidence demonstrating in vivo transformation of inorganic mercury into organo mercury species in individuals occupationally exposed to amalgam mercury vapor".**

**[Dr. Haley says:] There was a paper published entitled "Methylation of Mercury from Dental Amalgam and Mercuric Chloride by Oral Streptococci in vitro". .... This strongly indicates that "organo mercury species" are indeed capable of being made in the human body and may explain the appearance of methyl-mercury in the blood and urine of individuals who don't eat seafood.**

**Further, periodontal disease is considered one of the major risk factors for stroke, heart and cardiovascular disease and late onset, insulin independent diabetes. Many studies of the toxicants produced in periodontal disease have identified hydrogen sulfide (H2S) and methane-thiol (CH3SH) as major toxic products of infective anerobic bacteria in the mouth metabolizing the amino acids cysteine and methionine, respectively.**

**These volatile thiol-compounds are what cause bad- breath! Methane-thiol (CH3SH) would react immediately and spontaneously in the mouth with amalgam generated mercury cation to produce the following two compounds, CH3S-HgCl and CH3S-Hg-SCH3, which are organo- mercurial compounds (check this out with any competent chemist). They are also very similar in structure to methyl-mercury (CH3-HgCl) and dimethyl-mercury (CH3- Hg-CH3), the latter which caused the highly publicized death of a University of Dartmouth chemistry professor 10 months after she spilled two drops on her gloved hand.**

**We have synthesized CH3S-HgCl and CH3-Hg-CH3 in my laboratory and tested their toxicity in comparison to Hg2+. As expected, they were both more toxic than Hg2+ and this data is available on the www.altcorp.com web-site. Therefore, the ADA President is badly misinformed on this issue. Additionally, I am**

**amazed that the researchers at the ADA and NIDCR did not previously report on this obvious chemistry as I would imagine this is the kind of topic they should be add- ressing.**

**[The ADA says:] "Based on currently available scientific evidence, the ADA believes that dental amalgam is a safe, affordable and durable material for all but a handful of individuals who are allergic to one of its components. It contains a mixture of metals such as silver, copper and tin, in addition to mercury, which chemically binds these components into a hard, stable and safe substance."**

**[dr. Haley says:] This is a totally wrong statement unless you underline the "ADA believes" and define how big is a "handful of individuals". Sensible people want "believes" replaced with "knows" and a "handful" replaced with a "hard number".**

**Amalgams emit dangerous levels of mercury and the ADA absolutely refuses to accept this fact or even to study the possibility. Otherwise, the ADA administrators seem to be unable to separate fact from fiction. Consider, if they wanted to destroy my argument on amalgam toxicity they would reference several solid, refereed publication showing that mercury is not emitted from dental amalgams -- but they cannot do this with even one article.**

**They always state the "estimate" is that a very, very, very small amount. Competent, well-informed researchers don't use the evasive language used in the ADA President's letter. They would state the amount is so many micrograms mercury released per centimeter squared amalgam surface area and a "handful of individuals" would be a percentage of our population! Let's look at the published literature.**

**First, careful evaluation of the amount of mercury emitted from a commonly used dental amalgam in a test tube with 10 ml of water was presented in an article entitled "Long-term Dissolution of Mercury from a Non- Mercury-Releasing Amalgam". This study showed that "the over-all mean release of mercury was 43.5 + or - 3.2 micrograms per cm2/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. Further, research where amalgams containing radioactive mercury were**

**placed in sheep and monkeys, showed the radioactivity collecting in all body tissues and especially high in the jaw and facial bones. ....**

**Another publication, from a major U.S. School of Dentistry, stated that solutions in which amalgams had been soaked were "severely cytotoxic initially when Zn release was highest" .... Zn is a needed element for body health and is found in very low percentages in dental amalgams when compared to mercury and why mercury was not mentioned in the abstract of this publication baffles me. Why would the statement be true? Because Zn2+ is a synergist that enhances mercury toxicity!**

**However, does this sound like amalgams are a safe, stable material? We have repeated similar amalgam soaking experiments in my laboratory and the results can be seen at www.altcorp.com. Cadmium (from smoking), lead, zinc and other heavy metals enhanced mercury toxicity as expected (this research is currently being prepared for publication).**

**The ADA claim that a zinc oxide layer is formed on the amalgams that decreases mercury release is true, if you don't use the teeth.**

**The zinc oxide layer would be easily removed by slight abrasion such as chewing food or brushing the teeth. Further, my laboratory has confirmed that solutions in which amalgams have been soaked can cause the inhibition of brain proteins that are inhibited by adding mercury chloride, and these are the same enzymes inhibited in AD brain samples.**

**Further, mercury emitting from a dental amalgam can be easily detected using the same mercury vapor analysis instrument used by OSHA and the EPA to monitor mercury levels.**

**Anyone who does not believe mercury is emitted from amalgams should consider doing the following.**

**Have your local dentist make 10 amalgams using the same material he/she places in your mouth. Take these 10 amalgams to your nearest research university's department of chemistry or toxicology department and have them determine how much mercury is being emitted. For example, have them calculate how long it would take a single spill of hardened amalgam to make a gallon of water too toxic to pass EPA standards as drinking**

**water.**

**You will then have an answer from an unbiased, solid group of scientists who are trained to do such deter- minations. Also, remember the level of mercury they measure would not include the increase that would occur with amalgams in the mouth where chewing, grinding your teeth, drinking hot liquids and galvanism greatly increase the release of mercury. Since this approach can be easily done by anyone don't you think the ADA, FDA and other amalgam supporters would have this published by now if the level of mercury released was below the danger level?**

**Here is their attempt.**

**According to an ADA spokesman he has "estimated" that only 0.08 micrograms of mercury per amalgam per day is taken into the human body. Applying simple math to this "estimate" of 0.08 micrograms/ day one would divide this amount by 8,640 (24 hours/day X 60 minutes/hour X 6 ten second intervals/minute) to determine the amount of mercury in micrograms available for a ten second mercury vapor analysis.**

**Consider that somewhere between one-half to five-sixths of the mercury released would be into the tooth (that area of the amalgam that exists below the visibly exposed amalgam surface) and not into the oral air. In addition, some mercury in the oral air would be rapidly absorbed into the saliva and oral mucosa (mercury loves hydrophobic cell membranes) and also not be measured by the mercury analyzer.**

**Further, as the mercury analyzer pulls mercury contain- ing oral air into the analysis chamber, mercury free ambient air rushes into the oral cavity decreasing the mercury concentration. Taking all of this into account you can calculate that most mercury analyzers could not detect this "estimated" 0.08 micrograms/day level of mercury even if you had several amalgams.**

**However, the fact is that it is quite easy to detect mercury emitting from one amalgam using these analyzers. Therefore, the "estimate" by this ADA spokesman is way to low.**

**Also, if you gently rub the amalgam with a tooth-brush the amount of mercury emitted goes up dramatically. This is a test anyone can do and demonstrate to any group. The ADA spokesmen state that the mercury vapor analyzer is not accurate**

**at determining oral mercury levels and they are quite correct.**

**However, using this instrument would greatly under-estimate the amount of mercury exiting the amalgam. The very fact that the mercury analyzer detects high levels of oral mercury strongly indicates the emitted amount of mercury is too high to be acceptable.**

**Mercury release from dental amalgams is also the reason OSHA has used this analyzer to make the dentists place unused amalgam in a sealed container under liquid glycerin. This is done so that the mercury vapors from the amalgams will not contaminate the dental office making it an unsafe place to work.**

**This is also the reason the EPA insists that removed amalgam filling and extracted teeth containing amalgam material be picked up and disposed of as toxic waste. Apparently, the only safe place for amalgams is in the human mouth if you believe what the ADA believes.**

**[The ADA says:] "Amalgams have been used for 150 years and, during that time, has established an extensively reviewed record of safety and effective- ness."**

**[Dr. Haley says:] First, what other aspect of industry or medicine is still using the same basic manufactured material that they used 150 years ago? One has to ask the question as to what has hindered the progress of development of better and safer dental materials?**

**Also, consider that in the early 1900s the average life expectancy of most Americans was about 50 years of age and most of them could not afford dental fillings.**

**Fifty to sixty years is much less than the average age of onset of AD. Further, amalgams became more available to most working class Americans after World War II, or in the early 1950s. The greatest increase in the use of amalgam occurred at about this time and these 'baby boomers are the great ongoing amalgam experiment'.**

**They are now reaching the age where AD appears and have lived most of their lives carrying amalgam fillings. They also wonder what is causing their chronic fatigue as the physicians can find nothing systemically wrong with them. I would encourage all**

**concerned to contact the health experts on the rate of increase of AD in the U.S.A. at this time.**

**Consider the cost it will place on the taxpayer and how much we would save if we could even remove the exacerbation factors that might speed up the onset of AD. I must point out that the "extensively reviewed record of safety" mentioned in the ADA letter was mostly done by dentists and committees dominated by ADA dentists.**

**Also, much of the "safety opinion" was developed long before words like Alzheimer's disease and chronic fatigue were commonplace. Further, these were "reviews" and not carefully documented studies based on scientific experimentation and done by unqualified dentists, not medical scientists. Dentists are not trained to do basic research, nor are they trained in toxicology.**

**Furthermore, the ADA does have a vested interest in keeping amalgam use legitimate. The ADA was founded on using amalgam technology and participated in patenting and licensing amalgam technology. One has to question why there has not been a general outcry by the bulk of well-meaning dentists and their patients and this question should be addressed.**

**The International Association of Oral Medicine and Toxicology, started by American & Canadian dentists, does adamantly disagree with the ADA on the issue of safety of dental amalgams and this organization has the mantra of "Show me your science" with regards to all dental issues.**

**The ADA, through state dental boards stacked with ADA members, has instigated a "gag order" preventing dentists from even mentioning to their patients that amalgams are 50% mercury. Dentists cannot state that mercury is neurotoxic and emits from amalgams and that the dental patient should consider this as they select the tooth filling material they want used.**

**If a dentist informs a patient of these very truthful facts he will be consider not to be practicing good dentistry and his license will be in jeopardy.**

**Attacking a person's freedom of speech because he is telling the truth and causing serious questions to be asked about the protocols pushed by a bureaucracy (the ADA) makes me seriously**

**question the commitment the ADA has for the health of the American people.**

**The negative stand taken by many state dental boards against even informing the patients about the mercury content of amalgams and the other filling choices they have does not speak well for the organized dental profession. What medical group would give a treatment to a patient without telling them of the risks involved?**

**[The ADA says:] "Issued late in 1997, the FDI World Dental Federation and the World Health Organization consensus statement on dental amalgam stated "No controlled studies have been published demonstrating systemic adverse effects from amalgam restorations."**

**[Dr Haley says:] My first comment would be to question, "who staffed these committees and what percentage were connected to the ADA though the NIDCR or the FDA dental materials branch or other relationships?" We appear to have the foxes guarding the henhouse! Then I would again point out that "absence of proof is not proof of absence".**

**I would then ask 'have any controlled studies been done and if not, why not?' If the ADA dentists insist on placing amalgams in the mouth, are they not required to show it is safe, not the other way around?**

**Should not the ADA and others concerned push to require the FDA to prove amalgams are safe instead of totally ducking this issue. Go to the FDA dental materials web- site and try to find any evaluation of amalgam safety--- you will not succeed. The dental branch of the FDA refuses to do a safety study on amalgams and this is shame on our government.**

**[The ADA says: "the small amount of mercury released from amalgam restorations, especially during placement and removal, has not been shown to cause any adverse effects."**

**[Dr. Haley says:] This increase in mercury exposure has also not been shown to be safe by proving it does not cause any adverse effects!**

**Are we to believe this elevated exposure to a toxic metal is good**

**for us?**

**If one were in a building that caused the rise in blood/urine mercury that appears after dental amalgam removal, then OSHA would shut the building down.**

**In fact, no study by the ADA or NIDCR has been completed that specifically and accurately addresses this issue. Yet, the ADA leads us to believe that additional exposure to toxic mercury from these procedures is not dangerous to our health.**

**Mercury toxicity is a retention toxicity that builds up during years of exposure. The toxicity of a singular level of mercury is greatly increased by current or subsequent, low exposures to lead or other toxic heavy metals. ....**

**Therefore, the damage caused by amalgams could occur years after initial placement and at mercury levels now deemed safe by the ADA.**

**Our ability to protect ourselves from the toxic damage caused by exposure to mercury depends on the level of protective natural biochemical compounds (e.g. glutathione, metallothionine) in our cells and the levels of these protecting agents is dependent upon our health and age.**

**If we become ill, or as we age, the cellular levels of glutathione drop and our protection against the toxic effects of mercury decreases and damage will be done.**

**This is strongly supported by numerous studies where rodents have been chemically treated to decrease their cellular levels of protective glutathione and then treated with mercury, always with dramatic injurious effects when compared to controls. Therefore, published science indicates that mercury toxicity is much more pronounced in infants, the very old and the very ill.**

**A recent NIH study on 1127 military men showed the major contributor to human mercury body burden was dental amalgams. The amount of mercury in the urine increased about 4.5 fold in soldiers with the average number of amalgams versus the controls with no amalgams.**

**In extreme cases it was over 8 fold higher. Since the total mercury included that from diet and industrial pollution are we to**

**expect that this 4.5 to 8 fold average increase in mercury is not detrimental to our health? Does this indicate that amalgams are a "safe and effective restorative material"? Is the public and Congress expected to be so naive as to believe that increased exposure above environmental exposure levels is not damaging?**

**Then why are pregnant mothers told to limit seafood intake when mercury exposure from amalgams is much greater? Then why is the EPA pushing regulations to force the chloro-alkali plants and fossil fuel plants to clean up their mercury contributions to our environment?**

**Obviously, from this study most of the human exposure to mercury is from dental amalgams, not fossil fuel plants. Yet, the FDA lets the dental profession continue to expose American citizens to even greater amounts of mercury. They do this by refusing to test amalgam fillings as a source of mercury exposure. Also, remember that the amalgam using ADA dentists are a major contributor to mercury in our water and air through mercury leaving the dental offices, and even when we are cremated.**

**[The ADA says:] "The ADA's Council on Scientific Affairs 1998 report on its review of the recent scientific literature on amalgam states: "The Council concludes that, based on available scientific information, amalgam continues to be a safe and effective restorative material." and "There currently appears to be no justification for discontinuing the use of dental amalgam."**

**[Dr. Haley says:] What would you expect an ADA Council to say? The ADA, as evidenced in the current letter by the President of the ADA, only quotes and considers valid the published research that supports their desire to continue placing mercury containing amalgam fillings in American citizens. When were dentists trained to evaluate neurological and toxicological data and manuscripts?**

**What is needed is an international conference where both the pro- and anti-amalgam researchers show up and present their data in front of a world-class scientific committee. I would challenge the ADA to line up their scientists and supporters to participate in such a conference. This could be held in Washington, D.C. so the FDA officials could easily attend. Perhaps we could persuade the FDA to sponsor such a conference.**

**However, this is unlikely since a recent written request to have a conference to evaluate the safety of amalgams was rejected in a letter from the FDA and signed by three FDA/ADA dentists who presented the ADA line on this issue. Doesn't it seem a bit fraudulent to have FDA/ADA dentists deciding on whether or not a safety study should be done on mercury emitting amalgams being placed in human mouths with the blessing of the ADA? This does seem like a conflict in interest that Congress should address.**

**"In an article published in the February 1999 issue of the Journal of the American Dental Association, researchers report finding "no significant association of Alzheimer's disease with the number, surface area or history of having dental amalgam restorations."**

**This research was lead by a dentist, Dr. Sax. It was submitted to the J. of the American Medical Association and rejected. It was then submitted to the New England Journal of Medicine and rejected. It was then published in the ADA trade journal, JADA, that is not a refereed, scientific journal. JADA is loaded with commercial advertisements for dental products.**

**They even called a "press conference" announcing the release of this article! Calling a press conference for a twice-rejected publication that is to appear in a trade journal is playing politics with science at its worst!**

**At this press conference two of the authors made unbelievable statements that were not supported by any of the data in the article and conflicted with numerous major scientific reports, including the 1998 NIH study. .... Some of these were high-lighted in the side-bars of the ADA publication.**

**I would suggest that those concerned with this article visit Medline and look at the publication records of the two individuals who made these statements. Also, look at the three earlier excellent publications in refereed journals by some of the other authors showing significant mercury levels in the brains of AD subjects compared to controls. .... However, put a dentist in charge of the project and the data gets reversed!**

**Apply some common sense. The ancillary comments by some of the authors and the results of the JADA publication are in total disagreement with the vast majority of research published that**

**looks at elevated mercury levels in subjects with amalgam fillings. For example, the NIH study on military men discussed above showed a very significant elevation of mercury in the blood that correlated with number of dental amalgams. ....**

**Another recent publication demonstrated elevated mercury in the blood of living AD patients in comparison to age-matched controls. .... These studies clearly show that there should be increased mercury in your blood if you have amalgams and especially if you have AD and amalgams. ....**

**Does not the brain have blood in it? This makes it a total mystery as to how could the authors of the JADA article not find elevated brain mercury levels in patient with existing amalgams and/or AD. Even cadavers have brain mercury levels that correlate with the number of amalgam fillings they had on death.**

**Further, if you are addressing the contribution of amalgams to brain mercury and AD wouldn't it be important to divide the AD and control subjects into those with and without existing amalgams on death? In the JADA article this was not done and represents a major research flaw! That this was not done also arouses suspicion.**

**I participated in submitting a letter pointing out this flaw to editors of JADA but they refused to acknowledge the letter and did not publish our comments. It is my opinion that the entire situation around this singular supportive publication of the ADA position on amalgams, brain mercury levels and AD represents a weak attempt at controlling the mind-set of well-meaning dentists, scientists, physicians and medical research administrators.**

**It definitely impedes honest scientific debate. It also explains the cavalier attitude of the ADA and NIDCR about elemental mercury exposure and toxicity when compared to the more serious approaches taken by the EPA and OSHA.**

**With regards to the JADA article summary that "no statistically significant differences in brain mercury levels between subjects with Alzheimer's disease and control subjects." Here I must quote Mark Twain on honesty, "There are liars, damned liars and statisticians."**

**Comparing the level of mercury in the AD versus control alone**

**using straight-forward statistics previously showed a significant difference on mercury levels in AD versus control subjects. …. However, there are anomalies, confounders and other factors that can be considered in this situation, especially if you don't like the initial results.**

**This allows one to invoke a Bon-Feroni statistical manipulation. With Bon-Feroni you include the comparison of one pair of data (that may be statistically significantly different taken alone, e.g. mercury levels in the brains of AD versus control subjects) with several other pairs of data rendering the difference statistically insignificant.**

**One known weakness of the Bon-Feroni treatment of several coupled pairs of comparisons is that one very likely will miss a single comparison that is significantly different, and clever people know this. It is my opinion that application of the Bon-Feroni manipulation is what happened in this JADA study that reversed the previous significance of the mercury levels in AD versus control brain previously reported.**

**Research previously reported by some of the very same researchers involved in the JADA study consistently indicated that mercury levels were higher in AD versus age-matched control brains. ….**

**Only when an ADA dentist became involved did the results change to being insignificant.**

**I think the data used in this JADA article and funded by NIH needs to be re-evaluated by a different statistician if we are to ever really know if the mercury levels in the AD brains differed significantly from controls.**

**The letter from the ADA President then lists four publications as proof of amalgams having no statistically significant negative effects. Two of these were published in Scandinavian Journals, another was a review of the literature in a Dental Journal, and one was the JADA article mentioned above.**

**Sweden is well known to have lead the world in the restriction and replacement of dental amalgams with non-mercury containing materials.**

**Forces are pushing hard to get the use of amalgams accepted**

**again in Sweden to eliminate this embarrassment to our ADA. The current situation in Sweden and some other European countries, Canada and Japan seriously questions the ADA contention of amalgam safety. What if people in Sweden become healthier without amalgams?**

**Additionally, the studies quoted by the ADA President were epidemiological studies. These are very complex as many confounders are included which make finding a statistically significant difference very difficult.**

**So the results are negative, nothing found, and not surprising. However, they are in disagreement with numerous other similar reports and appear to be hand-selected to support the ADA position. One has to wonder, since the ADA President seemed to visit Swedish journals to support the ADA position, how he missed the research of the Nylander group in Sweden that showed increased mercury content in brains and kidneys of humans in relationship to exposure to dental amalgams. ....**

**Also, the referenced studies in the ADA letter did not involve neurotoxicity, autism or neurological disease -- -which is the question at hand. Rather, they addressed fertility, reproduction and other systemic illnesses. Could not the ADA find references to focus on neurotoxiological studies?**

**What about the 1989 study that showed elevated levels of mercury in 54 individuals with Parkinson's disease when compared to 95 matched controls? .... Further, one ought to consider who was doing these touted ADA studies and any vested interest they may have in the outcome.**

**I am also aware of studies done in the U.S.A. by major research universities that would disagree with the conclusions drawn by the ADA on this subject yet these articles are not considered in the ADA letter.**

**At the end of the last publication the quote "Conclusions: No statistically significant correlation was observed between dental amalgam and the incidence of diabetes, myocardial infarction, stroke, or cancer."**

**How does this relate to an article published in the J. of the American College of Cardiology where the mercury levels in the heart tissue of individuals who died from Idiopathic Dilated**

**Cardiomyopathy (IDCM) contained mercury levels 22,000 times that of individuals who died of other forms of heart disease? Where did this tremendous amount of mercury come from?**

**Even a Bon-Feroni manipulation could not make this difference insignificant! Many who die of IDCM are well-conditioned, young athletes who drop dead during sporting events -- and they live in locations and in economic environments where sea-food is not a dietary mainstay. Perhaps the victims of IDCM are within the ADA Presidents "handful of individuals who are allergic to one of its components."**

**[The ADA says:] "The National Institute of Dental and Craniofacial Research is currently supporting two very large clinical trials on the health effects of dental amalgam. Studies underway for several years each in Portugal and the Northeastern United States involve not only direct neurophysiological measures but also cognitive and functional assessments."**

**[Dr. Haley says:] Do we really think that the NIDCR and associated ADA personnel are going to deliver up a conclusion to American parents saying "we put a mercury containing toxic material in your child's mouth that lowered his/her I.Q. and made him more susceptible to neurological problems in comparison to the children whom we selected to not get exposed to this toxic material"?**

**It is my opinion that most bureaucracies don't have a brain or a heart, but they do have a very strong survival instinct. Therefore, the results presented from this study will likely follow previously ADA supported research, i.e. no significant results.**

**Since the NIDCR started this project only 4 years ago one has to ask why it took so long for them to get involved since the "amalgam wars" have been going on for scores of years? Was it the overwhelming amount of modern science showing mercury from amalgams being a major part of the daily exposure that forced their hand and they had to develop a defense?**

**Would I trust the conclusions of this study without knowing who put it together and who did the statistics? Not any more than I trust the conclusions of the JADA article mentioned in the ADA letter that stupendously concludes that mercury from dental**

**amalgams does not get into the brain.**

**As was proven by the tobacco situation, trying to find any significant negative effect of one product (amalgams) related to any disease through epidemiological studies is very difficult and complex. To do this with mercury would be difficult because of the synergistic effect two or more toxic metals or compounds (e.g. cadmium from smoking) may have on the toxicity of the mercury emitted from amalgams.**

**For example, one publication showed that combining mercury and lead both at LD1 levels caused the killing rate to go to 100% or to an LD100 level. .... An LD1 level is where, due to the low concentrations, the mercury or the lead alone was not very toxic alone (i.e., killed less than 1% of rats exposed when metal were used alone).**

**The 100% killing, when addition of 1% plus 1% we would expect 2%, represents synergistic toxicity. Therefore, mixing to non-lethal levels of mercury plus lead gave an extremely toxic mixture! What this proves is that one cannot define a "safe level of mercury" unless you absolutely know what others toxicants the individual is being exposed to.**

**The combined toxicity of various materials, such as mercury, thimerosal, lead, aluminum, formaldehyde, etc., is unknown. The effects various combinations of these toxicants would have is also not defined except that we know they would be much worse than any one of the toxicants alone.**

**So how could the ADA take any exception, based on intellectual considerations, to my contention that combinations of thimerosal and mercury could exacerbate the neurological conditions identified with autism and AD?**

**Autism and AD have clinical and biological markers that correspond to those observed in patients with toxic mercury exposure.**

**Why would the ADA take this position? I personally feel like I have been in a ten year argument with the town drunk on this issue. Facts don't count and data is only valid if it meets the pro-amalgam agenda.**

**The ADA was founded on the basis that mercury-containing**

**amalgams are safe and useful for dental fillings. This may have been an acceptable position in 1850. However, modern science has proven that amalgams constantly emit unacceptable levels of mercury.**

**Especially as the average life span has increased from 50 to 75-78 years of age where AD and Parkinson's become prevalent diseases. The ADA can try to verify its position using selected epidemiological studies. But the bottom line is that amalgams emit significant levels of neurotoxic mercury that are injurious to human health and would exacerbate the medical condition of those individuals with neurological diseases such as ALS, MS, Parkinson's, autism and AD.**

**I am hoping that the ADA sent this letter to your committee and also placed it on the ADA web-site to indicate that they are now willing for a wide-open discussion to take place on the issue of dental amalgams.**

**I, for one, would welcome a major scientific conference on this issue. The ADA should feel free to post my letter in response and address any issue they feel that I am mistaken about.**

**However, in closing I urge your committee to push forward on the study of the potential dangers of mercury in our dentistry and medicines. This includes mercury exposures from amalgams, vaccines and other medicaments containing thimerosal. The synergistic effects of mercury with many of the toxicants commonly found in our environment make the danger unpredictable and possibly quite severe, especially any mixture containing elemental mercury, organic mercury and other heavy metal toxicants such as aluminum.**