

# Mercury Amalgam Toxicity A Major Common Denominator Of Degenerative Disease

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## Introduction

I have become very interested in the silver amalgam problem and have begun doing some secondary research. Secondary research consists of investigating what others have done themselves as primary research. A local dentist with whom I shared a mutual patient became quite irate when I suggested that her problem may well be related to the amalgam fillings. When these are placed in the mouth they contain about 50% mercury and as they age give off an average total of 500 mg of mercury! He suggested that I write the University of Florida School of Dentistry. I did ... Chiayi Shen, Ph.D., Assistant Professor and Acting Chairman sent me an article by Karl O. Frykholm, *Allergy to Mercury from Amalgam Restorations*, that was published in 1957.

Frykholm did find that intra oral respired air contained mercury vapor although transient. Frykholm claimed that saliva sealed off the vapor and this belief seems to be perpetuated to date although the scientific literature has definitely disproved it! When I didn't receive further material that Dr. Shen offered to gather, I wrote to the Dean of the Dental School, and received a reply from Harold R. Stanley, DDS, Chairman, Department of Oral Medicine. He referred me to N.W. Rupp, DDS, MS, Research Associate

of the American Dental Association. Dr. Stanley ended his letter with, "As far as I know mercury within a set amalgam is of no concern to man. If there was a problem certainly it would have shown up in over 100 years of use across the world." Dr. Rupp responded with a beautiful letter with enclosed articles from the literature. He closes "...To date we see no danger for anyone other than a few sensitized patients..." Next, I received a copy of the article entitled *Safety of Dental Amalgam* from the Journal of the American Dental Association, April, 1983, from a dental friend and correspon dent. I wrote an open letter to Dr. Burton Press, DDS, President of the ADA, on May 8, 1983. To date I have received no reply!\* In Orlando at the recent meeting of the Florida Academy of General Dentistry, a historical and monumental presentation was given by Michael F. Ziff, DDS, and his colleague James E. Hardy, DMD. David Mays, friend and patient of mine, and close friend of Hal Huggins, DDS, commented that it was the most thorough and comprehensive

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report he had ever heard on the subject of mercury problems. Drs. Ziff and Hardy organized the material into a six hour presentation with beautifully typed and complete notes. Their entire presentation was on a strictly scientific level with all material documented from the literature — twenty pages of references! They did throw in a few anecdotes, but qualified them! I highly recommend this team of two for giving presentations to any interested health practitioner group. It is not geared for the layperson.

Dr. Linus Pauling points out that anecdotes have their place in science and merit study and investigation. Don't you agree? I do. After all, discovery often starts with the effect experienced by the individual. So, here are just a few! Dr. Ziff commented about two of his dental assistants. One had chest pain and arm pain; the other, a right hand like ice. The amalgams were removed and their problems cleared. On October 3, 1979, Dr. Ziff developed epigastric pain and nausea and was transported to the hospital with the aid of the paramedics. He had a diagnosis of "heart attack" with AV block and PVCs. He was treated with Inderal which itself can cause these heart irregularities. He spent 10 days in the hospital and at 14 days, he had a stress test and was in the 90th percentile (very healthy score!). These heart irregularities can be caused by mercury!. After having his amalgams removed he no longer needed two aspirins twice a day for headaches.

Now, let's begin the review of the Ziff/Hardy presentation. The majority of the material is 100% their work and I give them the greatest credit and highest respect. I have added some of my own thoughts, opinions, feelings, and information for which I take responsibility. Drs. Ziff and Hardy may or may not agree with me. I have done my best to present this information at a level of understanding for both layman and health practitioner. I feel there is a great need for this comprehensive review by both groups.

The content of this article is in no way intended for the use of the lay person in self treatment and I take no responsibility for violations. The material is intended for educational purposes only. Please consult with your health practitioner for specifics of

diagnosis and treatment. Above all, remember the choice of what you do is yours and yours alone. Preserve this great freedom!

We'll be covering six major categories; so, here we go!

### **HISTORY OF THE DENTAL AMALGAM CONTROVERSY**

In 1819 an English chemist invented the dental silver amalgam. It was first used in this same year in London and Paris, and in the United States in Philadelphia in 1825. Subsequently, a series of three "Amalgam Wars" broke out in 1840, 1925, and about 1970. The First Amalgam War was staged in the United States with the major concerns over economics and toxicity. The American Society of Dental Surgeons required its members to sign a written agreement not to put amalgam fillings in patients' mouths. Members violated their agreement, the organization dissolved, and the American Dental Association was born. Yes, over 143 years ago some wise individuals realized the dangers of the amalgam toxicity! Why is it taking us so long to awaken? The Second Amalgam War was fought in Europe and especially Germany where a German chemist, Stock, introduced the concept of "micro-mercurialism". This battle resulted in the discontinuation of the use of copper amalgams. Right now, the amount of copper in some amalgams is being increased in the United States! Copper in excessive amounts becomes a toxic metal and may be associated clinically with such conditions as arthritis, eczema, post partum psychosis, autism, and schizophrenia — to name a few. The Third War is Worldwide and is being waged on professional, scientific and public levels. There are consumer movements in Sweden, West Germany and the United States. Yes, in twenty-two of our states! The Vermont Dental Association will be asking for adequate answers to its questions at the next meeting of the ADA for their questions were not satisfactorily addressed at the last meeting. Personally, I feel that here in the U.S. we are on the brink of a media explosion and probable extreme public reaction as the truth becomes known. In reply to my challenge to him of their toxicity, one local dentist told me that amalgams are the backbone of dentistry. Already several dentists

in the greater Orlando community are removing amalgams and at least five no longer put them in their patients' mouths. There's a class action suit against the Government in Sweden. The war continues. Let's manifest a healthy ending!

***Does Mercury Escape From Dental Amalgam Restorations?***

From 1926 until the present time researchers and clinicians have been measuring mercury vapor. The major stumbling block in the closed mind of some dental professionals that I will compare to the so called "establishment" of medicine, has been the conclusion of the study by Frykholm in 1957 that when saliva covers the amalgam the mercury is no longer released. Although this finding has subsequently been disproven by several, it continues to be used by the establishment. In 1979 Gay measured expired air for mercury before and after chewing. He found approximately a fifteen fold average increase in the toxic metal! In 1981 Svare also measured expired air and found after chewing a 15,600 percent higher reading than in the controls! Dr. Hal Huggins has been using the Bachrach Mercury Sniffer and Wolfe has been using the Jenson Mercury Sniffer. Both these methods have been wet readings and show mercury escaping!

New amalgams contain about 50 percent mercury. Old amalgams do contain mercury too, with an average of 28 percent (based on six studies). In 1970, Radics found an average loss of 30-40 mg from each filling of about 100 mm. In the whole mouth the loss can amount to 500 mg! Numerous investigators have demonstrated that mercury migrates into dental hard tissues. ... There are professional recommendations for handling scrap amalgam. First, do not contact scrap amalgam with hands. Second, store in tightly sealed containers under fixer solution. The solution contains sulfhydryl groups (SH") that bind heavy metals. These same sulfur groups are found in Kyolic, special garlic preparation, and help to remove toxic heavy metals such as mercury from the body. Thirdly, dispose of the waste properly. There are already soil contamination problems from amalgam disposal in European cities. In Japan there was contamination from dental school disposal. Amalgams have

not been banned in Japan as has been rumored. There are no professional establishment regulations by the ADA for the safety of the patient who carries the mercury twenty-four hours a day for often years or a lifetime!... Although the earlier investigators claimed saliva stopped mercury vaporization, later investigators found the opposite, as mentioned above. Stock and later Trakh-tenberg demonstrated that mercury vapor will penetrate water and saliva.... Ingestion of hot foods and fluids increase mercury vaporization by three fold!... The mercury escapes from dental amalgam restorations in the forms of vapor, ions, and abraded particles.

***How Effectively is Mercury Being Eliminated from the Body?***

The major route of elimination is the urine and the minor routes are the feces, lungs, bile, sweat, and salivary glands. As a clinician I have recommended the utilization of sauna baths to facilitate removal of mercury by sweating. When I was an establishment physician, I often prescribed and administered injections of Mercurhydrin to "help" people with swelling problems of varying causes. I never thought of the toxicity of the mercury or just how it worked! But, I have now! Kidney function is disturbed within minutes after mercury enters the bloodstream. Its first effect is diuresis (polyuria) or in simple terms increased urination! If the kidney damage becomes extensive then urinary output decreases and may even cease! According to Fleishmann in 1928 it is completely wrong to equate urinary excretion of mercury with the amount given off from the amalgam. Urine specimens are often tested for mercury — probably best with a twenty-four hour collection. To preserve the mercury in the urine potassium persulfate is added. It is my understanding that the American Dental Association is currently carrying on a study with some of its members in which urine specimens are being examined for mercury and no preservative is being added. How valuable can such a study be?

***Tests for Mercury Body Load***

These tests include urinalysis, fecal analysis, whole blood, hair analysis, nails, x-ray

fluorescence, in vitro tests, and chelation. I'll only touch on the highlights. For urinalysis a collection of a one to five day sample is more accurate and the best method of analysis is by atomic absorption spectrophotometry. Whole blood does not correlate to pharmacologic or toxicologic activity in the body or signs and symptoms; but correlates to some degree with exposure by inhalation. Remember, blood tests measure what is circulating in the body at the particular time the sample is taken. Urine measures excretion or elimination from the body, and hair analysis measures storage. There may be a temporal or time relationship with hair to mercury exposure but no correlation to body load or pathology. The various chelation methods have degrees of toxicity. The most commonly used one is with EDTA. There is an organization in the United States called AAMP or the American Academy of Medical Preventics. Its members are involved in chelation and are abreast of the latest developments and techniques in this non-invasive procedure. Chelation can demonstrate storage of mercury in the body if the urine is collected in 1-5 days. In my opinion, the EDTA chelation is quite safe in the hands of a skilled physician!

#### *Standards and Criteria for Safe Mercury Levels*

In a nutshell, mercury is highly toxic to humans and therefore **any** amount is harmful to the cells and tissues of human beings. The question is how large a dose does it take to affect the life of the exposed person? Or does any amount adversely affect the human being whether on a conscious level or not? Mercury can occur in three basic forms which are elemental, inorganic, and organic. "Safe" levels of exposure have been established for these forms. These have titles such as Threshold Limit Values (TLV) and Maximum Allowable Concentrations (MAC). As I understand it, MAC is the average level in the air that doesn't cause signs or symptoms in all but hypersensitive people during an eight hour exposure. As a holistic/preventive medicine physician, I also understand primary prevention. Prevent the illness before it even happens. So, any level of mercury, I consider toxic and advise my patients to beware and avoid it!

In 1972, Joselow pointed out that there are

many uncertainties involved in making these calculations. Variations of mercury sensitivity between children and adults and individual adults are not known. Diagnosis has been mainly based on neurological dysfunction, but lesser toxic effects like on metabolism that are not easy to diagnose may occur at lower mercury concentrations than those causing neurological symptoms. Methyl mercury is one of the most potent chemical agents known for causing inactivation of the mitotic spindle, which deals with heredity. Look at the birth defects of children born of parents with mercury poisoning from Minamata Bay in Japan! People with below threshold levels have been reported to have symptoms from mercury! Autopsy studies reveal brain lesions characteristic of methyl mercury damage in males exposed to it but asymptomatic.

#### *Evaluation of Pro-Amalgam Positions*

Most of the pro-amalgam reports are based on secondary research. Primary research reports claiming safety of dental amalgam are based on urinalysis and blood mercury levels both of which have been proven to be unrelated to pathology, exposure, or symptomatology; or studies prior to 1960 utilizing experimental techniques or instruments that have now been shown to be inadequate or inaccurate. Many of these studies claimed safety because exposure levels found were below TLV, assuming no damage occurred below these levels. No attempt was made to investigate pathology, or even symptomatology, at any exposure level in many of these 'studies'. In the work of Frykholm, his instrumentation had detection limitations for measuring the smaller amounts of mercury vapor later proven to come from amalgams. He also used artificial saliva, artificial gastric juice, and glass. The former two are far from the natural conditions. The latter is a known absorbent of mercury and thus would cause a reflection of lower levels. Although he found mercury in the pulp he attributed it to contamination from sectioning (cutting tissues for study purposes), rather than migration via the dental tubules to the pulp tissues. The statements that mercury is bound into the dental amalgam and cannot escape and that saliva prevents escape of mercury from

dental amalgam are untrue.

There is no research to substantiate the safety of mercury in the mouth. A local dentist asked the National Institute of Dental Research, part of the National Institutes of Health, to show the safety of amalgams. Except for the attempt of Frykholm in 1957, there is no primary research to substantiate the safety of the mercury in amalgams! ADA Council on Dental Materials: "There is no documented scientific evidence to suggest that dentists and dental office personnel who are exposed to greater amounts of mercury vapor have a greater incidence of certain medical conditions or higher mortality rates as compared to the general population." Then, what about these known facts about dentists and personnel:

1. Highest suicide rate in the U.S.
2. Heart attack rate is 50 percent above the average.
3. Divorce rate is 50 percent above the average.
4. Female dental personnel have rates of sterility, stillbirths and miscarriages 3<sup>1</sup>/<sub>2</sub> times the average.

### THE TOXICITY OF MERCURY TO HUMANS

Mercury is probably the most toxic metal in our environment. Long term exposure can produce damage and symptoms after years of exposure at which time the cause may be very difficult to establish. Elemental mercury poisoning has an insidious onset after prolonged exposure and causes neurological signs that may become disabling. The initial symptom of chronic inorganic mercury poisoning may appear after a few weeks or take several years. Organic mercury poisoning may appear within two months after a single heavy exposure..

The pathology of mercury poisoning is extremely complex and complicated. Some people are hypersensitive to mercury, a matter of individual tolerance, which is an immune system response. Mercury is toxic to living cells of humans in any amounts. Damage may precede clinical effects.

#### *Documented Mercury Pathology*

Acrodynia has also been called Pink Disease, or Feer's Syndrome. Eight reports document its mercury etiology! The amount may be very small. The interval of time

between the exposure and onset may vary from one week to several months. Here are the signs and symptoms: Abdominal pain, pain in the joints and extremities, irritability, mood changes, photophobia, increased perspiration, desquamation (skin loss) and pink color of hands, hypertension, loss of teeth, muscular weakness.

#### **Mucocutaneous Lymph Node Syndrome** also called **MLNS**, and **Kawasaki's Disease**.

There may be considerable variation in symptomatology on an individual basis. The mercury cause was established in the late 1960's. Here are the signs and symptoms: Lymphadenopathy or swollen glands especially in the cervical or neck chains, joint pains, stiff neck, fever, lethargy, sore throat or pharyngitis, anorexia or loss of appetite, irritability, photophobia, elevated WBC count, elevated IgE count-type of antibodies, peripheral extremity edema and erythema or swelling and redness, pink to red palms and soles, thromboses or clots, cardiovascular pathology — such as myocardial infarction, coronary artery thrombo-arteritis, coronary artery aneurysms, AV blocks, premature ventricular contractions and tachycardia. These last few have rather big names, but are quite common symptoms of people with heart and blood vessel problems. It is important for physicians, especially cardiologists, and cardiovascular surgeons, to become aware of the potential underlying mercury basis of these conditions and to not only treat the effect but to get at the cause. Having served as an Emergency Room physician for three years, I have seen hundreds of patients present with many of these signs and symptoms and be subjected to rather intensive and expensive modern day medical care after which no cause was discovered. I now ask myself how many of these patients are ill because of mercury toxicity from their amalgams? And what about the huge expense they have gone through? And when will the diagnosis ever be made? Yes, Kawasaki's Disease is for real! Time for we health practitioners to become aware and to do something about it.

**Central Nervous System — Brain.** The brain is a target organ of elemental and organic mercury and effects are reported in

### **1. Psychological Disturbances**

Irritability

Nervousness Shyness or timidity

Loss of memory

Lack of attention

Loss of self confidence

Decline of intellect

Lack of self control

Fits of anger

Depression Anxiety Drowsiness

Insomnia

### **2. Oral Cavity Disorders**

Bleeding gums

Alveolar bone loss

Loosening of teeth

Excessive salivation

Foul breath

Metallic taste

Leukoplakia

Stomatitis

Ulceration of gingiva, palate, tongue

Burning sensation in mouth or throat

Tissue pigmentation

**3. Gastrointestinal Effects** Abdominal  
cramps Gastrointestinal problems,  
colitis Diarrhea

### **4. Systemic Effects**

Irregular heartbeat — tachycardia,  
bradycardia

**Table 2**  
**SOURCES OF MERCURY**

**Occupational Exposures**

Mercury-silver amalgam (dental fillings)	Amalgam makers	Insecticide makers
Broken thermometers and barometers	Bactericide makers	Investment casting workers
Consumption of grain seeds treated with methylmercury fungicide	Barometer makers	Jewelers
Fish and marine mammals	Battery makers, mercury	Laboratory workers, chemical
Mercuric chloride (used in histology labs)	Boiler makers	Lampmakers fluorescent
Calomel (body powders and talcs)	Bronzers	Manometer makers
Mercury containing cosmetics	Calibration instrument makers	Mercury workers
Latex and solvent-thinned paints	Cap loaders, percussion	Miners, mercury
Organic mercurials (diuretics)	Carbon brush makers	Mirror makers
Air polluted by industrial mercury vapor	Caustic soda makers	Neon light makers
Mercury polluted industrial water	Ceramic workers	Paint makers
Clothing worn by mercury workers	Chlorine makers	Paper makers
Hemorrhoid suppositories using mercurials	Dental amalgam makers	Percussion cap makers
Mercurochrome and thimerosal (Merthiolate)	Dentists	Pesticide workers
Fabric softeners	Direct current meter workers	Photographers
Floor waxes and polishes	Disinfectant makers	Pressure gauge makers
Air conditioner filters	Disinfectors	Refiners, mercury
Wood preservatives	Drug makers	Seed handlers
Cinnabar (used in jewelry)	Electric apparatus makers	Silver extractors
Batteries with mercury cells	Electroplaters	Switch makers, mercury
Fungicides for use on lawns, trees, shrubs, etc.	Embalmers	Tannery workers
Tanning leather	Explosives makers	Taxidermists
Felt	Farmers	Textile printers
Adhesives	Fingerprint detectors	Thermometer makers
Laxatives (containing calomel)	Fireworks makers	Vinyl chloride manufacturing
Skin lightening creams	Fish cannery workers	Wood preservative workers
Psoriatic ointments	Fungicide makers	
Photoengraving	Fur preservers	
Tattooing	Fur processors	
Lab and industrial equipment using metallic mercury	Gold extractors	
Sewage sludge used as fertilizer contaminates soil	Histology technicians	
Sewage disposal (may release 1000's of tons of Hg annually world wide)	Ink makers	

virtually all cases of known mercury poisoning. Human autopsy studies show pathological changes. The damage is permanent! **Peripheral Nervous System:** Widespread degeneration in the sensory pathways of this system have been reported. **Renal:** All forms of mercury may attack the kidney with damage to the tubular lining primarily but also the filters called glomeruli. As previously mentioned, first there is diuresis with increased urination and as damage progresses there may be decreased urination, oliguria, and then no urinary output, anuria. Protein may appear in the urine and with sufficient loss, the blood protein will become low and swelling or edema will develop.

**Erythrocytes:** The appearance of abnormal amounts of certain metabolites like coproporphyrin in victims of mercury exposure suggest interference with hemoglobin manufacture or synthesis. Remember that the red blood cell's hemoglobin contains 60 times more thiol (SH<sup>-</sup>) radicals than plasma.

#### *Membrane Activities of Red Blood Cells Inhibited by Mercurials*

**Leucocytes-Immune System:** Initially with exposure to mercury the WBC count is elevated and later it may be depressed. When mercury enters the WBC, biochemical changes occur that result in the rupturing of these cells into what are called "shadow cells". They release enzyme packets into the blood stream causing a multitude of allergic and immune responses. These enzymes are designed to protect the body from foreign invaders, but when released may attack other tissues of the body and inflict damage in what is called autoimmune disease. Removal of the amalgams will result in the movement of the WBC count whether upward or downward to 5,000 to 5,500. High IgE (immune) levels have been documented in MLNS.

**Cardiac:** ECG changes may indicate left ventricular hypertrophy, ST segment depression, prolongation of QT interval. Previously in practice, I was often confronted with a patient asking "why" to these abnormalities. I'd confess my ignorance by stating there must be a reason, but I do not know why. There may be arrhythmias, irregular rhythms, of slow and

fast heart beats called tachycardia and bradycardia. The cardiac features of MLNS were discussed above.

**Lungs:** Inhalation of elemental or organic mercury vapor causes damage to the alveolar lung tissue — the grape like portions at the very ends of the bronchial tree. Low oxygen or hypoxia, shortness of breath, persistent cough, emphysema, pneumonitis and chest pain are the major conditions.

**Oral Cavity:** Bleeding gums, alveolar bone loss, and loosening of teeth are classic and early signs of mercury poisoning. Excessive salivation, stomatitis, foul breath, metallic taste, burning sensation in the mouth or throat and leukoplakia (a precancerous condition) have also been reported. Tissue pigmentation is rarely mentioned in the literature, but the mercury tattoo is for real clinically.

**Teratogenic Effects:** Elemental mercury vapor and organic mercurials readily pass the placental barrier. Concentrations in the fetal blood are often as much as 20 percent higher than in the maternal blood. From the Minamata Bay mercury outbreak, 23 children of symptom free apparently healthy exposed mothers were born with cerebral palsy-like symptoms, varying from mild spasticity to severe mental retardation and death.

**Genetic Effects:** Chromosomal damage has been demonstrated from both elemental and organic mercury in animals and in humans. The chromosomes of circulating lymphocytes can be adversely damaged by mercury concentrations below those causing clinically overt signs of poisoning. Methylmercury is one of the most potent chemical agents known for causing inactivation of the mitotic spindle, which deals with cellular reproduction.

**Carcinogenic Effects:** No investigations of possible connection between mercury exposure and cancer have been found. There are anecdotal reports of "spontaneous remission" of leukemia and Hodgkin's Disease following removal of dental amalgams.

#### *Mercury Hypersensitivity*

The critical level of mercury exposure that results in overt signs and symptoms varies from individual to individual. Mercury poisoning may result from a single large

exposure or from chronic low level exposure. The term "mercury hypersensitivity" refers to individuals that will exhibit overt signs and symptoms of mercury toxicity at exposure levels lower than the established arbitrary safe levels. But what are safe levels? What's the difference between a little bit of poison or a lot? And what about the concern for primary prevention? Primary prevention is preventing the disease before it even has a chance to start. In the case of amalgams this would mean leaving them out!

***Micromercurialism***

Micromercurialism is the effect on living tissue resulting from exposure to minute amounts of mercury over long periods of time, particularly in the absence of clinical signs and symptoms readily attributable to mercury poisoning. As mentioned earlier, Stock in 1925 first investigated this condition in the Second Amalgam War. Trakhtenberg reported in 1969 that pathological changes occur from very low levels of mercury vapor and mercuric chloride — less than 1/8 of the U.S. TLV.

Pathological effects of micromercurialism reported by Trakhtenberg parallel many of those already mentioned above. Blood elements such as WBCs, RBCs, hemoglobin, bone marrow are adversely affected. With tissue proteins there is alteration of biological properties and protein synthesis. Enzyme; hormone; and endocrine functions of pituitary, adrenal, thyroid, ovaries, and testes are altered. There are pathological effects on the heart, liver, immune system, central nervous system, lungs, kidneys, and spleen.

Here's a brief summary of Trakhtenberg's work. There was no correlation between pathological findings and mercury levels in the blood or urine. Mercury vapor will penetrate water and other liquids. Elemental mercury vapor will not penetrate HCl (hydrochloric acid) solutions. (What happens in the human stomach?) "Exposure to low mercury concentrations will often produce those pathological changes without visible evidence of micromercurialism, on a background of apparent health."

**DIAGNOSIS AND TREATMENT**

As a holistic health physician, I feel that the presence of amalgam fillings containing

mercury is diagnostic because any known poison in the body is harmful. This statement is so logical and truthful, I wonder why for over 170 years dentists have been placing them in patients' mouths and patients have been allowing it to be done!

A dentist may or may not choose to use amalgams in his practice, but the final choice is that of the patient. It is important for both dentist and patient to make intelligent choices.

If the practitioner is convinced that mercury in any amount is harmful and the patient desires, then the dentist removes the amalgams and replaces them with the best non-mercury restorative available. Most dentists say gold is the best but in reality not everyone can afford gold. Then, if applicable, the composite may be used. To the patients, avoid any nickel being placed in your mouth! It combines with carbon monoxide to form nickel carbonyl which is a highly carcinogenic substance. It can cause cancer. Also watch out for highly toxic beryllium! Carbon monoxide is present in tobacco smoke and you don't have to be the smoker to get it, for exposure does it! Instead of the more expensive gold, some dentists recommend materials less expensive that contain nickel! Consumer beware!

If doctor and patient are in agreement without testing that mercury is toxic to the patient's body, then no further tests may be done and money is saved. However, electro-galvanic testing of current potential in order to determine the sequence of amalgam removal is quite helpful. It is important in order to avoid a flare up of previously experienced symptoms, and a possible worsening or an "arresting" or "freezing" of the patient's condition.

The removal of dental mercury is not a "cure" but the removal from the body of a source of a highly toxic source in their bodies. If physical symptoms of unknown cause are alleviated by the removal, all the better.

Amalgam removal does not remove mercury that is already complexed in the body. Yet, once the last amalgam is removed, the body will begin eliminating the complexed mercury and increased urinary mercury levels are frequently seen. Chelation therapy

may be necessary before relief of symptoms is accomplished. From the experience of Drs. Ziff and Hardy, they have noted that symptoms may be relieved immediately or take many months even with chelation therapy. CNS damage from mercury poisoning is sometimes permanent.

For both the dentist and the patient there are diagnostic procedures available for confirmation of mercury toxicity. Let's explore them!

**Diagnostic Procedures**

It is advisable for the patient to consult with preferably a holistic physician to rule out any other causes or factors in the illness, I recommend reading *Y—U—R Sick — Common Denominators of Degenerative Disease*. Add to the list this mercury problem and Chronic Candidiasis.

**History:** This is the simplest and least expensive procedure. The list of signs and symptoms may be placed in the form of a questionnaire to screen the patient, and/or the history questionnaire as developed by Hal Huggins DDS and available through ToxSupply may be used. Most of the signs and symptoms are non-specific and the clinical judgement of the dentist, physician and the intuitive feelings of the patient are all to be considered.

**The Mercury Patch Hypersensitivity Test:** This test is available from ToxSupply. It contains 0.02 percent or 200 parts per million of mercury, which is a very low dosage. It is important to administer the test properly to confirm the positive response for mercury hypersensitivity. A negative test is not necessarily conclusive.

The test should not be used on:

1. Pregnant women and nursing mothers.
- 2 Patients with the history of the following diseases: Multiple sclerosis, lupus erythematosus, leukemia, Hodgkins Disease, cardiovascular disease, mental illness — especially manic depression, acrodynia, MLNS (Kawasaki Disease).

2. Patients taking vitamin C. Cease Vitamin C at least two days before the test. Test Procedure:

It is outlined on the form *Mercury Test Doctor's Report*. Here are some additional comments.

1. Again be sure the patient has had no vitamin C for at least two days, nothing to eat or drink for fifteen minutes, and has been sitting in a relaxed environment for at least five minutes.

2. Record the patient's temperature, pulse, and blood pressure. Use the blood pressure method that is recommended by Melvin Page, DDS. First, determine the *diastolic* pressure, then inflate the cuff approximately 50 points above the level to determine the *systolic* pressure. To avoid individual variables, the same operator should take all the readings on the patient. (Also check to be certain the patient has not taken or been administered any drugs that may affect the pulse, e.g. bronchodilators for asthma).

3. Check for the presence or absence of a mercury tattoo. You might ask what is that as I did at first. Mercury may leak out in the gums and form a dark bluish tattoo often quite near the tooth with the amalgam. This may already be present or appear after the test is administered. Incidentally, regular tattoos are a source of mercury.

4. Wear rubber gloves to squeeze the solution onto the patch, or have the patient apply the solution to the patch.

5. Apply the patch to the underside of the forearm.

6. Check the patient one hour later. Take the blood pressure, pulse, and temperature again. If no positive reaction has occurred, send the patient home with written instructions to remove the patch, thoroughly wash area, and immediately contact you if any reaction occurs.

When to terminate the test:

1. Immediately upon occurrence of a positive response! Wash area thoroughly with soap and water. Monitor pulse and blood pressure until reaction subsides. Very rarely, assistance may be required if reaction is severe. Be certain that the patient has received written instructions if reaction occurs after leaving the office.

2. 24 hours after the patch is applied, have the patient return to the office for patch removal. Thoroughly wash the area. Record temperature, pulse and blood pressure.

3. Delayed reactions often occur 2.5 days later. Instruct patient to be alert for delayed local reactions or physical or mental signs or symptoms.

**Test Evaluation:**

In my mind there is confusion about the terminology of such words as allergic reaction and, hypersensitivity reaction. In his latest book, *Victory Over Diabetes* William Philpott, M.D. refers to two major types of reactions. One is immunologic or histamine. In my opinion this is the type that is generally accepted by the conventional allergist. The second is nonimmunologic — kinin or prostaglandin. Whatever type of reaction mercury elicits, here are the positive indicators:

1. Local redness, wheal or rising, itching. Indicates to immediately terminate the test!
2. Changes in blood pressure: either ten points up or down in the systolic or diastolic.
3. Pulse rate with a change of 10 beats per minute or more up or down.
4. Temperature change of 0.5 degree F.
5. Signs and symptoms as on the Mercury Test Doctor's Report, e.g. especially head ache, flu-like symptoms, tachycardia (fast) heart, bradycardia (slow) heart, sinusitis, joint or muscle pains, irritability, depression, cold or tingling hands or feet, fatigue, indigestion, frequent urination.

**Electrogalvanic Evaluation:** An ammeter measures current. Readily available and reasonably priced is the *Amalgameter* by ToxSupply. There may be inaccuracies due to discharging of electrical potential through measurement. The oscilloscope is more accurate yet more expensive and not easily obtainable.

In using the *Amalgameter*, record the positive or negative current from each individual restoration. Results may be recorded on the *Numbered Tooth Chart*. Upon completion of this test, total the measurements for each quadrant. Total the negative and positive microamps separately. The quadrant with the highest negative total is the one for removal and replacement first. Then the next highest negative total and continue in that manner. If the highest negative quadrant(s) has been removed, then next remove the highest positive quadrant(s). Removal in other order may well result in the patient becoming (quite) ill with reaction. This happened to a close relative, despite my request to the dentist to follow the quadrants, and also to another patient. Dr. Huggins has found this

safety factor from his research. It's important for the dentist to profit from these teachings rather than the patients to suffer a loss from the dentist's ignorance!

**Oral Temperature:** Many hypersensitive patients exhibit a subnormal temperature ranging from 98.2 F to 96.8 F. After amalgam removal the temperature of these patients may move toward 98.6 F within 24 hours. That's normal! In my patient population about 90 percent have hypothyroidism. I diagnose this by the Basal Temperature Study of Broda Barnes, M.D. Ph.D. along with a symptom/sign questionnaire called the Thyroid Appraisal Indicator, and with Behavioral Kinesiology. One of the prime symptoms of these patients is intolerance to cold and cold extremities when others are feeling warm. Also, their basal temperatures, taken under the arm at rest for ten minutes, run from below 97.8 F to some slightly under 96!. Might it be that the mercury is adversely affecting the thyroid gland and causing this malfunction? Did you know that just about every patient with cancer has hypothyroidism and so many with coronary heart disease and cardiovascular disease also suffer from hypothyroidism? Did you realize that normal thyroid function may be a preventive for these two life threatening conditions?

**Hair Analysis for Toxic Elements:** The larger laboratories doing hair analysis not only test for toxic elements like mercury, cadmium, nickel and lead; but also others that are normally needed for body function. The hair test may show a time or temporal relationship to mercury exposure, but has not been found to correlate to body load or mercury pathology. The hair is nourished by the blood via the blood vessels. It is probably the best structure for determining the presence of toxic heavy metals. The hair may serve as a storage organ for the mercury like a garbage can is to garbage! The hair sample is generally 1 to 1½ inches in length and represents a two to three month's growth. So, if the body has received a load of mercury from the outside or begins to unload it from within, then this increase may be noted in the hair, if the specimen was obtained at the proper time. We know that in lead poisoning, the blood lead level is only elevated for a few weeks after the initial poisoning.

**Urinalysis:** There is extreme individual and time variance. Single samples do not correlate to mercury exposure and pathology. Low urinary mercury levels may indicate renal or kidney damage from mercury. Collection samples of 24 hours or longer are more accurate. Remember the preservative potassium persulfate is needed to insure accuracy.

**Whole Blood Mercury:** It definitely does not correlate to body load or mercury pathology.

**Complete Blood Count (CBC):** White blood cell elevation or depression has been found in cases of known mercury poisoning. Amalgam removal often results in the WBC count leveling off at 5,000 to 5,500.

**Electrocardiogram, Electroencephalogram, Retinal Fundus Photography (Mercurialentis), Blood Profile, and Immune Differential:** Altered results have been found in all these modalities and they are not practical for the average dental practice.

**Summary:** No single test is infallible or complete. Combinations of procedures may be helpful in suggesting who may be experiencing mercury toxicity if the practitioner's judgement is acutely exercised.

**Therapy Protocol**

Some patients will experience adverse reactions triggered by the body load of mercury incurred from removal of amalgams. They may range from transient headaches or flu-like symptoms to a recurrence of pre-existing physical problems.

These reactions are of greater concern to the patient with severe systemic ailments or with physical problems suggestive of mercury toxicity than to patients in apparent good health. Here are some recommendations for the dentist in the way of an outline or protocol.

**General Dental Considerations:**

1. Rubber dam.
  - 2 High speed with water coolant spray.
- Dr. Joseph Pipkin has modified his hand piece to deliver catalyst water. It has a chelating property and thus binds mercury. It strengthens the thymus gland — the headquarters of the immune system and the regulator of the acupuncture energy system,

balances the cerebral hemispheres with resultant stress reduction, and calms the central nervous system.

3. Efficient high volume evacuation.
4. Patient respiration. May use nitrous oxide and oxygen if the patient desires.
5. Operator respiration. Do not use surgical masks for the amalgam particles from the aerosol lodge in the mask and body heat increases the amount of mercury vapor inhaled!
6. Operator and assistant use of gloves for protection from absorption of mercury contacting hands during amalgam removal.
7. If a patient shows signs of an adverse reaction, give 6 g sodium ascorbate in 1/2 to 1 glass of catalyst water immediately.

**Chelation Therapy:** Certain chemicals will grab or chelate mercury from the body. With their own thiol groups they will actually compete with the thiol (SH") groups of the body tissues. Some of these agents are pharmaceutical and require a physician's prescription and supervised administration. Some are non-pharmaceutical. In the former category are B.A.L., Penicillamine, Calcium EDTA, N.A.P., and lithium carbonate. Lithium carbonate is taken orally; the rest, by other routes or parenterally. Drs. Hardy and Ziff report that N.A.P. is the most effective and least toxic of the pharmaceutical parenteral agents. From my knowledge the use of Calcium EDTA in the hands of the properly trained physician is a very safe, beneficial, and probably the most widely used form of intravenous chelation therapy in the United States today. The non-pharmaceutical agents in the Ziff/Hardy paper are Vitamin C, L-Cysteine and selenium. I'll add to this list garlic; Kyolic, the special garlic preparation; sulfhydryl amino acids-cystine and methionine in addition to cysteine; apple pectin; fiber products or bulk formers; Vitamin A, Vitamin E complex or tocopherols; catalyst water; lactobacillus acidophilus; and oral chelating agents such as Chelazyme by Biotics. I have found all these supplements to be of great value for mercury removal. I have developed a detoxification program that I recommend for ninety days. The patient is advised to start one week before the first session of amalgam removal with the dentist. The multiple vitamin-mineral-amino acid supplement *Basic Preventive*™ contains a

variety of important nutrients in optimal amounts and in addition, Vitamin A (10,000 IU as fish liver oil), Beta-Carotene (15,000 IU), Vitamin E (400 IU), Vitamin C (1.200 mg) Selenium (200 mcg). These amounts are from the daily dose of six tablets — 2 three times a day with catalyst water. I recommend Vitamin C to bowel tolerance, which is just before the point of diarrhea. The dose is divided and may average 12 grams a day in three doses of 1 tsp each in catalyst water. Vitamin C increases cellular permeability and allows the mercury to escape from the cell and it provides an attachment or a ride for the mercury to aid in its excretion. When taking over three grams of Vitamin C a day it is best to take it in the form of ascorbate or the salt rather than the acid which may irritate the mouth and teeth. The most readily available and most popular is sodium ascorbate. I use the product by Bronson which is of high quality and of reasonable price. Contrary to usual belief, both medical and lay, the sodium of this ascorbate does not break down to the ionic form that is of great concern to those with high blood pressure. This work was done by Glen Dettman, Ph.D. in Australia! The "Sociable Garlic", Kyolic, has been a favorite of mine for many years. You do not smell from it as the toxic chemical, allicin, has been removed by an 18-24 month processing method. It contains SH' and thus is a chelator of toxic heavy metals such as mercury, lead, cadmium, and nickel. Dose is 3 times a day, and the liquid extract with B1 is best. Do not make the capsules ahead of time or you will have a mess to clean up as they "digest". Also, the SH" containing amino acids serve as chelators. The use of pectin and various bulk formers clinically have a beneficial effect in removing toxic metals from the intestinal tract. Fiber Plex™ by Advanced Medical Nutrition is a broad spectrum dietary fiber supplement and bulking agent in powder and capsules. Recently, some new oral chelating food supplements have come on the market. Chelazyme is one of these.

Now, back to the Ziff/Hardy report! L-Cysteine, a thiol containing amino acid, is recommended. Dosage is one gram a day orally with Vitamin C to prevent kidney

stones. Selenium is recommended at 100 mcg per day. Selenium can be toxic. Many selenium products are derived from yeast. Many patients are allergic to yeast and many are suffering from chronic candidiasis which is aggravated by yeast. I avoid recommending yeast containing products including food supplements. I have found 200 mcg per day of selenium quite safe over a four year period of clinical use. Lithium carbonate can be toxic. The recommended dose is 300 mg per day for 30 days only. Lithium may improve cellular permeability especially to calcium and may open the cell door to let the mercury out. Remember, it's important for the dentist and the dental personnel to be on a chelation program too!

**Sequence of Amalgam Removal:** As discussed previously, some patients may have acute symptoms with removal. There are two major aids in such a situation. Symptoms may be averted by giving the patient 50 grams of Vitamin C as sodium ascorbate in an intravenous drip on the day of amalgam removals. The sequence of removal was previously discussed (See Elec-troalvanic Evaluation).

## COMPOSITES

When the amalgams are removed, they must be replaced. We've mentioned gold as the best. Let's take a look next at composites!

**Advantages of Using Enamel and Dentin Bonding Composites vs. Amalgams:** They contain no mercury. They are electric insulators and do not create electrolytic (dissimilar metals) corrosion problems with metallic restoration in the same mouth. They are more thermally insulating and protect the pulp better from temperature changes. They attain full strength-very quickly and thus reduce early failure from lack of strength and permit finishing and polishing to be done during one placement appointment. Preparations may be more conservative with less tooth structure lost; little mechanical retention necessary by bonding to tooth structure; and tooth strength increases rather than decreases. No corrosion products are created. Composites have very good esthetics. There is extremely limited marginal leakage. I have just learned that posterior bond composite will return a tooth to 85 percent of its precarious state

but this statement is not documented!

**Recommendations:** Drs. Hardy and Ziff now recommend 3M's new self cured restorative called P-10, as the most wear resistant, strongest posterior resin bonded ceramic available. 3M is currently developing a light cured material called P-30 which may be available for marketing in 1984. This product will have as good a tensile and compression strength as does P-10! For the interested dentists and other health professionals 3M has an excellent Slide-Tape Presentation of 35 minutes duration.

### CORROSION

"Corrosion is an actual deterioration of a metal by reaction with its environment. The mouth is one of the harshest environments for a metal. It is wet with continual fluctuations in temperature, pH, oxygen tension, and electrolyte concentrations. Other factors influence corrosion: composition of the metal; physical state of the alloy; surface condition of the alloy-polished or non-polished; chemical components of surrounding medium; phases and concentrations of these chemicals, movement and circulation of medium around alloy; abrasion of alloy; nature of solubility of corrosion products; dissimilar metals within the mouth; frequency associations of alloy or RF dipole antenna characteristics; and intrinsic and extrinsic semiconductor nature of alloy." Sounds complex? Yes it is! But, here's something that will make more sense to you and me than these various factors. The length and thickness of the restoration may serve as a small AM antenna! Some people in Florida allegedly have picked up radio Cuba in their heads via their built in antennas. Yet, they have been reluctant to reveal their built in radio for fear of being diagnosed as mentally ill. Personally, I do not attribute any illness as being psychosomatic! I feel there is a cause for it which may or may not be known by the health practitioner.

Corrosion may be chemical, or electrolytic or electrochemical. Chemical is a direct combination of metallic and non-metallic elements. Many agents corrode the metal found in amalgams and other dental alloys. Here are some examples: oxygen; halides—chlorine, fluorine; acids — citric, hydro-

chloric, phosphoric, lactic; sulfides — hydrogen sulfide, ammonium sulfide. Ring bells?

What about the chlorine in the drinking water? The fluoride in the drinking water, the toothpaste, and in the dental treatments? I feel fluoride is a very toxic substance just like mercury and has no place in the human body! It's time to open the mind and stop poisoning ourselves or allowing ourselves to be poisoned by good intentioned but probably uninformed health professionals. It is your responsibility to protect yourself! It is the responsibility of the health professional to become knowledgeable of toxicity dangers and apply the teachings to his practice. And to do it now! Tomorrow may be too late! Soft drinks are high in phosphates used to buffer the acidity of these beverages and to prevent them from damaging your tissues if and when you drink them. Too much phosphorus is an underlying cause of periodontal disease and osteoporosis. Sulfur is considered to be the most important dietary element responsible for the chemical corrosion of amalgams. Sulfur gives many of our foods odors. When in combination with hydrogen, sulfur forms sulfhydryl groups which chemically bind or chelate toxic heavy metals as mentioned above. Sulfur is found in eggs, fish, meats, cabbage, brussel sprouts, onions, and garlic. So, although sulfur causes corrosion, combined with the hydrogen it can chelate the toxic mercury.

Electrolytic or electrochemical corrosion occurs along with chemical corrosion. It is caused by the flow of electric current and has two forms — dry and wet. The former rarely occurs in the mouth, for metal alloys are usually wet. In this type a metal dissolves and replaces hydrogen in water or acids or it replaces another metal in salt solutions. Although metals will stop corroding when their corrosion products saturate the immediate environment, in the mouth corrosion is continuous for the products are constantly being washed away.

There are four types of electrolytic wet corrosion in the mouth. First, dissimilar metals like two separate restorations. They do not need to be in contact, for current will flow in the saliva, and hard and soft tissues. An example would be a gold and an amalgam restoration. Second, heterogeneous composition. As I understand it, the amalgam has

different metals within it and thus results in currents and corrosion. Impurities enhance corrosion. Third, inhomogenous surface structure. An amalgam which is polished on one surface and unpolished on another has an inhomogenous surface structure. Fourth, concentration cell or pitting. This is the most destructive type of corrosion. It may be caused by food stuck within areas near the restorations, variations in oxygen tension and irregularities such as pits, notches and other deformations.

J.E. Hardy, DMD, gives a detailed technical scientific explanation of electric potentials. I shall do my best to give you a simplified version. Electrical energies or potentials within the mouth may reach 500 millivolts or higher. Rheobase is the least possible voltage at which a nerve will fire or send off an impulse when it is stimulated. It's 400-450 for a large myelinated (insulated) nerve. Dr. Hardy has measured and found a large portion of metal restorations produce 500-600 mV. This may be close enough to the nerve to exceed the rheobase and cause firing of the nerve. To quote Dr. Hardy, "I have seen some symptoms of TMJ (jaw joint) pain and symptoms of myofacial (muscles in the face) pain and dysfunction clear up after I replaced cathodal current metal (conducting) restorations by composites (non-conducting)." Dr. Hardy relates that since there is virtually no change in the magnitude of a restoration's current throughout its lifetime, the current may cause a sustained repetitive discharge until it is removed.

### **BIOLOGICAL PATHWAYS *Methods of Evaluation***

First, amalgams contain elemental and inorganic mercury. The presence of organic mercury is not known nor has it been studied in the amalgams. Toxicity occurs in or on cells when mercury is converted to ions. The amalgam is a source of ions, vapors, and particles from abrasion. *Candida albicans* is known to methylate mercury in the intestinal tract but this has not been established in the mouth yet. This is an organic form of mercury which is much more toxic.

There are several ways to evaluate the

mercury. These include radioactive tagging, autopsies of victims of known mercury exposure, animal studies, and physiologic studies.

### ***Forms of Mercury***

The three forms of mercury are elemental, inorganic and organic compounds.

**Elemental:** This form is extremely volatile and can enter the body by inhalation of vapor or aerosol or by ingestion of particles. Inhaled vapor is highly toxic and rapidly absorbed via the lungs to the tissues of the body and its cells. It becomes toxic upon ionization.

**Inorganic Compounds:** These are mainly mercurous and mercuric salts and those compounds in which the mercury forms a reversible chemical link with sulfhydryl groups. They enter the circulation mainly by ingestion but to a lesser rate by aerosol and vaporization. In physiology there is reference to the blood-brain barrier and placental barrier. There exists some type of a biochemical obstacle to the entry of certain substances into these tissues. The inorganic forms do not easily pass these barriers. It also is believed to be the least toxic form of mercury because of low absorption rates. Because mercury is bivalent or has two positive electrical charges, it can coagulate protein by binding two protein molecules — one to each of its charges.

**Organic Compounds:** When the mercury is linked up with a carbon atom directly with what is called a covalent bond, an organic compound is formed. You may think of this condition as two links. Organic mercurial compounds vary in toxicity. Alkyl mercury compounds like methyl and ethyl, are extremely toxic. More than 90 percent of methyl mercury is absorbed from the human GI tract! These organic forms do cross the blood brain and placental barriers! They may be found widely distributed in tissues and especially the red blood cells or RBCs.

### ***Entry Routes of Dental mercury***

"Dental amalgam is an unstable alloy and continuously gives off mercury in the form of vapor, ions, and abraded particles."

**Dentinal Tubules:** Dental mercury has been radioactively traced into the pulp. It is absorbed as ions. The effects of liners and bases in the tooth are controversial. From

clinical observation they may only delay the migration of the mercury into the tubules rather than prevent it.

**Skin and Mucous Membranes:**

Mercury in all forms is absorbed by the skin and mucous membranes. The skin absorption is of serious concern to the dental personnel. Again, it's advisable for the dentist and his personnel to use rubber gloves during amalgam removal. Also it is important to avoid hand contact with amalgam including its scraps. Mercury is toxic to the cells or cytotoxic even in small amounts. Bleeding gums, alveolar bone loss and loosening of teeth are classic signs of mercury toxicity. I have observed these signs with lead toxicity, too. The lining of the inside of the nose called the mucous membranes have been found by Stock in 1935 to absorb the mercury vapor and pass it rapidly to the brain.

**Inhalation:** Elemental mercury vapor is very rapidly and efficiently absorbed by the lungs and rapidly by the tissues. The rate depends upon the concentration. Aerosols of inorganic mercury are absorbed in a similar manner via the respiratory tract but to a lesser degree. Organic mercurial compounds may be either vapor or aerosol. The efficiency of respiratory absorption of vapor is not known but suggestive of being quite high. Aerosol inhaled is likely to be rapidly dissolved in body fluids and blood. Organic mercury compounds are not considered to be a problem in dentistry at this time. But, Dr. Ziff and Dr. Hardy ask what about the action of *Candida albicans* on the mercury chloride with conversion to methyl mercury in the intestinal tract? And mouth? Yes, studies are needed to find out what is happening in the oral cavity or upper respiratory system. Might chronic candidiasis be making methyl mercury in other parts of the body? Might the indiscriminate use of antibiotics by health professionals — both doctors and dentists — be contributing to this potential problem? Even discriminate use of antibiotics without simultaneous coverage with anti-fungal agents?

**Ingestion:** Elemental mercury is very poorly absorbed. Oxidized mercury or mercury in solutions of chloride have greater solubility. Trakhtenberg demonstrated that mercury vapor passes through water and many

liquids quite readily, but will not pass through solutions with hydrochloric acid. Insoluble inorganic mercurous salts are susceptible to oxidation to soluble absorbable compounds. Mercuric chloride is called "corrosive sublimate" and is known to cause ulceration of the intestinal tract. Organic mercury compounds like methyl mercury is about 90 percent absorbed! Other organisms besides *Candida albicans* have methylated mercuric chloride to methyl mercury in the gastrointestinal tract like *E. coli*, staph strains, and strep strains! Of note, increased blood levels of methyl mercury have been found in dentists over controls. Also increased excretion of methyl mercury after known exposure to elemental mercury has been demonstrated! How do you feel about your amalgams, now, Readers?

***Biotransformation and Transport***

The elemental and inorganic forms are oxidized to more toxic forms; organic mercury is thought to release mercury at or within the cells. 30 percent of elemental mercury entering the body is transferred to the blood within ten minutes. Inorganic mercuric mercury in the plasma binds to proteins and to the hemoglobin in the red blood cells. The serum protein called albumin serves as a taxi for the mercuric mercury and brings it to the proteins of the very cells which have a liking or affinity for the mercury. Organic mercury, elemental mercury and mercury vapor are soluble in fats or lipids and ride the 'lipid taxi service' through the body.

***Tissue Distribution and Retention***

The pattern of tissue accumulation is complicated by the biotransformations of mercury within the body. We speak of the total body load of a toxic heavy metal. Mercury's target organs are kidney, cardiac muscle, lungs, liver, brain, and RBCs. Other stops are the thyroid, pituitary, adrenals, spleen, testes, bone marrow, skeletal muscle, and intestine. Are you starting to think about symptoms from these locations? I am! What about all the patients whom I see with hypothyroidism? About 90 percent of my patient population have hypothyroidism and about 90 percent have amalgams! So many complain of intolerance to cold along with "my temperature is always low, Doctor." Often on treatment their symptoms improve but their basal temperature remains low.

Might the thyroid function be low from the mercury toxicity from the amalgams and the cause remains in the patient's mouth? What about mercury toxicity affecting the testes?

Mercury vapor accumulates rapidly in the lungs, cardiac muscle, brain and RBCs. It passes the blood/brain and placental barriers. Inorganic mercury has its highest level in the kidneys and the liver is next. Organic mercury is widely distributed throughout the body. A significant portion is found in the RBCs and the brain. Again, there is passage through the blood/brain and placental barriers.

What about retention? Elemental mercury vapor accumulates in the brain and is very slowly eliminated. Inorganic mercury accumulates in the brain, thyroid, testes and is eliminated from these organs slowly. Organic mercury has extremely long retention in the brain — up to 18-22 years.

Cutright, Miller, Battistone and Milliken authored *Systemic mercury levels caused by inhaling mist, during high speed amalgam grinding* in the Journal of Oral Medicine, Vol. 28, No. 4 Oct/Dec 1973. Here are their conclusions:

1. The dust is almost immediately absorbed into the blood stream.
2. The heart receives extremely high levels of mercury within minutes after exposure, 81 times higher than control level.
3. The brain and liver reach their highest levels of mercury 16 hours after exposure.
4. The heart, liver, brain and kidney concentrate mercury from the blood.
5. The lung and heart mercury levels decrease rapidly up to 32 hours and then more slowly through the duration of the experiment.
6. The brain and liver mercury levels decrease rapidly from their high at 16 hours through 32 hours and then slowly for the 72 hour duration of the experiment.
7. The kidney mercury level rises slowly throughout the duration of the experiment and contains its highest level at the end of the experiment.
8. None of the tissues analyzed had returned to control levels by the end of 72 hours.

Note: This was a rat study and the authors can not relate it in a comparative way to humans. However, they did point out possible

dangers of exposure to mercury even in minute quantities.

### **Chemistry and Mechanism of Action**

Mercury has a high attraction or affinity for sulfhydryl (SH") or thiol groups, as previously mentioned. Next is its affinity for chloride ions and amino acids. Mercury hooks up chemically with sulfur and may form mercaptides. Even in low concentrations, mercurials are capable of inactivating sulfhydryl containing enzymes and thus interfering with cellular metabolism and function. Mercury may also combine in chemical union with groups called carboxyl, phosphoryl, amide, and amine groups. The binding of mercury ions with such groups causes changes in membrane permeability for nutrients as well as interference with enzyme reactions in the cell. Cellular and organ damage is dependent on not only mercury accumulation but tissue sensitivity. **Potential Biological Thiol Pathways**

These sites are present wherever thiol containing amino acids are readily accessible on cell membranes. Hormones and enzymes may have readily accessible thiol groups. Red blood cells have 60 times more thiol groups as does the blood plasma. Anemia is a frequent complication of mercury toxicity! Glutathione is found on the surfaces of RBCs and contains SH" groups. Insulin also has sulfur linkages. There is an enzyme called glutathione-insulin transhydrogenase that plays a role in the insulin formation. May mercury be interfering with this reaction and be contributing to the 5 percent increase per year of adult onset diabetes? Coenzyme 'A' and succinyl coenzyme 'A' contain SH" groups and play a role in the Krebs Cycle, a metabolic pathway for part of our energy! It has an air or aerobic portion and a without air or anaerobic portion. The former has pyruvic acid as an end product; the latter, lactic acid. All tumors produce large amounts of lactic acid, which is responsible for the run down or 'cachexia' seen in cancer patients. May mercury interfere with these pathways and increase the amounts of lactic acid produced? Myosin contains SH" groups. It combines with actin to form actinomysin for muscular contraction. Pathology of muscular function is frequently seen in mercury toxicity. Cholinergic recep-

tors in cardiac muscle contain SH groups for transmission of nerve impulses to the cardiac muscle from the vagus nerve. Irregular heartbeat is frequently seen in mercury toxicity! Factor XIII is a blood protein associated with coagulation. The active form called XIIIa is a thiol enzyme. It's important for normal blood coagulation, wound healing, and placental retention. Mercuric ions have been demonstrated to interact with Factor XIII A with resulting inhibition of its activity. Thioredoxin is necessary for the biosynthesis of DNA precursors. DNA is vital to cellular reproduction and heredity. Mercury inactivates this thiol enzyme. This inhibition is not reversed by increasing the enzyme concentration, no matter how high the enzyme concentration is elevated. What about those babies of parents of victims of the Minamata Bay Incident?

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**OPEN LETTER TO BURTON PRESS, DDS, PRESIDENT ADA**

Dear Dr. Press:

As a holistic health physican, I am extremely interested in the article "Safety of Dental Amalgam" appearing in JADA, Volume 106, April 1983.

I think that it is very important for the health-minded practitioner, be he physician or dentist, to have an open mind and not to take for granted policies or opinions of groups. It is important for each individual to make intelligent choices in his life.

I have to disagree with the concluding paragraph, "The Association wishes to emphasize that except an individual sensitive to mercury, there is no reason why a patient should seek at this time to have amalgam restorations (silver fillings) removed."

I call to your attention the work of Hal Huggins, DDS, of Colorado Springs! I call your attention to the dynamic article in the Journal of Orthomolecular Psychiatry, Volume 11, Number 1, "Mercury: A Factor in Mental Disease?" Dr. Huggins has found that four systems have been primarily involved with mercury toxicity! These are the central nervous system, cardiovascular system, immune system — with allergic manifestations, and the connective tissue structures of the body with arthritic-like conditions!

I recommend to any of my patients that are symptomatic and have amalgam fillings in their mouth that they receive the mercury patch test! I have had all of my amalgams removed and am finally free of headaches which have plagued me since childhood! My wife has just completed having hers removed! She is a highly allergenic lady and is much improved how that they are out!

I question why the American Dental Association is so emphatic about precautions that their personnel should take in order to protect themselves from the hazards of the mercury in the amalgams in the office and yet the organization endorses the placing of this toxic heavy metal in the mouths of patients. With approximately 85 percent of the people in our country having silver amalgam fillings in their mouth, I feel that dentistry of this nature may be very detrimental to their health and it is time for your members to open their minds and make positive changes for the health and the growth and the sustenance of mankind.

In conclusion, I am enclosing a copy of an article which I have written about mercury hypersensitivity. I would greatly appreciate your making the content of this letter and my article available to your readers and ADA members.

**Roy Kupsinel, M.D.**