Opinion of a Dentist.

"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.

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.

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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.

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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.

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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 sttates (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 hharm to the human body.

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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.

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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.

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.

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 mercurials 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* mercurials 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 mercurials 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 methylmercury 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, methylmercury 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, methylmercury is credited with initiating degeneration and atrophy of the sensory cerebral cortex, paresthesia, (numbness and tingling), autism, behavioral and emotional aberations, 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, distoring 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 acumulate 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 ejaculaton 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.

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"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.

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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 biotrransformation 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. Conventionall 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.

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, leaading 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 micromolar 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 wwith 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. 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.

My Father and Grandfather were dentists. 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 opinions of David Kennedy, DDS